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