GLOBAL JOURNAL

OF COMPUTER SCIENCE AND TECHNOLOGY: A

Hardware & Computation

Analysis of Air Pollution

Internet of Things Pada Sistem

} Highlights {

Image Processing Machine

Rumah Menggunakan Telegram

Discovering Thoughts, Inventing Future

Global Journals Inc.

Publisher's Headquarters office

Global Journals® Headquarters
945th Concord Streets,
Framingham Massachusetts Pin: 01701,
United States of America
USA Toll Free: +001-888-839-7392
USA Toll Free Fax: +001-888-839-7392

Offset Typesetting

Global Journals Incorporated
2nd, Lansdowne, Lansdowne Rd., Croydon-Surrey,
Pin: CR9 2ER, United Kingdom

Packaging & Continental Dispatching

Global Journals Pvt Ltd
E-3130 Sudama Nagar, Near Gopur Square,
Indore, M.P., Pin:452009, India

Find a correspondence nodal officer near you

To find nodal officer of your country, please email us at *local@globaljournals.org*

eContacts

Press Inquiries: *press@globaljournals.org*
Investor Inquiries: *investors@globaljournals.org*
Technical Support: *technology@globaljournals.org*
Media & Releases: *media@globaljournals.org*

Pricing (Excluding Air Parcel Charges):

Yearly Subscription (Personal & Institutional)
250 USD (B/W) & 350 USD (Color)

CONTENTS OF THE ISSUE

Virtual Processor based on Hybrid Processor

By Akram Almansoub, Qi Deyu, Fares Aqlan & Abdullah Alqwbani

South China University of Technology

Abstract- This proposal presents a robust method through which virtualization can be optimized by the use of a hybrid processor. The discourse acknowledges that virtualization has become a key constituent of machine processing and efficiency through building virtual machine clusters that can be universally integrated to harness the utilization of hardware computing resources. As observed in low-level computing paradigms, the traditional x86 architecture was only capable of classical trapping to deploy virtualization, yielding para-virtualization. In response, virtual processors based on hybrid processors with hardware-assisted paging enables the handling of foreign Memory Management Unit (MMU) operations and translates the corresponding physical address to actual machine-controlled dynamic addresses, improving memory bound executions as well as the overall output of the HVM. This architecture derives a more powerful utility from the compromised architecture whereby the kernel space while the user space resides in the same privilege ring. Even though myriad hybrid architectures exist, the ultimate objective of this proposal is to satisfy one intrinsic feature: incorporate superiority behavior of the hardware-assisted virtualization.

Keywords: virtual processor, hybrid processor, algorithm, virtualization, CPU machine.

GJCST-A Classification: C.1.3

VIRTUALPROCESSORBASEDONHYBRIDPROCESSOR

Strictly as per the compliance and regulations of:

Virtual Processor based on Hybrid Processor

Akram Almansoub [α], Qi Deyu [σ], Fares Aqlan [ρ] & Abdullah Alqwbani [ω]

Abstract- This proposal presents a robust method through which virtualization can be optimized by the use of a hybrid processor. The discourse acknowledges that virtualization has become a key constituent of machine processing and efficiency through building virtual machine clusters that can be universally integrated to harness the utilization of hardware computing resources. As observed in low-level computing paradigms, the traditional x86 architecture was only capable of classical trapping to deploy virtualization, yielding para-virtualization. In response, virtual processors based on hybrid processors with hardware-assisted paging enables the handling of foreign Memory Management Unit (MMU) operations and translates the corresponding physical address to actual machine-controlled dynamic addresses, improving memory bound executions as well as the overall output of the HVM. This architecture derives a more powerful utility from the compromised architecture whereby the kernel space while the user space resides in the same privilege ring. Even though myriad hybrid architectures exist, the ultimate objective of this proposal is to satisfy one intrinsic feature: incorporate superiority behavior of the hardware-assisted virtualization.

Keywords: virtual processor, hybrid processor, algorithm, virtualization, CPU machine.

I. Introduction

Virtualization technology has recovered a substantial devotion for some time in computer system designing. Virtual Machines found a path of arrangement for encompassing latest server consolidations, secure computing and also transparent migration, and list the current to a system that maintains capability of the latest operating systems. In this analysis, the method of virtual processor based on hybrid process is seen in the presentation of computer systems that change level of parallel in multiple threads per node. The major goal of this research to analysis a virtual processor based on hybrid process. The research will further focus on the software and hardware processing on virtual processor based on hybrid process for a computer and multispectral methods. To arrive at the final goal of the research, the paper will be divided into three parts. The first part will be an analysis of a virtual processor, the second part will be a presentation on hybrid processor and the third will be an analysis of virtual processsor based on hybrid process. If a virtual processor has a hybrid system of plurality storage device attached, a thread can be utilized in hybrid system/CPU. Therefore, a task could heavily occupy the available hardware in the virtual system.

II. Related Work

According to Hoff beck, et. al "on a similar accession, the increasing thickness of power and wickedness o the latest servers has also projected numerous methods to Operating system directed control on energy consumption of the computer" (78). Though the energy management approaches are developed for legacy operating systems with a monolithic kernel. In most cases, monolithic kernels possess control of all the hardware devices and their mode of operation. It controls both energy ingesting and device activity to meet limitations of energy. Monolithic kernels controls the low in the system by tracing the power ingesting at individual level and also limit its specific sill in the process of device allocation to attain inclusive energy management (79)[1].

Virtualization is an abstraction layer (SW) that furs physical features of computing platform from the users, in its place showing another intangible, rivaled computing platform. Machine virtualization is about the creation and management of VMs on a "real" machine. For example Java Virtual Machine to accept java byte code in the form .class files. Virtual PC allows Windows app to be run on Mac/PowerPC, Sun PC SW emulates a PC how environment on Solaris/SPARC(Zhang, W Liang, and H Qiao, 195)[2].

A virtual CPU is allocated to a virtual machine. Virtual machines are automatically allocated a virtual central processing unit each. The CPU scheduler allocates execution settings in case the physical hosts possess numerous CPU cores. The vCPU becomes a sequence of time slots on logical processors (Katz, 6). It is significant for the administrator to comprehend the cloud of the usage of vCPU in an invoice since the dispensation time is billable. Adding more vCPU insignificantly advance the performance since the number when the number vCPUs raises, it gets hard for the scheduler to arrange many on the same CPUs (Chritoph et. al, 65)[3].

In most cases, vCPUs are a source of the symmetric multi-processing (SMP) multi-threaded model of the computer. SMp allows threads to pass across numerous logical cores to advance performance of similar tasks. vCPUs also on the same note allows multitasking to take place consecutively in physical environment

Author α σ: School of Information Science and technology South China University of Technology (SCUT), Guangzhou, China.
e-mails: a_almansoub555@yahoo.com, qideyu@gmail.com
Author ρ ω : School of Computer Science and Engineering. Central South University (CSU), Changsha, China.
e-mails: aqlanfares@csu.edu.cn, alqwbani@csu.edu.cn

A Distributed Application provides processing functionality that practice varied workload behavior. The user group retrieving the application is, thus, probable in size, but accesses the functions given by the application inversely. Whereas most of the purposes are used correspondingly over time and, thus, undergo Static Workload, some Processing Components experience Periodic Workload, Changeable Workload, or Unceasingly Changing Workload (Lesnik, et.al, 1524).The Processing Mechanisms experiencing changing workloads are provisioned in an elastic cloud. Loose Connection is ensured by switching information between the hosting settings asynchronously via messages.
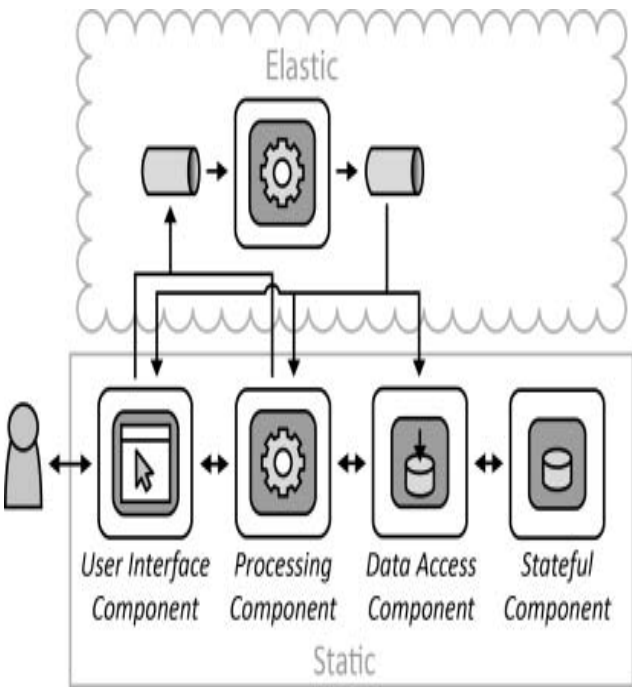
Fig. 1: The Processing Mechanism in an Elastic Cloud.

A VM performs SW in the similar way as the machine for which the SW was established.VM is applied as a mixture of actual machine and virtualizing software. The VM can have diverse resources diverse from the real machine either in quantity or type (cpu, mem, I/O, etc). A VM frequently offers a less perf than thesameactual machine operating the same SW.

Use of actual system calls to perform the functions given by VM instructions. Mapping of virtual state to actual resources. VM has two types which include: System VM operating as OS and process VM operating as a user process. VM monitor provide a total environment backup of various user processes, offering them entree to I/O devices, and acknowledge GUI of the desktop (Babic, Matej, 37) [4].
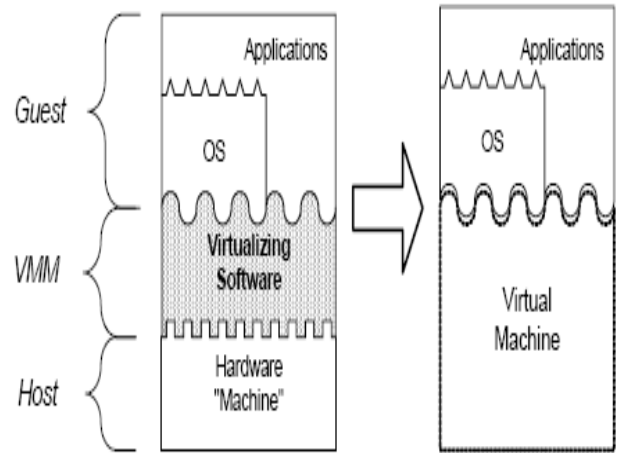
Fig. 2: Mixture of Machine and Vitalizing Software for VM Application.

In any case, when running an operating system is installed on the server, the system always analyses the overall number of operations it can manage simultaneously by encompassing the total number of processors which are on the serve. In a case when operating systems are installed on the like which has eight or ten processors, every processor will have to manage two systems simultaneously. The system wills in total manage sixteen and twenty operations at a go consecutively. In the same way when an operating system is installed on a logical panel that accepts devoted processors, the operation system will then examine the total number/weight of the processes which it can concomitantly manage through examining the total number of devoted processors that are given to partition. In both scenarios, the system in operation can end lessly examine the total operations it can handle by including the whole number of processors that can be accessible (Babic, Matej, 40) [4].

According to Blanchet and Dupouy, "When an operation system is inserted on a sound partition that allows joint processes, the system will have to examine the slight number from the total number of processing units and are availed to a portion" (179)[5]. The server represents the processing power obtainable to the operating system on the while number of processors. The scenario permits the computation of the total number of multiple existing operations that it can handle. Virtual processor is referred as a symbol of physical processor of a working system of logical par that permits joint processors. Processing units are coincidently allocated by the server firmware among the virtual processors allocated to reasonable part. In a given scenario when a logical partition entails one point eight processing and two processors, it will be discovered that each virtual processor will have zero point nine (0.9) processing units helping its workload (200)

Virtual processor has limitation of processing units. I a normal case, each virtual processor should only have 0.1. When firmware is FW760 or more, the minimum number of processing units will also decrease to 0.05. The extreme number of processing units each processor should have is 1.00. This amounts to a logical partition that can employ more processing units as compared to virtual processors which is available (Morris and Detlefsen, 67).

If the total number of virtual processor nearly to number of processing units available to the logical part, a logical partition always works very excellent. The enables the system of operation to accomplish a workload on logical partition efficiently. In certain scenarios, you can also be in place to increase system presentation somewhat b increasing the total number of virtual processors. If you upsurge the number of operations that operate concomitantly. On the same note, though you can upsurge the number of virtual processors minus altering the number of processing units, the restrictions of every operation operates will reduce. It is impossible for the running system to move processing power between processing powers dividing among processes the poses if the power of dividing among numerous virtual processors.

III. Hybrid Virtual Processor

System virtualization is a technology which can divide a single host (e.g., computer, server, etc.), into multiple parts, or partitions, each running a separate instance, or image, of a working system. Instances of functioning systems or partitions are separate, or isolated, from each other in some ways. For example, the partitions have separate file systems, separate users, separate applications, and separate processes Bi and Liang, 197)[6]. However, the partitions may also share some resources of the host. For example, the partitions can share the memory, the kernel, the processors, the hard drives, and/or other software, firmware, and/or hardware of the hos. Thus, each partition or instance of the operating system can look and feel like a separate server or machine from the perspective of its users. These instances are commonly referred to as "virtual" or "virtualized" machine and each partition may be referred to as a logical partition (LPAR) (198).

One server or data processing system can generally host a number of LPARs. These LPARs generally have virtual resources assigned to them (e.g., virtual processors) which provide an abstraction of the physical resource from which it is based (e.g., the physical processor). For example, a virtual resource may be considered a logical entity that is backed up by the physical entity. In a dedicated mode of LPAR operation, physical resources are assigned as a whole to an LPAR such that the assigned physical resources are not shared by other LPARs (Hoff beck, et.al, 78). In a shared mode of LPAR operation, the physical resources are part of a pool of resources which are shared among the LPARs. Additionally, LPARs can be configured to have a certain entitlement capacity representing a guaranteed physical resource capacity for the LPAR. LPARs may also be configured as capped or uncapped. In a capped mode, the resource capacity for the LPAR is capped at some value (e.g., its entitlement capacity). In an opened style, LPAR would surpass its entitlement capability after other shared resources are in place.

Cai, and Yan note that "Field programmable gate arrays (FPGAs) have been considered for either augmenting or replacing microprocessors in order to expand the limitations posed by the arithmetic logic units" (1005)[9]. Wholesale replacement of microprocessors with FPGAs generally requires the entire recoding of operating systems. On the other hand, redesigning microprocessors to include FPGA-like architecture presents its own set of design errors.

According to Wang and Chen "Bywords of the current evelation give a technique, structure and processor program merchandise for hybrid virtual machine configuration management" (1097)[7]. For example, in some embodiments, the method and technique includes: assigning to a major set of virtual properties linked with enabled possessions of a virtual apparatus a first priority; giving to a second set of virtual resources associated with the virtual appliance a second useless than the first use, where the first and seconds types when joined surpass the permitted resources for the virtual machine; charting the first types of virtual resources to a first known resource of a pool of shared physical resources assignable to the first and second sets of virtual properties, whereas the initial physical resource includes a anticipate dempathyequal to a second physical resource assigned to the virtual machine; and differently assigning the first physical resource to the first set of virtual resources (Blanchet and Dupouy, 178)[5].

In accordance with the present invention, a hybrid, modular processor package and method for developing a hybrid, modular data processing package from microprocessor and field programmable gate array (FPGA) technology combines a microprocessor, an FPGA, and a modular controller chip in order to obtain enhanced performance over that of the microprocessor (Zhang, W Liang, and H Qiao, 193)[2]. The combination of the microprocessor, FPGA, and controller chips is effected by identifying and selectively routing the non-control pins of the respective chips in parallel to the hybrid package pins and routing respective control pins of the microprocessor and FPGA through the controller pins. The controller chip emulates the behavior of the selected microprocessor bus interface and provides a set of services to the FPGA, such as configuration and memory management. By creating a standard interface

to the FPGA and different microprocessor bus interfaces, a configuration code compatible family of computing devices can be created.

According to Salem, et al "Personifications of the current disclosure allow improved empathy levels keep maintained to physical resources in a shared resource pool environment" (5)[8]. Embodiments of the present disclosure utilize a prioritization scheme to assign a higher priority to entitlement virtual resources than to virtual resources utilizing uncapped excess resources of the pool (Cai, and Yan, 1003)[9].

Physical resources having a desired or greatest affinity level to a physical resource of interest are mapped to the high priority virtual resources. In response to the dispatch of a high priority virtual resource, a physical resource allocation preference is given to the high priority virtual resource over a virtual resource that may be utilizing the mapped physical resource in an uncapped, shared mode.

Venkata, et al note that "Features of the current disclosure can be personified as a system after being acknowledged by a given skill. Consequently, features of the current disclosure can take the form of a complete hardware personification, an embodiment joining features of hardware and software, a total software embodiment like circuit, module or system" (4748)[10]. On the same note, the new disclosure can take the form of processor program product personified in additional clear mediums of computers taking computer clear program code personified

The mixture of more processor usable or computer readable mediums is utilized. Computer readable medium is a computer legible signal medium stowing medium. In any case the processor readable storage medium is electronic, inferred, optical, magnetic, apparatus, devices semiconductors system. Other examples include: an electric having more wires, portable computer diskette, flash memory, hard disk, optical fiber, optical storage device, magnetic storage compact disc read only memory mention but a few. A computer has a readable storage medium which is a tangible medium that stores program for use by an instruction execution device (Hewlett and Wright, 983)[11].

Computer readable signal medium entails a spread data with system readable program code personalized within. This include: part of a carrier wave. Propagated signals of this kind are of different types including optical, electro-magnetic and many others. A virtual processor decipherable indication medium is in any computer clear medium that is not a virtual processor readable storage medium band that connect and conveyance a program for use by linking with a training device and execution system. A program core put on a processor legible medium is comminuted using a suitable medium like RF, wireless, optical fibre cable

and a combination of all the above (Zhang, Liang and Qiao, 190)[2].

A computer program has a code for performing out virtual processes for structures of the current disclosure is shown in various of programming languages with a target of programming languages like conventional technical programming languages (comparable software design languages and Cprogramming language), Smalltalk and Java. The program code performs completely on the computer of the user, partly on the computer of the used as software set, partially on a remote processor and on a remote processor completely. According to Blanchet and Depouy " In a given situation, the remote computer can be linked to the user of the computer over a given network, a local area network or far reaching network and by linking can be made to an outside virtual processor for example over the internet employing internet service distributor [5].

Lesnik et al assert that " features of the current disclosure are labeled with reference to flowchart and diagram of devise, gear, computer program products and system as paper the personifications of the disclosure" (1523). It is understood that the flow of the flowchart picture, the flowchart diagram, illustration and ampule be applied by computer program instructions. These instruction of the processor are given to a computer for a distinct purpose and any other programmable data processing device to give out a machine, such that the commands that execute via a computer devices and programmable data processing device which create ways of applying the functions mentioned in the flowchart (1525).

According to Babic, Matej "In a method for providing concurrent access to virtual memory data structures, a lock bit for locking a virtual page data structure is provided in a page table entry of a page table" (38). The page table is configured to map virtual pages to physical pages. Then, a first thread specifying an operation on the virtual page data structure is received. The first thread is provided exclusive access to the virtual page data structure by setting the lock bit in the page table entry such that other threads are prevented from accessing the virtual page data structure. A wait bit also may be provided in the page table entry to indicate that one or more of the other threads are in a wait queue when the first thread contains limited access to the data program. When the first thread no longer needs exclusive access to the data structure, a second thread is selected from among the other threads and is provided with limited access to the data configuration (39).

The computer program directives put onto programmable data dispensation apparatus to source a sequences of the ladder of operation to be done on the computer so as to yield a programmable device

processes for applying the acts started in the flowchart (Dhas, and Kumanan, 9)[12].

A virtual processor has a reconfigurable, programmable logic matrix array for processing data in accord with a hardware encoded algorithm, a memory for storing a number of hardware configuration records for the programmable logic matrix array, each configuration file for programming an algorithm to be performed by the matrix array, an input/output bus for providing data to the matrix array for dispensation and for procurement treated data from the matrix array, a memory expedient for storing data, a VPM regulator for monitoring the overall procedure of the virtual processor plus giving operation arrangement maps, providing parameters for precise operations, and offering status information, a data bus manager for controlling the flow of the data to the matrix array for processing, and also configuration supervising the order of reconfiguration of the matrix array to route data by a specific order of algorithms (Rodic, Peteret et al, 30)[13].

The figure below illustrates a computer system including a hybrid data processor.
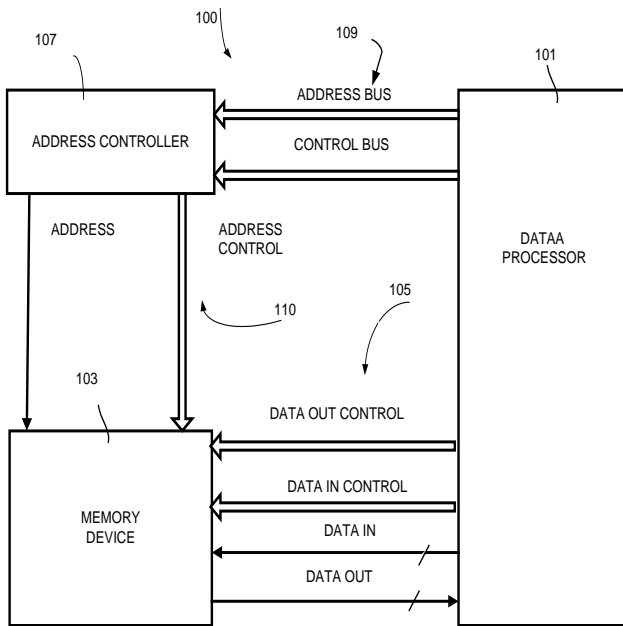
Table 1: Format hybrid data processor

There block diagram of data processing system 100 which includes hybrid, modular data processor 101. Hybrid data processor 101 connects conventionally to a conventional memory unit 103 through data/control Input/output (I/O) buses 105. Address controller 107 receives address and control instruction information from processor 101 over buses 109, and conventionally controls the addressing of data within memory device 103 by hybrid data processor 101 utilizing buses 110.

A computer has two forms of storages which include: the Primary storage and secondary storage. The virtual processor closely relates with the major memory, involving the instructions and data. In examining the preparation of the CPU in the virtual machine monitors hypothetically. A virtual processor memory temporally holds data when a virtual processor processes a program. Secondary program clasps permanent and semi-permanent data on the outward magnetic medium. There are two kinds of virtual machines in the system which includes: the high-throughput and the concurrent. The virtual machine is put as synchronized type when all of the workload is synchronized submissions so as to minimize the cost of synchronization.

The main storage which is also referred to as memory which also has different terms like main memory, main storage, internal storage, and primary memory. The terms are used interchangeably by computer specialists on those well versed with computer programs. Memory is portion of the virtual processor that grips data and guidelines for dispensation. Keeping items in retention when the database is not operating feasible. Though the memory is associated with the central processing unit closely; it is distinct from other items. Memory keeps program and the command in the whole process of operation.

To manage the issue, hybrid scheduling framework is given for CPU management in the VMM to adjust to the variety of VMs running concurrently on the machine. However, implementation of a hybrid scheduler was founded on Xen and the outcome show that hybrid CPU management technique is also predictable to alleviate the negative impact of the virtualization on synchronization and advance the performance of synchronized application in the virtualized scheme in upholding the presentation of high all through the application (Stampar, Simon, et al, 113)[14].

According to Zitter, Ilya, and Aimee Hoeve "With virtualization skill, the functionality of several standalone processor systems can be combined into a sole hardware processor, to promote effective usage of the hardware whereas reducing power depletion" (78)[15]. As a consequence, virtualization is a significant brick for structuring the cloud substructure for example the computer elastic of Amazon. Currently, a virtual machine monitor (VMM) is sedentary between the working system level and the hardware level in the virtualized system, instances of system virtualization comprise Xen, Hyper-V, VMware, Virtual Box and KVM. Diverse from the outdated system software stack.

IV. Experiments and Analysis

a) Virtual processor and hybrid processor

The technology of virtualization creates it possible that different guest functional system operate on virtual machine. The virtual processor based on hybrid system stages vigorously as a way of preparation style. The process of scheduling in Xen prepares virtual hybrid system operating machines synchronously as

maintaining part of the system consuming time to the weight of operation, exhausting the system volume. Though this type of arrangement makes it worse in the performance if at all the virtual machine which is aligned to hybrid system of operation can be used to finalize the applications of equal programs (McDowall, Wil, 63)[16].

Preparation of a synchronous virtual processor based on hybrid process preparation strategy leads to enough physical virtual time when the system workload is synchronized. The diskettes and CD-ROM disk are secondary storages in giving a hybrid development framework for the virtual processor setting up a machine up in a virtual monitor. The storage device is put as a high throughput from as the default then the virtual traits of lesser storage system control the as data is prearranged. In implementing the hybrid development framework built on Xen, the recital of the presented arrangement framework and plan based on the multi-core stage and the test portrays the scheduling framework and strategy to advance the performance of the virtual machine system (Leupers, Eeckhout, et al, 718)[17].

(Blanchet and Dupouy note that "Virtual machines (VMs) with a diversity of assignments may run concurrently on a virtual machine in the cloud platform" (1216). The arrangement algorithm used in Xen schedules virtual hybrid based processor of a VM asynchronously and assurances the quantity of the processor time allocated to the VM. As a significant keystone for clouds, virtualization plays a vigorous role in building this developing of both hybrid and virtual processor (1217)[5].

Blanchet, Gerard et al note that "when workloads in VMs are concurrent applications like multithreaded programs with the synchronization process, it has been established that this type in the VMM can decrease the presentation, due to the undesirable effect of virtualization on synchronization" (178). This proportional sharing (PS) method is helpful as it shortens the application of CPU arrangement in the virtual machine monitor (VMM), and can convey near-native performance for certain workloads. Prior to the executing of instruction, processor instructions and data has to be put in the memory from an input system and a lesser storage system (the procedure is in addition complex by the element that, as noted earlier, the data will automatically make a provisional stop in a record) (180)[5].

According to Acosta, Eric, and Alan Liu "A virtual hybrid based processor system using a special instruction inserted into a thread (virtual processor) at a selected point to trigger an immediate thread change (i.e., transfer of virtual processor control to hybrid process)" (1099) [18]. When the virtual processor processes a hybrid instruction, the task thread surrenders control of the virtual processor, and an otherwise idle thread is selected by a thread scheduling mechanism of the MVP system for loading into the physical processor.
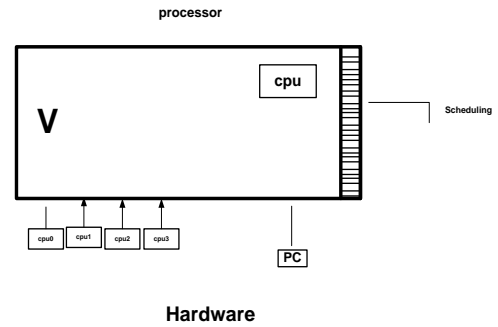
Table 2: The general shape of the virtual processor based on the hybrid processor

V. Conclusion

Virtualization technology has improved a large devotion for some time in computer system designing. Virtual Machines found a passageway of collection for about latest server consolidations, secure computing and also transparent migration, and list the current to a system that maintains the capability of the latest operating systems. In this analysis, the method of virtual processor based on the hybrid process is seen in the presentation of computer systems that change the level of parallel in multiple threads per node. The major goal of this research to analysis a virtual processor based on hybrid process. The research further focused on the software and hardware processing on virtual processor based on the hybrid process for a computer and multispectral methods. We arrived at the final goal of the research, the paper divided into three parts. The first part I an analysis of a virtual processor, the second part I displayed on the hybrid processor and the third part I analyzed of virtual processor based on hybrid process. If a virtual processor has a hybrid system of plurality storage device attached, a thread can be utilized in hybrid system/CPU. Therefore, a task could heavily occupy the available hardware in the virtual system.

System virtualization is a technology which can divide a single host (e.g., computer, server, etc.), into multiple parts, or partitions, each running a separate instance, or image, of a working system. Instances of functioning systems or partitions are separate, or isolated, from each other in some ways.

A computer has two forms of storage which include: the Primary storage and secondary storage. The virtual processor closely relates with the major memory, involving the instructions and data. In examining the preparation of the CPU in the virtual machine monitors hypothetically.

Preparation of a synchronous virtual processor based on hybrid process preparation strategy leads to

enough physical virtual time when the system workload is synchronized. The diskettes and CD-ROM disk are secondary storages in giving a hybrid development framework for the virtual processor setting up a machine up in a virtual monitor.

References Références Referencias

1. Hoffbeck, et. al. "Interfacing Matlab with a Parallel Virtual Processor for Matrix Algorithms." The Journal of Systems & Software. 56.1 (2001): 77-80. Print.

2. Zhang, Liang, and Qiao. "Processor Coalition Algorithm for Virtual Routers on a Multiprocessor System."*Advances in Information Sciences and Service Sciences*. 4. 5 (2012): 191-198. Print.

3. *Christoph et al.Cloud Computing Patterns. Springer. (2014): 25-99. Print*

4. Babic, Matej."New Hybrid System Using in Modeling Process of Hardening with Intelligent System."*Acta Mechanica Slovaca*. 20. 1 (2016): 34-40. Print.

5. Blanchet and Dupouy."Virtual Memory." (2013): 175-204. Print.

6. Blanchet, Gérard et al, "Virtual Memory." (2013): 175-204. Print.

7. Bi and Liang."Processor Coalition Algorithm for Virtual Routers on a Multiprocessor System." *Advances in Information Sciences and Service Sciences*. 4. 5 (2012): 191-198. Print.

8. Wang and Chen."A System-Level Network Virtual Platform for IPsec Processor Development." *Ieice Transactions on Information and Systems*. 96. 5 (2013): 1095-1104.

9. Salem, et al. "The Development of Body-Powered Prosthetic Hand Controlled by Emg Signals Using Dsp Processor with Virtual Prosthesis Implementation." *Conference Papers in Engineering*. 2013. 4 (2013): 1-8. Print.

10. Cai and Yan. "Labview- based Parallel Optimization of Networked Virtual Test System in Multi - Core Processor Environment." *Advanced Materials Research*. (2012): 1004-1008. Print.

11. Venkata, et al. "Design and Implementation of Scheduler for Virtual File Systems in Shared Memory Multi-Core Processor Using Arm-Fl2440." *International Journal of Control Theory and Applications*. 9. 10 (2016): 4747-4754. Print.

12. Hewlett and Wright."Dynamic Monitoring Efficiency of Computer Processor Virtual Memory Management Data Structures." *Research Disclosure*. (2012): 983. Print. Hewlett-Packard, Company, and R Wright."Dynamic Monitoring Efficiency of Computer Processor Virtual Memory Management Data Structures."*Research Disclosure*. (2012): 983. Print.

13. Dhas and Kumanan."Weld Quality Prediction of Submerged Arc Welding Process Using a Function Replacing Hybrid System."*Advances in Production Engineering & Management*. 5. 1 (2010): 5-12. Print.

14. Rodic, Peteret et al. "Study of a Sol-Gel Process in the Preparation of Hybrid Coatings for Corrosion Protection Using Ftir and [sup] 1h Nmr Methods." *Journal of Non-Crystalline Solids*. (2014): 25-35. Print

15. Stampar, Simon, et al. "Nonlinear Control of a Hybrid Batch Reactor." *Strojniski Vestnik*. 59. 2 (2013): 112-123. Print.

16. Zitter, Ilya, and Aimee Hoeve. "Hybrid Learning Environments: Merging Learning and Work Processes to Facilitate Knowledge Integration and Transitions." (2012). Print.

17. McDowall, Will. "Exploring Possible Transition Pathways for Hydrogen Energy: A Hybrid Approach Using Socio-Technical Scenarios and Energy System Modelling. "*Futures*. 63 (2014). Print.

18. Leupers, Eeckhout, et al, N Topham, and Chen. "Virtual Manycore Platforms: Moving Towards 100 + Processor Cores." *Proceedings Design, Automation and Test in Europe, Date*. (2011): 715-720. Print.

19. Acosta, Eric, and Alan Liu."A Pipeline Virtual Environment Architecture for Multicore Processor Systems."*The Visual Computer*. 28. 11 (2012): 1099-1114. Print.

This page is intentionally left blank

Security Solution for the IOT Devices

By Dr. Gorti VNKV Subbarao

Keshav Memorial Institute of Technology

Abstract- As the internet is available widely with low cost to connect with the devices day by day. Almost all electronic devices are coming to the market with wi-fi capabilities and sensors built into them, even technology costs also coming down. All of these devices are forming Network by accessing the internet through their wi-fi capabilities. These are creating a perfect IOT storm like smart phones are becoming rocks and penetrating everywhere so the sky is the limit for them. As these all are in the hands of everybody, there is obviously security threats. In this paper, all the possible threats are addressing with possible solutions occurring in these IoT devices. Suggested the Homomorphic Encryption scheme for security in IoT devices.

Keywords: *internet of things, homomorphic encryption scheme, encryption, enhanced homomorphic encryption.*

GJCST-A Classification: *K.6.5*

SECURITYSOLUTIONFORTHEIOTDEVICES

Strictly as per the compliance and regulations of:

Security Solution for the IOT Devices

Dr. Gorti VNKV Subbarao

Abstract- As the internet is available widely with low cost to connect with the devices day by day. Almost all electronic devices are coming to the market with wi-fi capabilities and sensors built into them, even technology costs also coming down. All of these devices are forming Network by accessing the internet through their wi-fi capabilities. These are creating a perfect IOT storm like smart phones are becoming rocks and penetrating everywhere so the sky is the limit for them. As these all are in the hands of everybody, there is obviously security threats. In this paper, all the possible threats are addressing with possible solutions occurring in these IoT devices. Suggested the Homomorphic Encryption scheme for security in IoT devices.

Keywords: internet of things, homomorphic encryption scheme, encryption, enhanced homomorphic encryption.

I. Introduction

As the internet is available widely with low cost to connect with the devices day by day. Almost all electronic devices are coming to the market with wi-fi capabilities and sensors built into them, even technology costs also coming down. All of these devices are forming Network by accessing internet through their wi-fi capabilities. These are creating a perfect IoT storm like smart phones are becoming rocks and penetrating everywhere so the sky is the limit for them. As these all are in the hands of everybody, there is obviously security threats [4]. In this paper, all the possible threats are addressing with possible solutions occurring in these IoT devices.

The Internet of Things (IoT) is the collection of many things to many people. Everything from new applications generated, such as smart cities/townships or autonomous vehicles/devices to massive sensor networks for monitoring environmental elements or industrial systems or procedures

Another way we can define IoT as a system of interrelated computing systems or devices includes electrical, mechanical, digital machines and the objects includes animals or human being that are provided with unique identifiers and they will have the capability of transferring data between the devices or objects over the network without demanding interaction between them[1].

In the IoT the things may be a person, animal or device like a human brain means a farm animal with a

Author: Associate Professor, CSE, Keshav Memorial Institute of Technology, Narayanaguda, Hyderabad, Telangana, India.
e-mail: gvnkvsubbarao@yahoo.com

biochip, an automobile or device having a sensors in it to alert the driver when tire pressure is not upto the mark or any other natural or artificial object assigned with an IP address and that can be able to send data over a network to destination.

As we know that this field IoT is continually growing with advancements in core technologies, hardware and software enhancements with generated products. So the internet of things making industry grow fast with these latest components.

II. History of Iot

Kevin Ashton, Auto-ID Center co-founder at MIT, mentioned the term the internet of things in his presentation 1999[2]. He wants to bring radio frequency ID (RFID) to the attention senior management, Ashton named his presentation "Internet of Things" to incorporate the new trend of the internet. Another MIT professor Neil mentioned in his book indirectly that Things Start to think for interacting with each other.

IoT includes, the convergence of wireless technologies, micro electro mechanical systems, micro services and the internet. The convergence has helped to fill the gap between operational technology and information technology, enabling unstructured machine-generated data to be analyzed for future predictions or steps.

We have seen in the early 1980s the first internet appliance, a Coke machine at Carnegie Mellon University. Using the web, programmers understand the status of the machine whether there would be a cold drink available or not [3].

III. Internet of Things Working Style

An IoT ecosystem consists of internet-enabled wise gadgets that use embedded processors, sensors, conversation hardware to acquire, store, act on gathered data. IoT gadgets share the sensed data by connecting to an IoT gateway to analyze or transfer it to the cloud to be analyzed. Every so often, those devices communicate with each other connected devices and act on the facts each other. These devices perform maximum of the works without human help except to set them up, deliver them commands or get admission to the records[6].The main factors like connectivity, networking and communication protocols used with these web-enabled devices depends on the specific IoT applications.
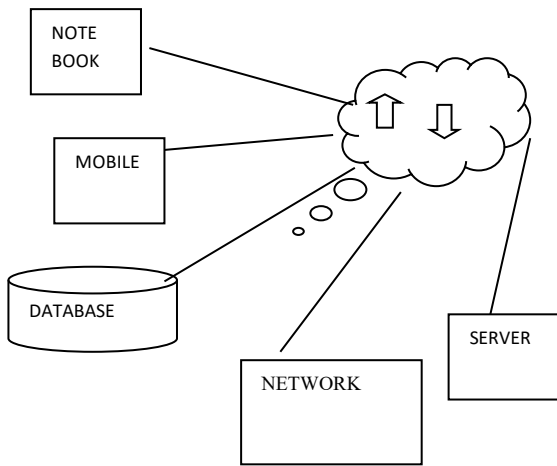
2. Things
3. *Sensors*
4. Actuators
5. Services

Collect data date → Collect and Transfer analaya data and take step.

| IOT Devices

Ex:

1.Sensors

2.Antenna
3.Microcontr
oller | IOT HUB

Or

Gateway | 1.User Interace

2.Analytics of Businessapplicatio ns

3.Back end Systems |
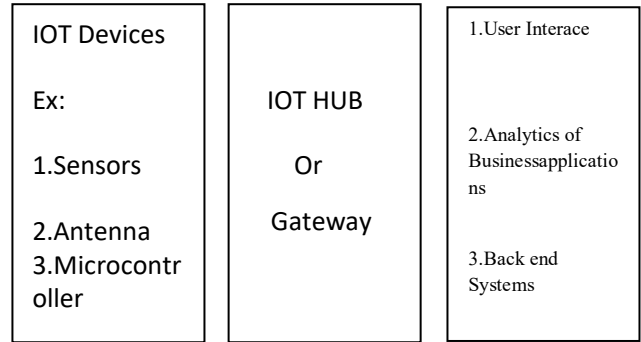
IV. THE IOT IMPACT ON THE INDUSTRY

In coming days we may understand, "Anything that could be connected, would be connected." We also understand the importance of connected devices talking to each other. Take the following contexts to understand well, suppose you are on the way to a meeting, your car could have access to your route map and knows the best route to take. If the traffic is heavy your car might send a message to the other party informing them that you will be late. your alarm clock wakes up you at 5 a.m. and then give signal to your coffee maker[7]. Your store equipment knew when it was running low and automatically order to supplier. The wearable device you used in the workplace could alert you when and where you should be active and productive and shares that information with other devices also connected to you.

The Internet of Things is the upcoming digital transformation. Digitizing things - from bulbs, watches to industrial equipment - creates new opportunities for industry to increase operational productivity, enhance users experiences, and increases web revenue. With web IoT, we can manage billions of devices, run analytics and machine learning, and take actions to make better steps [8]. AWS offers the most complete precxedure, from edge to cloud, for both Industrial IoT and the Connected Home. For IIoT, industry community can optimize operations in the areas of predictive quality and maintenance or remote monitoring. In Home network, engineers can bring new functionalities to smart devices, namely, interconnectivity, and machine learning, security.

V. CATEGORIES OF INTERNET OF THINGS

IoT classified into The internet and the things, with several subcategories.

1. Internet
    Hard Infrastructure
    API Cloud Services
    Cloud Scale Platforms

VI. IOT BENEFITS AND APPLICATIONS

Number of benefits to organizations, enabling them to:

*   Overall business steps will be managed.
*   Customer experiences will be improved.
*   Time and money will be saved.
*   Employee productivity increases.
*   Business models can be integrate and adapt.
*   Business decisions can be made better.
*   Increases revenue.

VII. POSSIBLE THREATS IN THE IOT DEVICES AND CHALLENGES

As per the survey there are 50 billion IoT connected devices by the year 2025. So that IoT devices will soon play vital role in our daily lives. Modern households are going to connect to the internet — sharing information with each other and often sending reports and notifications to your phone [9]. We are observing the same in the mobile application market for these devices. Some are even interpreting that these new IoT mobile applications may take over the cell phone and tablet market in the next coming years.

Devices with the Internet of Things concept may be required, but there is huge security risks involved in it. Recently, there has been a rise in IoT devices being hacked and added to small files in order to carry out malicious attacks. Sensitive data in the IoT devices may be stolen by hackers simply. Sensitive data with weak infrastructure makes IoT devices extremely target for hackers. The first thing IoT users should avoid the default passwords to keep their data, and homes, safe. Many routers and other devices have been attacked because of default passwords and simple IoT devices are following suit. Surprisingly large amount of first grade professionals are using these default passwords, which only makes them target. Mostly hacker needs to

study a manual in order to take advantage of IoT devices on the market, if they use to create a strong password, avoid using routine passwords with names, common nouns and short strings of numbers. These types of passwords are not safe easily can guess. Long, complex passwords are ideal to prevent the most basic hacking attempts. Use a special combination of letters and numbers, symbols and varying letter case in your passwords to keep your data safe.

VIII. IOT Security Challenges

A number of procedures prevent the securing of IoT devices and ensuring end-to-end security. Idea of networking appliances and other objects working together is new, security has not always been considered top most priority while design phase. As they have fast demand in market, many product designers and manufacturers shows more interested in releasing their products to market quickly, rather than embedding security features from the start [10].

A major issue identified in IoT security is the use of weak password which can lead to security breaches. Even if passwords are changed, they are often not strong enough to prevent its security.

In terms of updates, many systems only include support for a set timeframe. For legacy and new assets, security can lapse if extra support is not added in the devices. And as many IoT devices stay in the network for many years, adding security can be challenging.

IoT security is very weak because of lack of industry-accepted standards. Even though many IoT security frameworks exist, there is no single agreed-upon framework. Large companies and industry organizations may have their own specific standards [12], while certain segments, such as industrial IoT, have proprietary, incompatible standards from industry managers. The various standards makes it difficult for secure systems, even arises interoperability problem between them.

IX. Internet of Things Security Solutions to Protect Iot Systems and Devices

The challenges and design issues that affect data process in IoT systems and devices.

1. Network longevity
2. Responsiveness
3. Fault tolerance
4. Scalability
5. Heterogeneity
6. Self-configuration
7. Privacy and security
8. Data reporting
9. Connectivity and coverage
10. Delay

X. Security Solutions - Constraints

The advanced features of Internet of Things is delivering data and helpful targets to organizations around the world--but it has also introduced new and challenging vulnerabilities [13].

Security alternatives for IoT systems and devices should preferably have the following features

- *Lightweight:* Solutions should reduce the number of calculations and interaction needed given restricted power and computational resources of cellular, ad hoc-enabled gadgets.
- *Decentralized:* they must set up security without referrals to central, long term organizations. Instead, security paradigms should impose the collaboration of all reliable pair nodes in the system.
- *Reactive:* MANETS are formed dynamically and the nodes in the Network are either trustworthy or malicious, they may enter or leave at any time without any information. Security issues in this network should respond to changes in system state. They must aim to identify weaknesses and adjustments. So these alternatives should be sensitive.
- *Fault-Tolerant:* As wireless sensor Networks channels are not reliable and they may enter or leave or may compromise at any time without any information or warning so that the security solutions should be designed not to depend on message sequencing.

The above are not the only considerations. Their importance may vary from implementation in applications

XI. Suggestion Scheme in the Devices for Data Storage and Transformation

a) Encryption to protect data

Securing these sensitive data with trust is the main area to be identifiable or proprietary. This means protection on the IoT device itself[14], when the data is being transmitted to intermediate points, such as IoT gateways, and when it is moving route to final destinations, such as the cloud or a data center for storage and analysis.

This requires not only process steps to identify the specific data to be encrypted, but also a key management scheme to distribute and manage the keys that are used to encrypt the data. Secure storage and access control for keys requires planning — they must be available to permitted people/entities to enable data access, but also properly segregated from the data and stored securely. It might be easy in outlook, but IoT scale and speed is dynamic. The life of Keys based on their length and the algorithm being used, and therefore must be rotated at regular intervals. Losing a key used

to encrypt data in the sense losing the data indirectly. Key management is most crucial functionality in IoT deployments with sensitive data[1,15].

In day to day communication process and data storage confidentiality is maintained by encryption. In recent network environments it is compulsory to adapt some functionality, such as delegation of computations and comparisons of data to untrusted nodes or organizations for further processing. Then the only way is to provide data in encrypted format for further process, Rivest et al suggested in 1978 a remedy for this problem through homomorphic security [14], where operations are performed on encrypted data to maintain confidentiality. Homomorphic encryption techniques allow particular kinds of operations to be performed on the ciphertext as if the operations are conducted on the plaintext [19].

The security requirements for data and methods have become very stringent in the last few decades. Due to the development of technology, a variety of attacks on electronic gadgets are possible. The issue becomes more complicated when data needs to be handled at insecure locations. That is where homomorphic cryptosystems can be used.

Homomorphic Encryption is a procedure by which complicated computations can be calculated on encrypted data just as on plain text. This scheme exhibits this property for all the arithmetic operations and combinations thereof. For example, additive property means $E(x + y) = E(x) + E(y)$ and multiplicative property means $E(x * y) = E(x) * E(y)$. In mixed multiplicative homomorphism means $E(x * y) = E(x) * y$. In most situations, this is undesirable because it may help to expose details by splitting the encrypted data [8]. However, this is a desirable property if one wishes to have the sum of a group of encrypted values verified without revealing those encrypted values. In voting protocols, this is used to verify the tally of the ballots without revealing what they are.

b) Homomorphic encryption schemes have the following advantages

- Cost Saving: As the operations can be performed (addition, subtraction or multiplication) on the cipher text, this saves the encryption and decryption cost at intermediate nodes.
- Secret encryption key and information not revealed: Nodes need not store this encryption key information, as the operation can be performed directly on the encrypted data. The node even if compromised won't reveal the sensitive encryption key and information.
- We proposed a nondeterministic Enhanced Homomorphic Cryptosystem (EHC) for homomorphic Encryption / Decryption with IND-

CCA secure theme exhibiting higher performance mainly in processing speed, memory and power consumption16]

- In our scheme we have taken a large prime number ' p ', another prime number ' q ' such that q < p are taken and a random number ' r ' is taken to make the process nondeterministic. Let the set of plain text information Zp and the set of cipher text functions {+ , - ,* , / and mixed} composed respectively, of the addition, subtraction, multiplication and mixed multiplication modulo m, with m = pq. Let the cipher text be Zc. The security key k = (p, q, m, r) and E(X)=)(mod m). Decryption will be done with the secret key ' p', X=D (Y) = Y mod p. It can be broken if 'p' can be discovered which is not easy to solve.

- Let us see the operations of EHC scheme:-

Key Generation Secretkeygen()
Chose large prime number ' p ' and another prime number ' q ' Calculate m = p * q Generate a random number ' r '. R,q and m Kept secret. Secret values r,q and m Shared key : p
Encryption Encrypt(X,m,p,q,r) Assume X € Zp Compute)(mod m) Output Y € Zc
Decryption Decrypt(Y,p) input Y € Zc compute X = Y mod p output X € Zp

Fig. 1: Algorithm of EHC

- We constructed proposed new Enhanced Homomorphic Cryptosystem (EHC) with IND-CCA security with better performance than existing schemes mainly in computation, memory requirement and power consumption. Proposed scheme is non deterministic and satisfies additive, multiplicative, mixed additive and mixed multiplicative homomorphism.

- The EHC is additively, multiplicatively, and mixed-multiplicatively homomorphic. Also, our EHC encrypts same plaintext message, 'x', into different ciphertext messages. Thus, even though E1 (x) ≠ E2 (x),but D(E1 (x)) = D(E2 (x)).

We have tested our scheme with four scenarios' with varying the IoT devices and the data size in simulated environment with critical, average, worst and best scenarios'. The results are given below.

Encryption time of EHC with 1024 bit key sizes
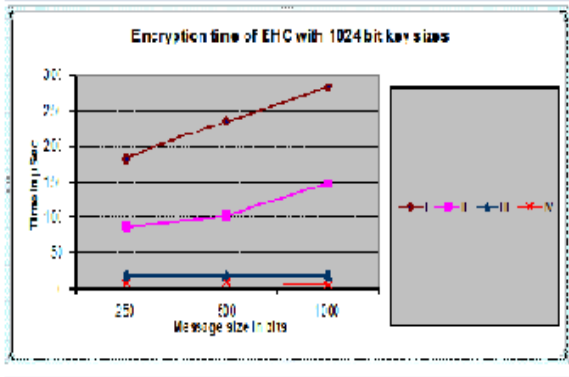
XII. How to Protect iot Systems and Devices

IoT security features vary depending on specific IoT application and place in the IoT ecosystem. So that IoT companies from product makers to semiconductor manufactures should concentrate on building security from the beginning, making hardware tamper proof, planning secure hardware, ensuring secure upgrades, providing standard updates or patches and performing dynamic testing. Developer's focus should be on secure software development and secure integration. Deploying IoT systems, hardware security and authentication are critical measures. For example operators, keeping systems secure with new version, protecting from malware, auditing, protecting infrastructure are the key features.

Major IoT Security Issues we Need to Handle:

Identity and access management
Data integrity
Privacy and confidentiality
Automation and management tools
Data Encryption
Data Authentication
IoT Hardware Issues
Hardware testing is inevitable
Managing updates
IoT security tools and legislation

XIII. The future of Iot

As per recent survey, 86% of respondents said that they were unable to identify all of the devices connected to their networks. 59% were nervous about their device security, and 61% were concerned about integration. More organizations will proceed with IoT implementations in 2025. The surprising thing depends on interoperability among the vendors. This all will be achieved by single plan management only.

In recent industry applications, there will be serious progress toward the integration of AI, machine learning, and deep learning. AI will deliver preliminary business insights from analyzed data with a baseline of algorithms. As computers and other mechanized appliances observe anomalies that conflict with preliminary assumptions, then they refine their knowledge bases by appling machine learning. If the results yielded continue to be incomplete, they will apply a deeper set of algorithms known as deep learning to operate on the data. The goal is precision results of AI at all levels by implementing AI and learning technologies to work together for best results.

XIV. Conclusion

It is recommended to apply the homomorphic encryption scheme in IoT devices and the systems based on the demand when operations required in between transmission.

IoT devices demand more security in handling and processing the data securily. This can be achieved by our scheme very efficiently as the security features meeting the demand of the IoT devices.

References Références Referencias

1. A. D. Wood and J. A. Stankovic: Denial of Service in Sensor Networks, Computer, Vol. 35, No. 10, Oct. 2002; DOI: 10.1109/MC.2002.1039518
2. B. B. Zarpelão, R. S. Miani, C. T. Kawakani and S. C. de Alvarenga: A Survey of Intrusion Detection in Internet of Things.
3. Journal of Network and Computer Applications, Vol. 84, Apr. 2017; https://doi.org/10.1016/j.jnca.2017.02.009
4. M. A. Ferrag, L. A. Maglaras, H. Janicke and J. Jiang: "Authentication Protocols for Internet of Things: A Comprehensive Survey" arXiv, Dec. 2016
5. T. Heer, O. Garcia-Morchon, R. Hummen, S. L. Keoh, S. S. Kumar and Klaus Wehrle: Security Challenges in the IP-based Internet of Things, Wireless Personal Communications, Vol. 61(3), Dec. 2011; DOI: 10.1007/s11277-011-0385-5
6. Article Current research on Internet of Things (IoT) security: A survey
7. Akbar Abbasi "Desirable Security for WSN",International Journal of Computer and Electrical Engineering, Vol.1, No.3, august,2009, 1793-8163.
8. A. J. Menezes, D. B. Johnson, "EC-DSA: An Enhanced DSA", Invited Talks – 7th Usenix Sec., Symp., Jan., 1998, pp. 33-43.Certicom Corp., "Certicom ECC Tutorials".
9. A silverberg "homomorphic encryption plan for cloud services", 2013.

10. Alessandro Sorniotti, Laurent Gomez, Konrad Wrona and Lorenzo Odorico "Secure and Trusted in-network Data Processing in Wireless Sensor Networks: a Survey" Journal of Information Assurance and Security 2 (2007) 189 – 199.

11. Bart Goethals, Sven Laur, Helger Lipmaa, and Taneli Mielik¨ainen, "On Private Scalar Product Computation for Privacy -Preserving Data Mining" Helsinki University of Technology, Finland.2011.

12. Brett Hemenawy and Rafail Ostrovsky, University of Michigan "On Homomorphic Encryption and Chosen-Cipher text Security" in the Proceedings of PKc 2012.

13. Bruce schneier,"Applied cryptography – Protocols ,Algorithms, and Source Code in C" Second Edition. 2011.

14. C. Fontaine, F. Galand, "A survey of homomorphic encryption for no nspecialists" EURASIP Journal on Information Security, p.1-15, January 2007.

15. C. Negus, "Linux Bible: Boot Up to Fedora, KNOPPIX, Debian, SUSE, Ubuntu, and 7 Other Distributions" 2006..

16. C. Orlandi, A. Piva, andM. Barni, "Research Article Oblivious Neural Network Computing via Homomorphic Encryption" Hindawi Publishing Corporation EURASIP Journal on Information Security Volume 2007, Article ID 37343, 11 Pages doi:10.1155/2007/37343.

17. C. Shannon, "Communication theory of secrecy systems," Bell System Technical Journal, vol. 28, pp. 656–715, 1949.

18. Carlos de marais cordeiro,Dharma praksh Agarwal "Ad Hoc & Sensor Networks" Theory and Applications - Worlds Scoentific.publications-2012.

19. Certicom Corp., "Remarks on the Security of the ECC systems", ECC White Papers, uly 2000.

20. Cherita Corbett, Raheem Beyah, Janise McNair "Computer and Network Security Volume 3 Security in Ad Hoc and Sensor Networks".-2011.

21. D. Integrity, P. Sakarindr, and N. Ansari, "Security Services IN Group Communications OVER Wireless

22. Infrastructure, Mobile Ad Hoc, AND Wireless Sensor Networks" IEEE Wireless Communications, pp. 9, 2007.

23. D. Micciancio and O. Regev. "Post-Quantum Cryptography, chapter Lattice-based Cryptography". Springer, 2008

Implementasi Internet of Things Pada Sistem Kendali Lampu Rumah Menggunakan Telegram Messenger Bot Dan Nodemcu Esp 8266

By Mohamad Yusuf Efendi & Joni Eka Chandra

Universitas Putera Batam

Abstract- The house light control system is still mostly manual and the homeowner sometimes tends to forget to turn off the lights when leaving the house, so the owner of the house must return to turn off the lights or leave the lights on until the homeowner returns.

The use of NodeMCU ESP8266 is currently favored by internet of things based developers, because the price of the module is quite cheap and can be programmed using the Arduino IDE allowing NodeMCU to be the preferred choice. This study uses Telegram Messenger Bot as a message sender and message recipient to control home lights, using NodeMCU as a Relay controller to turn off and turn on the home lights when they are or not at home.

Keywords: home light control system, nodeMCU ESP8266, arduino ide, relay, telegram messenger bot.

GJCST-A Classification: I.2.m

IMPLEMENTASIINTERNETOFTHINGSPADASISTEMKENDALILAMPURUMAHMENGGUNAKANTELEGRAMMESSENGERBOTDANNODEMCUESP8266

Strictly as per the compliance and regulations of:

Implementasi Internet of Things Pada Sistem Kendali Lampu Rumah Menggunakan Telegram Messenger Bot Dan Nodemcu Esp 8266

Mohamad Yusuf Efendi [α] & Joni Eka Chandra [σ]

Abstract- The house light control system is still mostly manual and the homeowner sometimes tends to forget to turn off the lights when leaving the house, so the owner of the house must return to turn off the lights or leave the lights on until the homeowner returns.

The use of NodeMCU ESP8266 is currently favored by internet of things based developers, because the price of the module is quite cheap and can be programmed using the Arduino IDE allowing NodeMCU to be the preferred choice. This study uses Telegram Messenger Bot as a message sender and message recipient to control home lights, using NodeMCU as a Relay controller to turn off and turn on the home lights when they are or not at home.

Keywords: home light control system, nodeMCU ESP8266, arduino ide, relay, telegram messenger bot.

I. Pendahuluan

a) Latar Belakang

Smart home dan internet merupakan dua hal yang saling berkesinambungan, konsep *Internet of Things* yang dipakai dalam *smart home* juga berarti menjadikan sebuah perangkat di rumah dapat tersingkronisasi dengan module melalui internet. Menurut Ashton pada tahun 2009 definisi awal IoT adalah *Internet of Things* memiliki potensi untuk mengubah dunia seperti pernah dilakukan oleh Internet, bahkan mungkin lebih baik.

Perkembangan dibidang Elektronik pun juga semakin berkembang pesat, salah satunya adalah pada sistem kontrol jarak jauh, dimana hal ini memungkinkan seseorang dapat mengontrol suatu alat, menghidupkan ataupun mematikan alat tersebut dari jarak yang jauh, modul yang sering digunakan yaitu Arduino, Wimos D1, Raspberry phi, Node MCU ESP8266, dll.

Node MCU merupakan sebuah platform module IoT yang bersifat opensource. Terdiri dari perangkat keras berupa System on Chip ESP 8266 dari seri ESP buatan Espressif System, juga firmware yang digunakan menggunakan bahasa pemrograman scripting Lua. Istilah NodeMCU secara default sebenarnya mengacu pada firmware yang digunakan daripada perangkat keras development kit.

Belakangan ini kita sering menemukan pemilik rumah yang lupa mematikan lampu rumah saat meninggalkan rumah, dan pemilik rumah baru sadar bahwa lupa mematikan lampu saat sudah dalam perjalanan. Perilaku inilah yang mengakibatkan pemborosan energi listrik. Keinginan pemilik rumah yang ingin mematikan atau bahkan ingin menyalakan lampu rumah saat tidak berada di tempat atau saat berada ditempat inilah yang membuat sistem pengontrolan terhadap lampu rumah otomatis pun berkembang, baik dari yang menggunakan SMS, Sensor, WEB Server, maupun lewat *Smartphone*, baik yang berupa Aplikasi langsung ataupun menggunakan Aplikasi *Internet Messenging*, dan masih banyak lagi. Aplikasi *Internet Messenging* digunakan dalam penelitian ini karena memiliki unsur praktis dan Aplikasi *Internet Messenging* sendiri juga sering kita gunakan dalam aktifitas sehari-hari di *Smartphone* kita, seperti: Whatsapp, Blackberry Messenger, LINE, Telegram, dll.

Oleh karena itu, penulis mengangkat judul *"Implementasi Internet Of Things Pada Sistem Kendali Lampurumah Menggunakan Telegram Messenger Bot Dan Nodemcu Esp 8266"* yang diharapkan sistem kendali ini dapat membantu dalam pengontrolan lampu di rumah dan dapat di terapkan di konsep-konsep Smart Home untuk mengontrol alat alat elektronik lainnya.

b) Identifikasi Masalah

Berdasarkan latar belakang permasalahan yang telah diuraikan diatas, dapat disimpulkan bahwa identifikasi masalah yaitu:

1. Seringnya pemilik rumah kelupaan mematikan lampu saat meninggalkan rumah.
2. Masih sedikit yang menggunakan NodeMCU ESP8266 sebagai module IoT untuk mengontrol lampu rumah.
3. Masih banyaknya orang awam yang belum mengerti kelebihan lain dari Aplikasi Telegram.

c) Batasan Masalah

Untuk keseragaman pemahaman dalam penelitian, maka terdapat batasan-batasan masalah yang berlaku, batasan-batasan tersebut adalah:

1. Aplikasi Android yang digunakan untuk mengontrol lampu rumah adalah Telegram Messenger.

Author α σ: Prodi Teknik Informatika, Fakultas Teknik, Universitas Putera Batam. e-mail: Katagiri.rain@gmail.com

2. Module yang dipakai adalah NodeMCU ESP8266.
3. Perangkat lunak yang dipakai untuk memprogram Module NodeMCU ESP8266 adalah Arduino IDE.
4. Menggunakan media chat bot pada Aplikasi Telegram sebagai penghantar pesan ke NodeMCU ESP 8266.

d) Rumusan Masalah

Berdasarkan latar belakang permasalahan yang telah diuraikan diatas, dapat disimpulkan bahwa permasalahan yang dihadapi yaitu:

1. Bagaimana merancang sistem pengontrol lampu rumah otomatis menggunakan module NodeMCU ESP 8266 dan Aplikasi Telegram.
2. Bagaimana cara membuat chat Bot Telegram dan mengkoneksikan Bot API Telegram dengan NodeMCU ESP 8266 sehingga pesan dapat diterima oleh module.

e) Tujuan Penelitian

Adapun tujuan dari penelitian ini adalah:

1. Merancang dan membuat sistem pengendali lampu rumah berbasis Internet Messenger yang efektif.
2. Mengenalkan Aplikasi Telegram terutama sistem chat Bot sebagai aplikasi *messenging* yang serbaguna, bukan hanya sebagai Aplikasi *Messenging* tapi juga sebagai media penghubung antara *Smartphone* dengan module IoT NodeMCU ESP 8266.
3. Memperkenalkan NodeMCU ESP 8266 sebagai modul IoT yang murah dan reliable.

f) Manfaat Penelitian

Manfaat dari penelitian ini adalah sebagai berikut:

a. Menambah serta memperdalam pengetahuan atas teori-teori pembuatan sebuah pengontrol lampu menggunakan NodeMCU ESP 8266 dan Telegram Messenger Bot.
b. Mempermudah dalam pengontrolan lampu rumah dengan menggunakan Telegram Messenger Bot baik saat berada dirumah ataupun saat berada diluar rumah.

II. Kajian Pustaka

a) Internet of Things

Menurut Casagras (*Coordinator and support action for global RFID-related activities and standadisation*) mendefinisikan Internet of Things sebagai sebuah infrastruktur jaringan global, yang menghubungkan benda-benda fisik dan virtual melalui eksploitasi data *capture* dan kemampuan berkomunikasi. Menurut ETP EpoSS (*European TechnologyPlatform on Smart System Integration*) mendefinisikan IoT sebagai jaringan yang dibentuk oleh hal-hal atau benda yang memiliki identitas, pada dunia

maya yang beroperasi di ruang itu dengan menggunakan kecerdasan antarmuka untuk terhubung dan berkomunikasi dengan pengguna, konteks sosial dan lingkungan.

b) Smart Home

Smart Home adalah rumah yang menyediakan keamanan, kenyamanan dan efisiensi enegri untuk pemiliknya meskipun pemilik sedang tidak berada di rumah. Smart Home juga merupakan bagian dari IoT (Internet of Things) yang memungkinkan pengontrolan rumah tanpa harus berada di rumah. Adapun kontrol ini dapat bersifat otomatis maupun manual dari jarak jauh. Smart Home, selain memiliki fungsi untuk dapat bekerja otomatis dan dikontrol dari jauh, juga dapat menghemat energi, waktu dan uang.

c) NodeMCU ESP 8266

Node MCU adalah sebuah platform IoT yang bersifat *Opensource*. Terdiri dari perangkat keras berupa System o

Gambar 2.1: NodeMCU ESP 8266

ESP 8266 dari seri ESP besutan Espressif System, juga firmware yang digunakan merupakan bahasa pemrograman scripting Lua. Istilah Node MCU secara default sebenarnya mengacu pada firmware yang digunakan daripada perangkat keras development kit, dan Node MCU juga bisa diartikan sebagai board arduino-nya ESP 8266. Selain dengan bahasa Lua NodeMCU juga support dengan sofware Arduino IDE dengan melakukan sedikit perubahan pada board manager di dalam software Arduino IDE yaitu dengan menambahkah URL untuk mengunduh board khusus NodeMCU pada board manager.
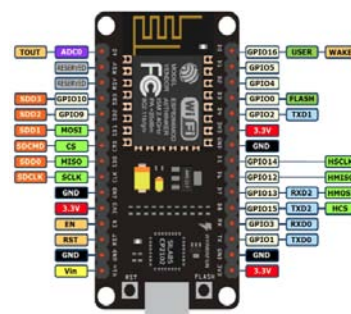
Gambar 2.2: Skematik pin pada board NodeMCU ESP 8266 Sumber:

Berikut ini adalah spesifikasi dari NodeMCU ESP8266:

Tabel 2.1: Spesifikasi NodeMCU ESP8266

Mikrokotroller	ESP 8266
Input Tegangan	3.3V ~ 5V
Ukuran Board	57 mm x 30 mm
GPIO	13 pin
Flash Memory	4 MB
Wireless	802.11 b\g\n standard
USB to Serial converter	CH340G

d) Relay 6 Channel

Relay adalah suatu komponen listrik yang berfungsi sebagai Saklar (*Switch*) otomatis yang dioperasikan menggunakan listrik dan memiliki dua komponen elektro mekanis yaitu bagian utamanya berupa coil yang berfungsi sebagai komponen elektromagnet dan seperangkat *Contact* yang mewakili fungsi mekanis.

Relay 6 Channel ini memiliki 8 pin yang diantaranya 1 pin sebagai input VCC 0-5vdc, lalu 1 pin GND, dan 6 pin input terdiri atas In1 sampai dengan In6. Masing masing relay memiliki beban sebesar 10A dan tegangan maximal yang dapat mengalir di kontak adalah sebesar 250Vac.

Gambar 2.3: Relay 6 Channel 5vdc

Sumber: (Data Penelitian, 2019)

e) Telegram Messenger

Telegram adalah aplikasi layanan pengirim pesan dengan fokus pada kecepatan dan keamanan. Kita dapat menggunakan Telegram di semua perangkat kerja pada saat yang bersamaan, pesan kita dapat tersinkronisasi dengan mulus di sejumlah ponsel, tablet, ataupun komputer (Windows, Mac, dan Linux).

Dengan Telegram, kita dapat mengirim pesan, foto, video, dan file jenis apa pun (dokumen, zip, mp3, dll.), Serta membuat grup untuk 100.000 orang atau saluran untuk disiarkan ke member tak terbatas. Kita dapat menulis kontak telepon kita dan menemukan orang dengan nama pengguna mereka. Sebagai hasilnya, Telegram seperti gabungan SMS dan email, dan dapat mengurus semua kebutuhan pribadi atau bisnis. Selain itu, telegram juga mendukung panggilan suara terenkripsi end-to-end.
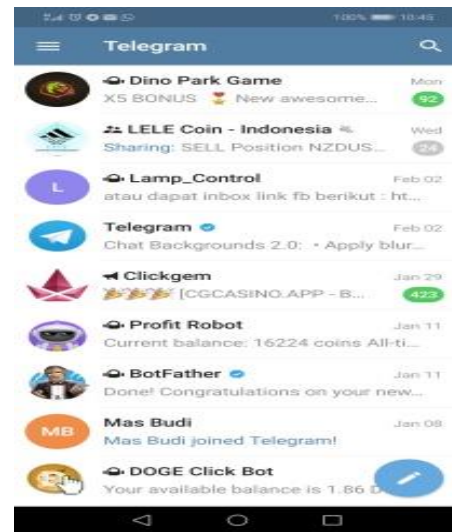
Gambar 2.4: Telegram versi Android
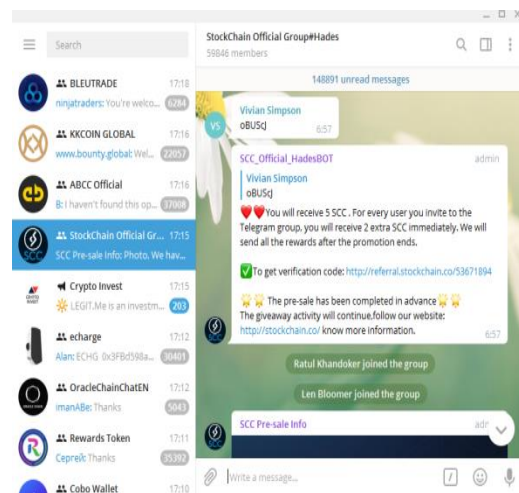
Gambar 2.5: Telegram versi Desktop

f) Tools

i. Arduino IDE

Arduino IDE (*Integrated Deveopment Environmet*) adalah software yang telah disiapkan oleh arduino bagi para perancang untuk melakukan berbagai proses yang berkaitan dengan pemrograman Arduino. IDE ini juga sudah mendukung berbagai sistem operasi populer saat ini seperti Windows, Mac, Linux, dan Android.
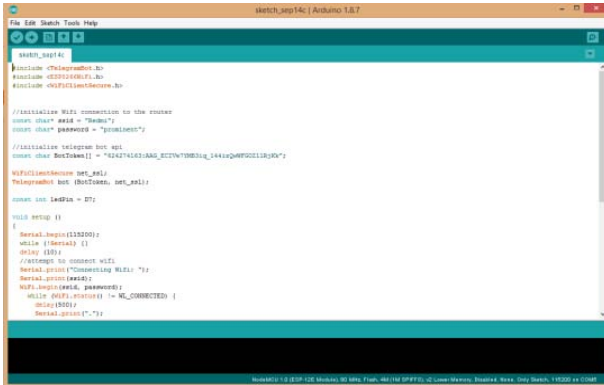
Gambar 2.6: Software Arduino IDE

III. Metode Penelitian

a) Tahap Penelitian
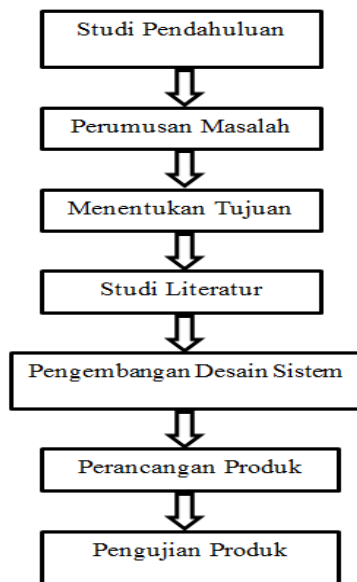
Gambar 3.1: Tahap Penelitian

Berikut ini adalah penjelasan dari tahap-tahap penelitian yang ada pada gambar di atas.

1. Studi Pendahuluan

Studi pendahuluan merupakan langkah awal tahap penelitian yang bertujuan untuk mengidentifikasi permasalahan yang berkaitan dengan topik penelitian, sehingga peneliti mengetahui masalah sesungguhnya yang harus dipecahkan.

2. Perumusan Masalah

Pada tahap ini peneliti merumuskan masalah yang merupakan alasan penelitian ini dilakukan. Perumusan masalah ini bertujuan agar peneliti mengetahui permasalahan secara spesifik sehingga dapat lebih mudah dan fokus untuk menyelesaikan masalah tersebut melalui penelitian.

3. Menentukan Tujuan Penelitian

Peneliti menentukan tujuan penelitian yaitu menciptakan sebuah alat kendali cerdas yang mampu menggantikan fungsi saklar listrik untuk menyalakan/memadamkan lampu rumah yang bisa dioperasikan secara wireless melalui *Wi-Fi*.

4. Studi Literatur

Peneliti melakukan studi literatur dengan mengumpulkan, membaca, dan memahami referensi teoritis yang berasal dari buku-buku teori, buku elektronik (*e-book*), jurnal-jurnal penelitian, *datasheet* komponen, dan sumber pustaka otentik lainnya yang berkaitan dengan penelitian. Referensi ini antara lain yang berhubungan dengan topik penelitian yaitu sistem kendali cerdas, *Wi-Fi*, *smart home*, nodeMCU ESP8266, Telegram, dan Arduino IDE.

5. Pengembangan Desain Sistem

Tahap ini adalah tahap perancangan desain sistem atau model dari alat yang akan dibuat. Desain sistem terdiri dari blok diagram sistem dan gambaran sistem secara keseluruhan.

6. Perancangan Produk

Pada tahap ini peneliti melakukan perancangan produk yang terdiri dari perancangan perangkat keras dan perancangan perangkat lunak. Perancangan perangkat keras terdiri dari perancangan mekanik dan perancangan elektrik. Sedangkan perancangan perangkat lunak terdiri dari perancangan Bot pada Aplikasi Telegram , dan perancangan program pada NodeMCU ESP 8266 melalui arduino IDE.

7. Pengujian Produk

Pengujian produk dilakukan untuk mengetahui tingkat keberhasilan alat yang telah dibuat. Pada tahap ini terdapat dua macam pengujian yaitu pengujian *hardware* dan pengujian *software*.

b) Peralatan Yang Digunakan

Pada perancangan sistem ini, dibutuhkan beberapa alat, bahan, serta program aplikasi pendukung, yang dikelompokkan menjadi 3 bagian, yaitu perangkat keras (*hardware*), perangkat lunak (*software*) dan alat penunjang.

Perangkat keras (*hardware*) yang digunakan antara lain laptop, *Smartphone* Android, Power Board, Project board, Modul NodeMCU ESP 8266, Relay 6

channel, dan lampu LED 220v. Perangkat lunak (*software*) yang digunakan antara lain sistem operasi Windows 8.1, Google Sketchup, Arduino IDE 1.8.7, dan Aplikasi Telegram. Sedangkan alat penunjang yang digunakan dalam membangun alat ini antara lain solder listrik, timah, *multimeter* (alat ukur), tang potong, gergaji, mesin grinda tangan dan obeng.

c) Desain Sistem

Dibawah ini adalah gambaran dari sistem alat kendali secara keseluruhan.
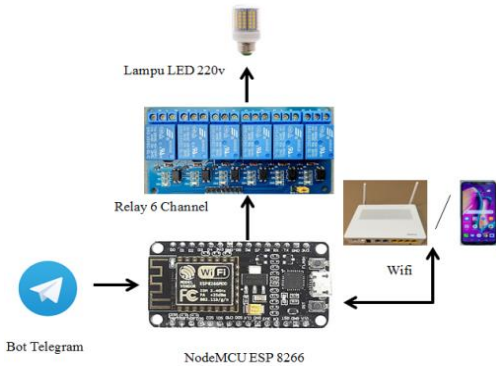
Gambar 3.2: Desain Sistem

d) Perancangan Alat
   i. Perancangan Mekanik

Pada penelitian ini, peneliti menggunakan bahan acrylic dalam membentuk desain rumah minimalis lalu pada setiap ruangan di rumah minimalis tersebut di letakkan lampu LED termasuk pada teras,
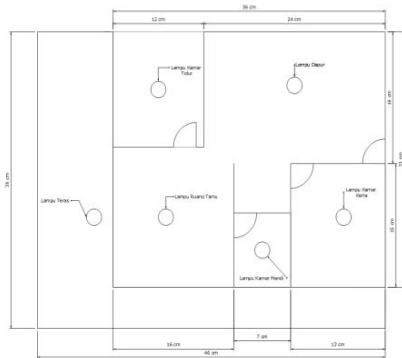
Gambar 3.3: Desain layout rumah dan penempatan lampu

   ii. Perancangan Elektrik

Perancangan elektrik terdiri dari beberapa rangkaian yang memiliki fungsi tertentu dan saling berhubungan membentuk sebuah sistem. Alat pada penelitian ini dikontrol oleh sebuah NodeMCU ESP 8266 dan Relay 6 channel. Untuk lebih jelasnya akan dibahas di penjelasan berikut.

1. Perancangan rangkaian pada NodeMCU ESP8266

Keterangan:
— Vin 5vdc
— Gnd
— D3(nodeMCU)/in1(relay1)
— D4(nodeMCU)/in2(relay1)
— D5(nodeMCU)/in1(relay2)
— D6(nodeMCU)/in2(relay2)
— D7(nodeMCU)/in1(relay3)
— D8(nodeMCU)/in2(relay3)
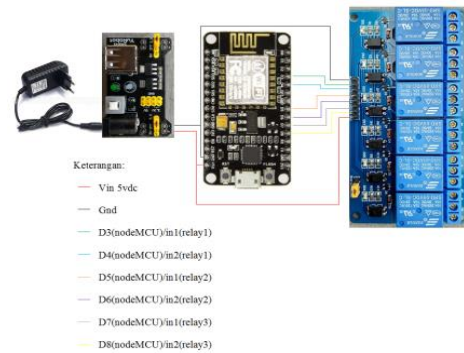
Gambar 3.4: Rangkaian powerboard, NodeMCU dan Relay 6 Channe

a. NodeMCU ESP 8266
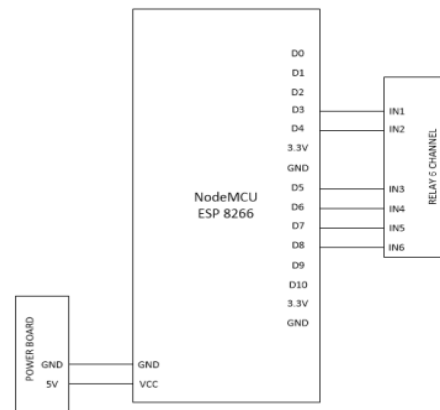
Gambar 3.5: Rangkaian penggunaan pin NodeMCU ESP 8266

b. Module Relay 6 Channel
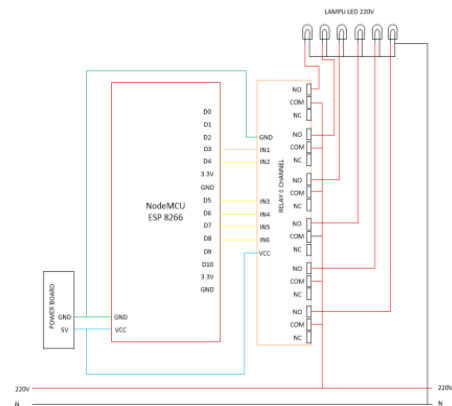
Gambar 3.6: Rangkaian Relay 6 channel dengan NodeMCU ESP 8266

e) Perancangan Perangkat Lunak

Perancangan perangkat lunak menunjukkan bagaimana sistem kerja alat yang dibuat. Alur program pada penelitian ini adalah memulai program dengan menekan *start* pada chat bot telegram. Selanjuatnya akan muncul balasan selamat datang dari NodeMCU beserta petunjuk penggunaan.untuk mengontol lampu. Di bot ini pengontrolan dapat dilakukan dalam 2 mode type langsung atau melalui inline keyboard, untuk melakukan typing langsung dapat dilihat di petunjuk awal start dan lalu untuk memuculkan inline keyboard hal yang dilakukan adalah mengetik atau bisa menekan tulisan /Option lalu inline keyboard akan keluar. Setelah itu untuk meyalakan lampu yang diinginkan, dapat menekan button yang ada di inline keyboard, Contoh: /LampKTon, maka bot chat akan mengirimkan message "/LampKTon" ke NodeMCU. Jika input diterima oleh NodeMCU maka lampu akan menyala, lalu NodeMCU akan mengirimkan notifikasi ke Bot bahwa lampu menyala. Begitu pula sebaliknya jika memilih "/LampKToff" maka lampu akan padam dan NodeMCU akan mengirimkan notifikasi bahwa lampu padam. Untuk tombol "/status" ini berfungsi mengetahui apakah semua lampu benar dalam keadaan padam atau menyala. Saat tombol ini ditekan, bot akan mengirimkan "/status" ke NodeMCU dan apabila diterima maka NodeMCU akan langsung mengirimkan balasan berupa status ke bot telegram.

Berikut ini adalah *Flowchart* dari Bot aplikasi telegram.
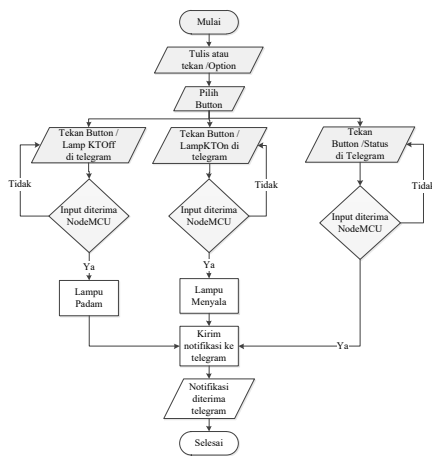
Gambar 3.7: Flowchart dari Bot Telegram

i. *Pembuatan Bot Telegram*

Untuk membuat bot, disini harus memiliki aplikasi Telegram Messenger. Kemudian kita mencari user Bot dengan nama "BotFather".
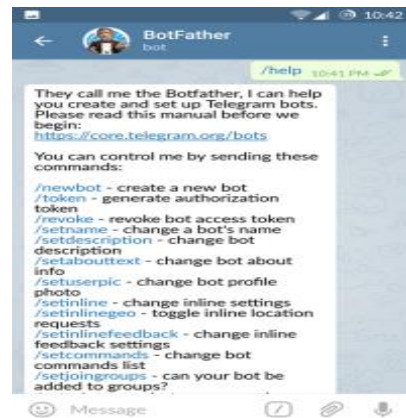
Gambar 3.8: User Chat BotFather

Bot Father adalah sebuah bot yang berfungsi untuk membuat Bot dan mengatur bot yang telah dibuat sebelumnya. BotFather memiliki banyak fungsi mengenai bot, misalnya membuat bot, menghapus bot, merubah nama bot, merubah deskripsi bot dan hal lainnya mengenai bot. Untuk membuat bot kita ketik command "/newbot", kemudian kita akan diminta untuk menulis nama dari bot, misalnya kita tuliskan "Lamp_Control_Bot", lalu kita juga akan diminta menuliskan username untuk bot tersebut, misalnya kita tuliskan "Lamp_Control_Bot". Setelah menentukan username bot, maka kita akan diberikan Token dari bot tersebut. Token memiliki fungsi yang sangat penting dan tidak boleh diketahui oleh orang lain. Token disini berfungsi untuk mengakses HTTP API dari bot tersebut. Dengan kata lain, kita dapat mengendalikan bot tersebut dengan bermodalkan Token tersebut.

IV. Hasil dan Pembahasan

a) Hasil Perancangan Perangkat Keras

i. *Hasil Perancangan Prototype Rumah*

Hasil dari perancangan Prototype ini merupakan konturksi miniatur rumah yang dirancang. Dimensi total alat ini 38 x 45 x 10cm. Terdiri dari 6 titik lampu, yaitu lampu depan, lampu kamar tidur, lampu ruang tamu, lampu kamar mandi, lampu dapur dan lampu kamar kerja. Berikut adalah gambar dari konstruksi Prototype rumah.

1. Prototype rumah
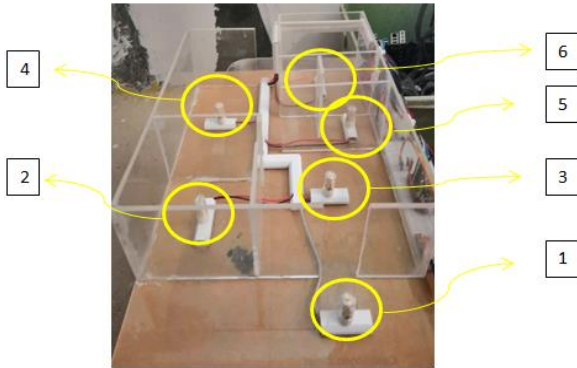
Gambar 4.1.1: Kontruksi prototype rumah

ii. *Hasil Perancangan Elektrik*

Perancangan elektrik terdiri dari rangkaian power supply, rangkaian NodeMCU ESP 8266, Connector Netral dan Fasa input, dan Relay.

1. Rangkaian kontrol
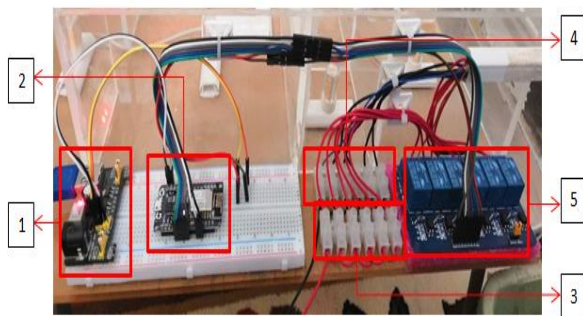
Gambar 4.1.2: Rangkaian kontrol menggunakan NodeMCU ESP8266

b) *Hasil Pengujian*

i. *Pengujian Alat*

1. Bot Telegram
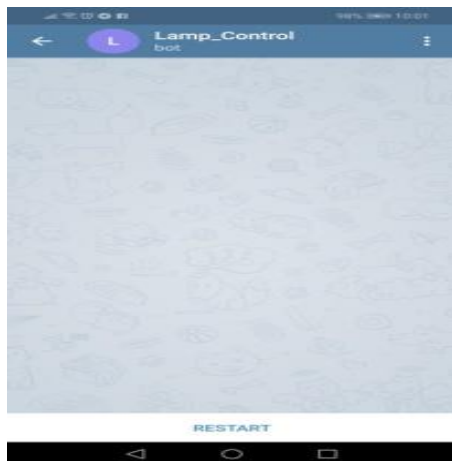
Gambar 4.2.1: Tampilan awal @Lamp_Control_bot
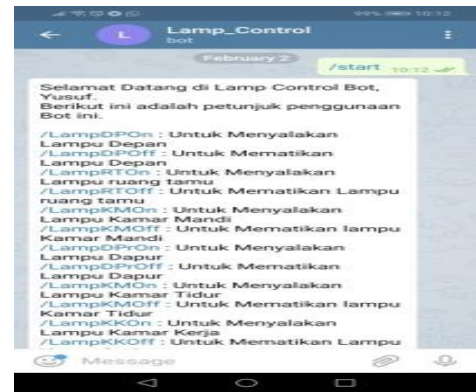
Gambar 4.2.2: Setelah tombol start ditekan
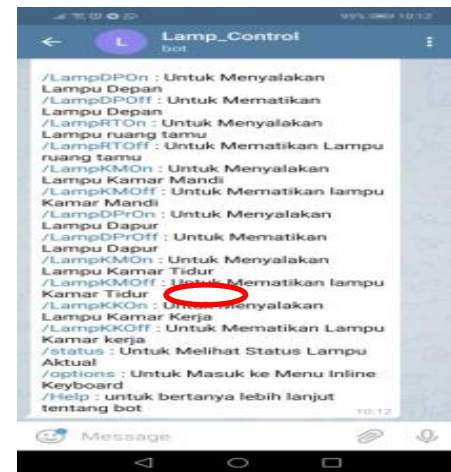
Gambar 4.2.3: Tekan atau ketik /option

Gambar 4.2.4: Setelah command /option ditekan atau diketik

Windows 8.1, Google Sketchup, Arduino IDE 1.8.7, dan

3. Pengujian sistem pengontrolan 6 lampu
   Pengujian ini dilakukan untuk mengukur seberapa cepat NodeMCU ESP8266 merespon pesan dari bot dalam menyalakan dan mematikan lampu serta mengirim balik pesan ke bot.
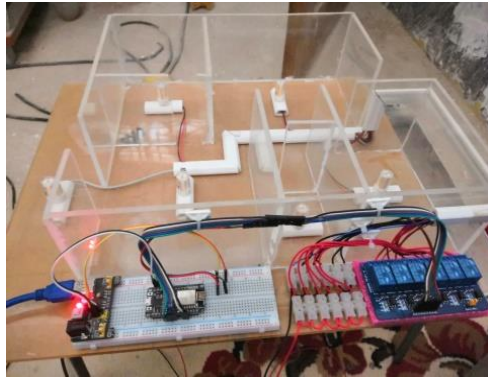
Gambar 4.2.5: Keadaan lampu sebelum commad belum dikirim
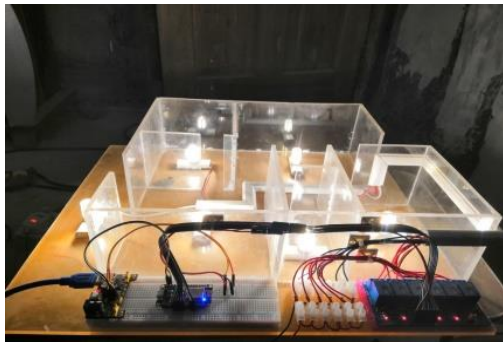
Gambar 4.2.6: Lampu menyala semua saat ke 6 command di kirim dari bot

Pengujian ini dilakukan terhadap ke 6 lampu sebanyak 10 kali pengujian, dimulai dari lampu depan, lampu kamar tidur, lampu ruang tamu, lampu kamar mandi, lampu dapur dan lampu kamar kerja. Pengujian dilakukan menggunakan stopwatch dan dimulai saat command dikirim. Dan berikut adalah hasil dari pengujian tersebut.
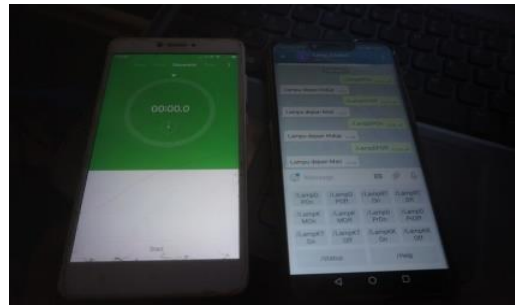
Gambar 4.2.7: Sebelah kiri adalah Stopwatch dan sebelah kanan adalah kontrol Bot

Table 4.2.1: Pengujian pada lampu depan

No	Menyala (detik)	Pesan diterima (detik)	Selisih (detik)	Error (%)	Padam (detik)	Pesan diterima (detik)	Selisih (detik)	Error (%)
1	2,9	6	3,1	0	1,8	4,5	2,7	0
2	3,5	6,3	2,8	0	2,7	5,6	2,9	0
3	1	4,4	3,4	0	3,1	5,9	2,8	0
4	1	3,7	2,7	0	1,8	4,6	2,8	0
5	3,1	8,6	5,5	0	1,1	4,6	3,5	0
6	1,9	4,8	2,9	0	3,4	6,2	2,8	0
7	1,1	3,8	2,7	0	0,6	3,3	2,7	0
8	2,2	4,9	2,7	0	0,8	3,4	2,6	0
9	3,1	5,9	2,8	0	1,5	7,2	5,7	0
10	2,2	5,8	3,6	0	4	6,8	2,8	0

Table 4.2.2: Pengujian pada lampu kamar tidur

No	Menyala (detik)	Pesan diterima (detik)	Selisih (detik)	Error (%)	Padam (detik)	Pesan diterima (detik)	Selisih (detik)	Error (%)
1	1	3,8	2,8	0	1,1	4	2,9	0
2	3,5	6,3	2,8	0	0,6	3,3	2,7	0
3	0,9	3,7	2,8	0	1,3	4,1	2,8	0
4	3,1	5,9	2,8	0	3,5	6,3	2,8	0
5	1,2	3,9	2,7	0	2,4	5,2	2,8	0
6	1,6	5,3	3,7	0	2,6	5,4	2,8	0
7	0,9	3,7	2,8	0	3	5,7	2,7	0
8	2,6	5,5	2,9	0	1	3,8	2,8	0
9	2,2	5	2,8	0	0,6	3,3	2,7	0
10	2,9	5,7	2,8	0	4,3	7,1	2,8	0

Table 4.2.3: Pengujian pada lampu ruang tamu

No	Menyala (detik)	Pesan diterima (detik)	Selisih (detik)	Error (%)	Padam (detik)	Pesan diterima (detik)	Selisih (detik)	Error (%)
1	1,4	4,2	2,8	0	3,1	6,6	3,5	0
2	1,4	4,2	2,8	0	0,6	3,4	2,8	0
3	1,1	3,9	2,8	0	3,2	6	2,8	0
4	3,2	6	2,8	0	1	3,8	2,8	0
5	3	6,1	3,1	0	1,2	4	2,8	0
6	0,9	3,7	2,8	0	3,1	6,6	3,5	0
7	1,3	4	2,7	0	2,3	5,1	2,8	0
8	0,7	3,4	2,7	0	2,8	5,6	2,8	0
9	1,6	4,3	2,7	0	1,1	3,8	2,7	0
10	1,2	3,9	2,7	0	2,6	8,2	5,6	0

Table 4.2.4: Pengujian pada lampu kamar mandi

No	Menyala (detik)	Pesan diterima (detik)	Selisih (detik)	Error (%)	Padam (detik)	Pesan diterima (detik)	Selisih (detik)	Error (%)
1	2,4	5,2	2,8	0	0,8	3,5	2,7	0
2	2,1	4,9	2,8	0	2,5	5,4	2,9	0
3	0,8	3,4	2,6	0	3,8	6,6	2,8	0
4	1,9	4,7	2,8	0	3	5,8	2,8	0
5	0,6	3,4	2,8	0	1,6	4,4	2,8	0
6	3,3	6	2,7	0	2,1	5	2,9	0
7	0,6	3	2,4	0	3,2	6	2,8	0
8	0,7	3,5	2,8	0	3,3	6	2,7	0
9	1	3,8	2,8	0	2	4,7	2,7	0
10	2	4,8	2,8	0	0,7	3,4	2,7	0

Table 4.2.5: Pengujian pada lampu dapur

No	Menyala (detik)	Pesan diterima (detik)	Selisih (detik)	Error (%)	Padam (detik)	Pesan diterima (detik)	Selisih (detik)	Error (%)
1	3,8	6,9	3,1	0	3,2	6,8	3,6	0
2	3,2	6	2,8	0	2,7	5,5	2,8	0
3	3,5	6,3	2,8	0	3	5,8	2,8	0
4	1	3,7	2,7	0	1,6	4,4	2,8	0
5	3,3	7	3,7	0	2,6	5,4	2,8	0
6	2,2	4,9	2,7	0	0,7	3,6	2,9	0
7	2	4,8	2,8	0	9,6	13,8	4,2	0
8	1,7	4,5	2,8	0	2,9	5,8	2,9	0
9	1,4	4,5	3,1	0	1,3	4,5	3,2	0
10	0,7	3,4	2,7	0	1,5	4,2	2,7	0

Table 4.2.6: Pengujian pada lampu dapur

No	Menyala (detik)	Pesan diterima (detik)	Selisih (detik)	Error (%)	Padam (detik)	Pesan diterima (detik)	Selisih (detik)	Error (%)
1	1,1	4,8	3,7	0	2,4	5,2	2,8	0
2	2,1	6	3,9	0	1,7	4,5	2,8	0
3	4,2	7	2,8	0	2	4,6	2,6	0
4	2,9	5,7	2,8	0	5,6	8,4	2,8	0
5	5,1	7,8	2,7	0	0,8	3,6	2,8	0
6	2,3	5,1	2,8	0	2,5	5,2	2,7	0
7	1,6	4,4	2,8	0	1,1	3,7	2,6	0
8	1,4	4,1	2,7	0	1	3,8	2,8	0
9	1,2	3,9	2,7	0	2,7	5,4	2,7	0
10	3,2	6	2,8	0	1,4	4,3	2,9	0

ii. *Hasil Penelitian*

Dari hasil pengujian di atas, didapati bahwa sistem berjalan dengan baik, bot telegram dapat mengirim dan menerima pesan, dan Node MCU dapat menerima pesan dan mengeksekusi pesan tersebut.

V. Kesimpulan

a) Kesimpulan

Didalam pengujian sistem secara keseluruhan , dapat disimpulakn bahwa:

1. Module NodeMCU ESP8266 dapat menjadi salah satu alternatif IOT (*Internet of Things*)untuk mengontrol lampu rumah jarak jauh.
2. Implementasi sistem kendali lampu dapat berkerja dengan baik apabila smartphone ataupun desktop user dan perangkat NodeMCU ESP8266 terkoneksi dengan internet.
3. NodeMCU dapat menerima dan mengolah data yang dikirim oleh bot Telegram lalu dapan

memperosesnya dengan mengirimkan sinyal ke relay melalu pin yang sudah di program dan mengaktifkan output.
4. Sistem dapat mengirimkan pesan balik ke bot telegram sebagai tanda bahwa sistem sudah merespon perintah untuk menyalakan dan memadamkan lampu.

b) Saran

Untuk pengembangan selanjutnya diharapkan dapat mengembangkan sistem lebih sempurna dan lebih baik lagi. Dalam implementasi sistem kendali lampu rumah ini, penulis memberi beberapa saran diantaranya:

1. Penambahan *Output* pada NodeMCU yang diharapkan agar dapat mengontrol lebih banyak lagi, seperti untuk mengontrol stop kontak, alat alat elektronik, dll.
2. Penambahan LCD untuk mempermudah user, untuk mengetahui apakah sistem sedang berjalan atau tidak

3. Penggunaan *Internet Messenging* selain telegram, agar mengetahui apakah aplikasi *Internet Messengging* lain seperti Line, Whatsapp, Kakaotalk, dll., dapat berfungsi sama seperti telegram atau tidak.

Daftar Pustaka

1. Rohmat, T., Unang, S., Irfan Kurniawan, Muhamad. 2018. *Internet of Things*: *Sistem Keamanan Rumah berbasis Raspberry Pi dan Telegram Messenger*. jurusan Teknik telekomunikasi. Universitas Telkom.

2. Junaidi, Apri. 2015. *Internet of Things, Sejarah, Teknologi dan Penerapannya: Review*. Teknologi Informasi Terapan. Universitas Widyatama.

3. Geraldy Martin, P., R.Rumani, M., Randy Erfa, S. 2018. *Sistem otomasi rumah pintar menggunakan raspberry pi 3 berbasis android melalui komunikasi wireless*. Fakultas Teknik Elektro. Universitas Telkom.

4. Dhenny, R., Noor Al Azam, Moh, Benediktus, A. 2017. *Sistem Pemantau & pengendalian Rumah Cerdas Menggunakan Infrastruktur Internet Messaging*. Fakultas Ilmu Komputer. Universitas Narotama Surabaya.

5. Nurfitri, A., Yulia Nur, U., R.Rumani. 2018. Perancangan Speaker Recognition pada sistem kendali lampu berbasis mikrokontroler. Fakultas Teknik. Universitas Telkom.

6. Andrianto. Susanto, Arief. 2015. *Aplikasi Pengontrol Jarak Jauh Pada Lampu Rumah Berbasis Android*. Fakultas Teknik. Universitas Muria Kudus.

7. Singh, S., Bhullar, S. 2016. Hardware implementation of auto switching and light intensity control of LED lamps. Journal of Electrical & Computer Engineering Balkan.

8. Kishor Khadke, S., 2014. Home Appliances Control System Based On Android Smartphone. Department of Electronic and Telecomunication. Sinhgad School of Engineering.

This page is intentionally left blank

A Comparative Analysis of Air Pollution Detection Technique using Image Processing, Machine Learning and Deep Learning Approach

By Samia Sultana

Stamford University Bangladesh

Abstract- Air pollution is one of the principal environmental issues for the industrial emission and infection of the atmosphere which is caused by the climatic and traffic elements, burning of fossil fuels, etc. For the past several years, various methods and models have been discovered to detect the pollution of the air. In this paper, among all of those, three mechanisms have been focused, which are image processing approach, machine learning, and deep learning technique. A comparative study has developed among these three methods to detect the pollutant of the air in the account of time, cost and efficiency so that different scenario and system can choose the best method according to their need. The objective of this paper is to assimilate the procedure of these methods in brief and utilize this study to estimate the best solution for the corresponding requirement of any particular circumstances.

Keywords: air pollution, image processing, machine learning, deep learning.

GJCST-A Classification: I.2.m

ACOMPARATIVEANALYSISOFAIRPOLLUTIONDETECTIONTECHNIQUEUSINGIMAGEPROCESSINGMACHINELEARNINGANDDEEPLEARNINGAPPROACH

Strictly as per the compliance and regulations of:

A Comparative Analysis of Air Pollution Detection Technique using Image Processing, Machine Learning and Deep Learning Approach

Samia Sultana

Abstract- Air pollution is one of the principal environmental issues for the industrial emission and infection of the atmosphere which is caused by the climatic and traffic elements, burning of fossil fuels, etc. For the past several years, various methods and models have been discovered to detect the pollution of the air. In this paper, among all of those, three mechanisms have been focused, which are image processing approach, machine learning, and deep learning technique. A comparative study has developed among these three methods to detect the pollutant of the air in the account of time, cost and efficiency so that different scenario and system can choose the best method according to their need. The objective of this paper is to assimilate the procedure of these methods in brief and utilize this study to estimate the best solution for the corresponding requirement of any particular circumstances.

Keywords: air pollution, image processing, machine learning, deep learning.

I. Introduction

Air pollution is a mixture of natural and artificial substances that causes various harmful effects on human and the atmosphere. Most of the industrial activities emit massive amounts of toxic or harmful pollutants to the atmosphere such as SO2, NO2, CO, PM, and toxic organics. The pollution may also Lead to more serious problems affecting people and the whole world, such as global warming and climate change. The main reason for air quality damage is due to the smoke exhaust from industries, pollution generated by power plants, and the smoke exhaust from various vehicles. For the past few years, many methods and procedure have been invented and followed to detect air pollution. By image processing procedure, polluted images are collected from the environment and compared with the footages which are pollution-free. From those images, the diffusion process has been done, and the ratio factor is obtained to get the level of pollution. However, it works well for the images of a higher level of noise [1]. Again, if we consider the machine learning method, it detects the PM (Particulate matter) 2.5 levels based on atmospheric value for a particular day. Logistic regression is used to identify if a data sample is polluted or not, and auto-regression evaluates the future PM2.5 value based on past PM2.5 values [2]. Lastly, about the deep learning approach, which is a sub-cluster of machine learning, it uses large data set, solve the problem without dividing, using more layers, processing sequential layers simultaneously [3]. Since air pollution is a very hazardous factor for not only living being but also for nature, several numbers of techniques and procedures are there to detect this. In most of the cases, the main concentration is always on a single method and its analysis. But in this paper, the main focus will be on these three methods- pros and cons, expense and accuracy of these techniques. Comparison and correlation of these methods in one study might be convenient to differentiate, and select the suitable approach accordingly in many essential conditions.

II. Literature Review

Air pollution is a modern-day curse, which is an outcome of expanding urbanization and industrialization. It does, however, evolve with interesting transitions in line with economic, technological, and political change [4]. So, to disseminate the impact, the detection of pollution is necessary at the very first place. Among several detection procedures, a brief background description is given below of the three focused methods of this paper-

a) Image processing

Image processing is an effective method of converting an image, perform some necessary operation upon it, and extract useful information accordingly [5]. Some common important steps of image processing are- image pre-processing, segmentation, compression, canny edge detection, grayscale conversion, Gaussian blur, edge tracking by hysteresis, and many more.

Various techniques of image processing are used to detect contamination of the air. For example, satellite images are processed, and observed on different frequencies for being compared with different surface measurement to detect the pollution [6]. In some other research, IVS camera is used to obtain the reflectance caused by atmospheric components. [7].

Author: Samia Sultana, Lecturer, Department of Computer Science and Engineering, Stamford University Bangladesh.
e-mail: sayysamia@gmail.com

b) Machine Learning

Machine learning is an utilization of artificial intelligence (AI) that enable the systems to learn explicitly and enhance the output from experience [8]. The procedure of learning begins with observations, experience, and instruction to seek patterns in data and make better observation, and decisions.

Nowadays several machine learning methods have been used to predict and detect the air pollution such as- the extreme learning machine (ELM), online sequential multiple linear regression (OSMLR), etc, which have been successful in forecasting ozone and also PM2.5 [9].

c) Deep Learning Approach

Deep Learning is a subfield of machine learning concerned with algorithms inspired by the structure and function of the brain called artificial neural networks [10]. When the quantity of data intensified, machine learning techniques are insufficient in terms of performance, and deep learning gives a better performance like accuracy. Deep Learning methods can also provide productive result within air pollution epidemiology as it focuses on standard artificial neural network algorithms but operates on much large-scale, and deeper networks. The training operation with the combination of the depth of the networks allows the learning and proficiency of data abstractions at the different depths [11].

In this manuscript, out of so many procedures, only three simple techniques of these three methods will be described. The main objective of this paper is to give a concise knowledge on some significant air pollution detection procedure so that new and interested researchers in this field can get a reflection of some well-established methods in one paper and also synthesize a comparison among these methods.

III. Methodology

Considering the three procedures mentioned above, each of them performs and operates differently to detect air pollution. To estimate the better comparison, how they work and processed in the air pollution detection methodology, are discussed below-

a) Image processing

In this process, to detect the pollutants, images are obtained from the environment. The binary segmentation algorithm is used to segment the input image. Various steps such as image pre-processing, edge detection have been followed to obtain the pollution level in the environment using canny operator. Pre-processing of an image is used to improve the image quality of the input image. It partitions the images into small frames to obtain clarity regarding the frame which has the smoke or pollution content. Noise brightness ratio is used to find the ratio of the noisy image to that of the noiseless image. The diffusion process is used to remove unwanted noises (such as trees) and enhance the image quality to show only the smoky or polluted area [1]. Finally, a dialog box is displayed to show the level of pollution. With the help of input images, the System Monitor the pollution and obtain the ratio, and the diffusion process.

b) Machine Learning

The machine learning experiment has done on data set to detect the air quality was obtained from the UCI repository. The dataset have the following attributes:

- Temperature
- Wind speed
- Dew point
- Pressure
- PM2.5 Concentration(ug/m^3)

Logistic regression is an algorithm employed to detect if a user-defined sample to be polluted or not. The data set gets classified into two classes —polluted or not polluted. Like all regression analyses, the logistic regression is a predictive analysis. The logit function is used to generate log odds of an attribute that signifies the probability of the attribute. Based on the logit function, the system classifies the training data to be either 0 (not polluted) or 1 (polluted) and verifies its accuracy using the test data. The result of the user input is also 0/1 and not the PM2.5 level [2].

Basically, the forecasting and prediction of the level of PM2.5 of the future condition depend on the past assessments. An autoregressive (AR) model considers observations from previous time steps as input to predict the value at the next time step. Auto-regression applied on time series data set to predict the PM2.5 rate seven days before the current date and the date on which the value of PM2.5 is to be predicted [2]. And the prediction is pretty close if we compare it to the actual and final one.

c) Deep Learning Approach

There are several modeling techniques appropriate for air pollution prediction in deep learning. LSTM (Long short term memory) method is the mostly used one for this purpose. LSTM model employs a framework to estimate future forecasting, the contamination and meteorological information of time series data and it is also a part of recurrent neural networks (RNN). In LSTM model, a memory block is used instead of neurons in hidden layer of standard RNN.

In this context, another famous method is the STDL (Spatiotemporal deep learning) which take into account spatial and temporal variations for prediction. Stacked auto-encoder models are used as an introduction model to remove inherent air quality features. The main idea behind stacked auto-encoder is the connected output layer of auto-encoder stacked in below layer is wired to the successive input layer [3].

Moreover, spatiotemporal data analysis is prominent for increasing prediction performance in DAL (deep air learning) models which mainly uses feature selection and semi-supervised learning. DAL is an efficient methodology which also considers spatiotemporal semi-supervised learning and feature selection in the input and output layers [3].

Hence, all these deep learning methods give a reasonably good prediction of various pollutants of the air like- PM2.5, O3, NO2, and PM10.

IV. Comparison

If we compare among these three, all of them can find about the pollution to some extent. But if we follow each of them one by one, in image processing, it only identifies if the air is pollutant or not. It gives output just in a dialog box and defines a kind of yes or no. It does not exaggerate any further. So, it is only able to detect the pollution if only the above particular image processing technique is concerned. Again, if we observe the machine learning method, it works on a specific data set, first find out if the air is pollutant or not. Then, it tries to find out the level of PM2.5. So, in comparison with image processing, after detecting the pollution, it is little more specified since it finds the PM2.5 level as well considering the above method of machine learning.

Lastly, looking at the deep learning approach and its various methods, it finds out not only PM2.5 but also some other pollutant along with the detection of pollution. But it works on massive data set in comparison with machine learning.

For better understanding, we can observe the following table which provides fundamental differences and similarities of the references [1] [2] [3].

Table 1: Comparison of the three methods

	Image Processing	Machine Learning	Deep Learning
Pollution Detection	Possible.	Possible.	Possible.
Dataset	Not needed.	Needed.	Needed.
Accuracy Level	Good, considering the detection.	Very good, As identify PM2.5 level along with detection.	Excellent, As identify PM2.5, O3, NO2, and PM10 level along with detection.
Pollutant Detection	None.	PM2.5.	PM2.5, O3, NO2, and PM10.
Expense	Less expensive regarding no need of data set.	Expensive as requirement of dataset.	Most expensive considering huge range of dataset.
Detection area	Particular area where the camera is placed and can move.	Large area considering the range of data set.	Large area considering the range of data set.

Therefore if we observe the three procedures that have been discussed in this paper, considering the effectiveness and accuracy, deep learning approach will give the best result among these three. But it needs to be done on a huge data set. So along with its accuracy level, the overall expense and cost will also increase. If simple detection is the requirement, then image processing can be a good option.

V. Conclusion

Air Pollution is one of the major issues of nature, and it is expanding day by day with increasing urbanization and industrialization. Several methodologies are there to detect that. However, in this manuscript, as mentioned earlier, the focus was on only three simple procedures. Hence, the primary observations of this paper are- image processing can be a favorable choice for detection, but more specified algorithm and sensors are needed to detect the impure substance. But if more specified detection of pollutants is required, then machine learning or deep learning will be a better approach. And if the expense is concerned, deep learning will be most expensive owing to the enormous range of the dataset. In the future, more enhanced mechanism may discover in regard to both cost and accuracy.

References Références Referencias

1. Joans. S. M and Pavithra. M, (2017) Air Pollution Monitoring through Image Processing, IJRASET, 5, 1377-1382. https://www.ijraset.com/fileserve.php?FID=10557
2. C R. A, Deshmukh C. R., D K. N and Vidyavastu P. G (2018) Detection and Prediction of Air pollution using Machin Learning Models, IJETT, 59, 204-207. http://ijettjournal.org/2018/volume-59/number-4/IJETT-V59P238.pdf
3. Ayturan Y. A, Ayturan Z. C and Altun H. O (2017) Air Pollution Modeling with Deep Learning: A Review, IJEPEM, 1(3),58-62. https://dergipark.org.tr/download/article-file/555329
4. Nathanson J. A (2018) Air Pollution https://www.britannica.com/science/air-pollution

5. Elsevier B. V (2019) Image Processing https://www.sciencedirect.com/topics/neuroscience/image-processing

6. Prochdxka. A, Kolinovd. M, Fiala. J, Hampl. P and Hlavaty. k (2000), Satellite image processing and air pollution detection, 2000 IEEE International Conference on Acoustics, Speech, and Signal Processing. Proceedings (Cat. No.00CH37100), Istanbul, Turkey, 2000, pp. 2282-2285 vol.4.

7. By C. J. Wong, MatJafri. M. Z., Abdullah. K and. Lim H. S (2009), Development of Low cost Air quality Monitoring System using Image Processing Technique. Yung-Sheng Chen, Intech Open.

8. Fraggella.D (2019) What is Machine Learning https://emerj.com/ai-glossary-terms/what-is-machine-learning/

9. Bellinger, C., Mohomed Jabbar, M. S., Zaïane, O., & Osornio-Vargas, A. (2017). A systematic review of data mining and machine learning for air pollution epidemiology. BMC public health, 17(1), 907.

10. Brownlee. J (2016) Deep Learning and Artificial NeuralNetwork.https://machinelearningmastery.com/what-is-deep-learning/

11. Peng. H (2013), Air Quality Prediction by Machine Learning Methods, B.Sc. Thesis, Sun Yat-sen University, Vancouver.

Global Journals Guidelines Handbook 2019

FELLOW OF ASSOCIATION OF RESEARCH SOCIETY IN COMPUTING (FARSC)

Global Journals Incorporate (USA) is accredited by Open Association of Research Society (OARS), U.S.A and in turn, awards "FARSC" title to individuals. The 'FARSC' title is accorded to a selected professional after the approval of the Editor-in-Chief/Editorial Board Members/Dean.

> The "FARSC" is a dignified title which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., FARSC or William Walldroff, M.S., FARSC.

FARSC accrediting is an honor. It authenticates your research activities. After recognition as FARSC, you can add 'FARSC' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, and Visiting Card etc.

The following benefits can be availed by you only for next three years from the date of certification:

FARSC designated members are entitled to avail a 40% discount while publishing their research papers (of a single author) with Global Journals Incorporation (USA), if the same is accepted by Editorial Board/Peer Reviewers. If you are a main author or co-author in case of multiple authors, you will be entitled to avail discount of 10%.

Once FARSC title is accorded, the Fellow is authorized to organize a symposium/seminar/conference on behalf of Global Journal Incorporation (USA).The Fellow can also participate in conference/seminar/symposium organized by another institution as representative of Global Journal. In both the cases, it is mandatory for him to discuss with us and obtain our consent.

You may join as member of the Editorial Board of Global Journals Incorporation (USA) after successful completion of three years as Fellow and as Peer Reviewer. In addition, it is also desirable that you should organize seminar/symposium/conference at least once.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

The FARSS can go through standards of OARS. You can also play vital role if you have any suggestions so that proper amendment can take place to improve the same for the benefit of entire research community.

As FARSS, you will be given a renowned, secure and free professional email address with 100 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders,Auto-Responders, Email Delivery Route tracing, etc.

The FARSS will be eligible for a free application of standardization of their researches. Standardization of research will be subject to acceptability within stipulated norms as the next step after publishing in a journal. We shall depute a team of specialized research professionals who will render their services for elevating your researches to next higher level, which is worldwide open standardization.

The FARSS member can apply for grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A. Once you are designated as FARSS, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria. After certification of all your credentials by OARS, they will be published on your Fellow Profile link on website https://associationofresearch.org which will be helpful to upgrade the dignity.

The FARSS members can avail the benefits of free research podcasting in Global Research Radio with their research documents. After publishing the work, (including published elsewhere worldwide with proper authorization) you can upload your research paper with your recorded voice or you can utilize chargeable services of our professional RJs to record your paper in their voice on request.

The FARSS member also entitled to get the benefits of free research podcasting of their research documents through video clips. We can also streamline your conference videos and display your slides/ online slides and online research video clips at reasonable charges, on request.

The FARSS is eligible to earn from sales proceeds of his/her researches/reference/review Books or literature, while publishing with Global Journals. The FARSS can decide whether he/she would like to publish his/her research in a closed manner. In this case, whenever readers purchase that individual research paper for reading, maximum 60% of its profit earned as royalty by Global Journals, will be credited to his/her bank account. The entire entitled amount will be credited to his/her bank account exceeding limit of minimum fixed balance. There is no minimum time limit for collection. The FARSS member can decide its price and we can help in making the right decision.

The FARSS member is eligible to join as a paid peer reviewer at Global Journals Incorporation (USA) and can get remuneration of 15% of author fees, taken from the author of a respective paper. After reviewing 5 or more papers you can request to transfer the amount to your bank account.

MEMBER OF ASSOCIATION OF RESEARCH SOCIETY IN SCIENCE (MARSS)

The ' MARSS ' title is accorded to a selected professional after the approval of the Editor-in-Chief / Editorial Board Members/Dean.

The "MARSS" is a dignified ornament which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., MARSS or William Walldroff, M.S., MARSS.

MARSS accrediting is an honor. It authenticates your research activities. After becoming MARSS, you can add 'MARSS' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, Visiting Card and Name Plate etc.

The following benefitscan be availed by you only for next three years from the date of certification.

MARSS designated members are entitled to avail a 25% discount while publishing their research papers (of a single author) in Global Journals Inc., if the same is accepted by our Editorial Board and Peer Reviewers. If you are a main author or co-author of a group of authors, you will get discount of 10%.

As MARSS, you will be given a renowned, secure and free professional email address with 30 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders,Auto-Responders, Email Delivery Route tracing, etc.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

The MARSC member can apply for approval, grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A.

Once you are designated as MARSC, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria.

It is mandatory to read all terms and conditions carefully.

Auxiliary Memberships

Institutional Fellow of Open Association of Research Society (USA)-OARS (USA)

Global Journals Incorporation (USA) is accredited by Open Association of Research Society, U.S.A (OARS) and in turn, affiliates research institutions as "Institutional Fellow of Open Association of Research Society" (IFOARS).

The "FARSC" is a dignified title which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., FARSC or William Walldroff, M.S., FARSC.

The IFOARS institution is entitled to form a Board comprised of one Chairperson and three to five board members preferably from different streams. The Board will be recognized as "Institutional Board of Open Association of Research Society"-(IBOARS).

The Institute will be entitled to following benefits:

The IBOARS can initially review research papers of their institute and recommend them to publish with respective journal of Global Journals. It can also review the papers of other institutions after obtaining our consent. The second review will be done by peer reviewer of Global Journals Incorporation (USA) The Board is at liberty to appoint a peer reviewer with the approval of chairperson after consulting us.
The author fees of such paper may be waived off up to 40%.

The Global Journals Incorporation (USA) at its discretion can also refer double blind peer reviewed paper at their end to the board for the verification and to get recommendation for final stage of acceptance of publication.

The IBOARS can organize symposium/seminar/conference in their country on behalf of Global Journals Incorporation (USA)-OARS (USA). The terms and conditions can be discussed separately.

The Board can also play vital role by exploring and giving valuable suggestions regarding the Standards of "Open Association of Research Society, U.S.A (OARS)" so that proper amendment can take place for the benefit of entire research community. We shall provide details of particular standard only on receipt of request from the Board.

The board members can also join us as Individual Fellow with 40% discount on total fees applicable to Individual Fellow. They will be entitled to avail all the benefits as declared. Please visit Individual Fellow-sub menu of GlobalJournals.org to have more relevant details.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

After nomination of your institution as "Institutional Fellow" and constantly functioning successfully for one year, we can consider giving recognition to your institute to function as Regional/Zonal office on our behalf.

The board can also take up the additional allied activities for betterment after our consultation.

The following entitlements are applicable to individual Fellows:

Open Association of Research Society, U.S.A (OARS) By-laws states that an individual Fellow may use the designations as applicable, or the corresponding initials. The Credentials of individual Fellow and Associate designations signify that the individual has gained knowledge of the fundamental concepts. One is magnanimous and proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice.

Open Association of Research Society (US)/ Global Journals Incorporation (USA), as described in Corporate Statements, are educational, research publishing and professional membership organizations. Achieving our individual Fellow or Associate status is based mainly on meeting stated educational research requirements.

Disbursement of 40% Royalty earned through Global Journals : Researcher = 50%, Peer Reviewer = 37.50%, Institution = 12.50% E.g. Out of 40%, the 20% benefit should be passed on to researcher, 15 % benefit towards remuneration should be given to a reviewer and remaining 5% is to be retained by the institution.

We shall provide print version of 12 issues of any three journals [as per your requirement] out of our 38 journals worth $ 2376 USD.

Other:

The individual Fellow and Associate designations accredited by Open Association of Research Society (US) credentials signify guarantees following achievements:

➢ The professional accredited with Fellow honor, is entitled to various benefits viz. name, fame, honor, regular flow of income, secured bright future, social status etc.

- In addition to above, if one is single author, then entitled to 40% discount on publishing research paper and can get 10%discount if one is co-author or main author among group of authors.
- The Fellow can organize symposium/seminar/conference on behalf of Global Journals Incorporation (USA) and he/she can also attend the same organized by other institutes on behalf of Global Journals.
- The Fellow can become member of Editorial Board Member after completing 3yrs.
- The Fellow can earn 60% of sales proceeds from the sale of reference/review books/literature/publishing of research paper.
- Fellow can also join as paid peer reviewer and earn 15% remuneration of author charges and can also get an opportunity to join as member of the Editorial Board of Global Journals Incorporation (USA)
- • This individual has learned the basic methods of applying those concepts and techniques to common challenging situations. This individual has further demonstrated an in–depth understanding of the application of suitable techniques to a particular area of research practice.

Note :

"
- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.

- In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.

- In case of "Difference of Opinion [if any]" among the Board members, our decision will be final and binding to everyone.
"

Preferred Author Guidelines

We accept the manuscript submissions in any standard (generic) format.

We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

Alternatively, you can download our basic template from https://globaljournals.org/Template.zip

Authors should submit their complete paper/article, including text illustrations, graphics, conclusions, artwork, and tables. Authors who are not able to submit manuscript using the form above can email the manuscript department at submit@globaljournals.org or get in touch with chiefeditor@globaljournals.org if they wish to send the abstract before submission.

Before and during Submission

Authors must ensure the information provided during the submission of a paper is authentic. Please go through the following checklist before submitting:

1. Authors must go through the complete author guideline and understand and *agree to Global Journals' ethics and code of conduct,* along with author responsibilities.
2. Authors must accept the privacy policy, terms, and conditions of Global Journals.
3. Ensure corresponding author's email address and postal address are accurate and reachable.
4. Manuscript to be submitted must include keywords, an abstract, a paper title, co-author(s') names and details (email address, name, phone number, and institution), figures and illustrations in vector format including appropriate captions, tables, including titles and footnotes, a conclusion, results, acknowledgments and references.
5. Authors should submit paper in a ZIP archive if any supplementary files are required along with the paper.
6. Proper permissions must be acquired for the use of any copyrighted material.
7. Manuscript submitted *must not have been submitted or published elsewhere* and all authors must be aware of the submission.

Declaration of Conflicts of Interest

It is required for authors to declare all financial, institutional, and personal relationships with other individuals and organizations that could influence (bias) their research.

Policy on Plagiarism

Plagiarism is not acceptable in Global Journals submissions at all.

Plagiarized content will not be considered for publication. We reserve the right to inform authors' institutions about plagiarism detected either before or after publication. If plagiarism is identified, we will follow COPE guidelines:

Authors are solely responsible for all the plagiarism that is found. The author must not fabricate, falsify or plagiarize existing research data. The following, if copied, will be considered plagiarism:

- Words (language)
- Ideas
- Findings
- Writings
- Diagrams
- Graphs
- Illustrations
- Lectures

- Printed material
- Graphic representations
- Computer programs
- Electronic material
- Any other original work

Authorship Policies

Global Journals follows the definition of authorship set up by the Open Association of Research Society, USA. According to its guidelines, authorship criteria must be based on:

1. Substantial contributions to the conception and acquisition of data, analysis, and interpretation of findings.
2. Drafting the paper and revising it critically regarding important academic content.
3. Final approval of the version of the paper to be published.

Changes in Authorship

The corresponding author should mention the name and complete details of all co-authors during submission and in manuscript. We support addition, rearrangement, manipulation, and deletions in authors list till the early view publication of the journal. We expect that corresponding author will notify all co-authors of submission. We follow COPE guidelines for changes in authorship.

Copyright

During submission of the manuscript, the author is confirming an exclusive license agreement with Global Journals which gives Global Journals the authority to reproduce, reuse, and republish authors' research. We also believe in flexible copyright terms where copyright may remain with authors/employers/institutions as well. Contact your editor after acceptance to choose your copyright policy. You may follow this form for copyright transfers.

Appealing Decisions

Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

Declaration of funding sources

Global Journals is in partnership with various universities, laboratories, and other institutions worldwide in the research domain. Authors are requested to disclose their source of funding during every stage of their research, such as making analysis, performing laboratory operations, computing data, and using institutional resources, from writing an article to its submission. This will also help authors to get reimbursements by requesting an open access publication letter from Global Journals and submitting to the respective funding source.

Preparing your Manuscript

Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

FORMAT STRUCTURE

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in a research paper?" Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

PREPARATION OF ELETRONIC FIGURES FOR PUBLICATION

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

TIPS FOR WRITING A GOOD QUALITY COMPUTER SCIENCE RESEARCH PAPER

Techniques for writing a good quality computer science research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of computer science then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10.Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

INFORMAL GUIDELINES OF RESEARCH PAPER WRITING

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- o Explain the value (significance) of the study.
- o Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- o Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- o Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- o Report the method and not the particulars of each process that engaged the same methodology.
- o Describe the method entirely.
- o To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- o Simplify—detail how procedures were completed, not how they were performed on a particular day.
- o If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- o Resources and methods are not a set of information.
- o Skip all descriptive information and surroundings—save it for the argument.
- o Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

o   Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
o   In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
o   Present a background, such as by describing the question that was addressed by creation of an exacting study.
o   Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
o   Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

o   Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
o   Do not include raw data or intermediate calculations in a research manuscript.
o   Do not present similar data more than once.
o   A manuscript should complement any figures or tables, not duplicate information.
o   Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

o   You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
o   Give details of all of your remarks as much as possible, focusing on mechanisms.
o   Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
o   One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
o   Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

CRITERION FOR GRADING A RESEARCH PAPER (COMPILATION)
BY GLOBAL JOURNALS INC. (US)

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals Inc. (US).

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

INDEX

A

Asynchronously · 4, 10

C

Ciphertext · 17
Consecutively · 3, 4

F

Fossil · 33

K

Kernel · 2, 3, 5

N

Nondeterministic · 18

P

Pengontrol · 21
Personifications · 6

R

Reconfiguration · 8

S

Sequential · 33, 34
Synchronously · 9

save our planet

Global Journal of Computer Science and Technology

9 2

70116 58698 61427>

ISSN 9754350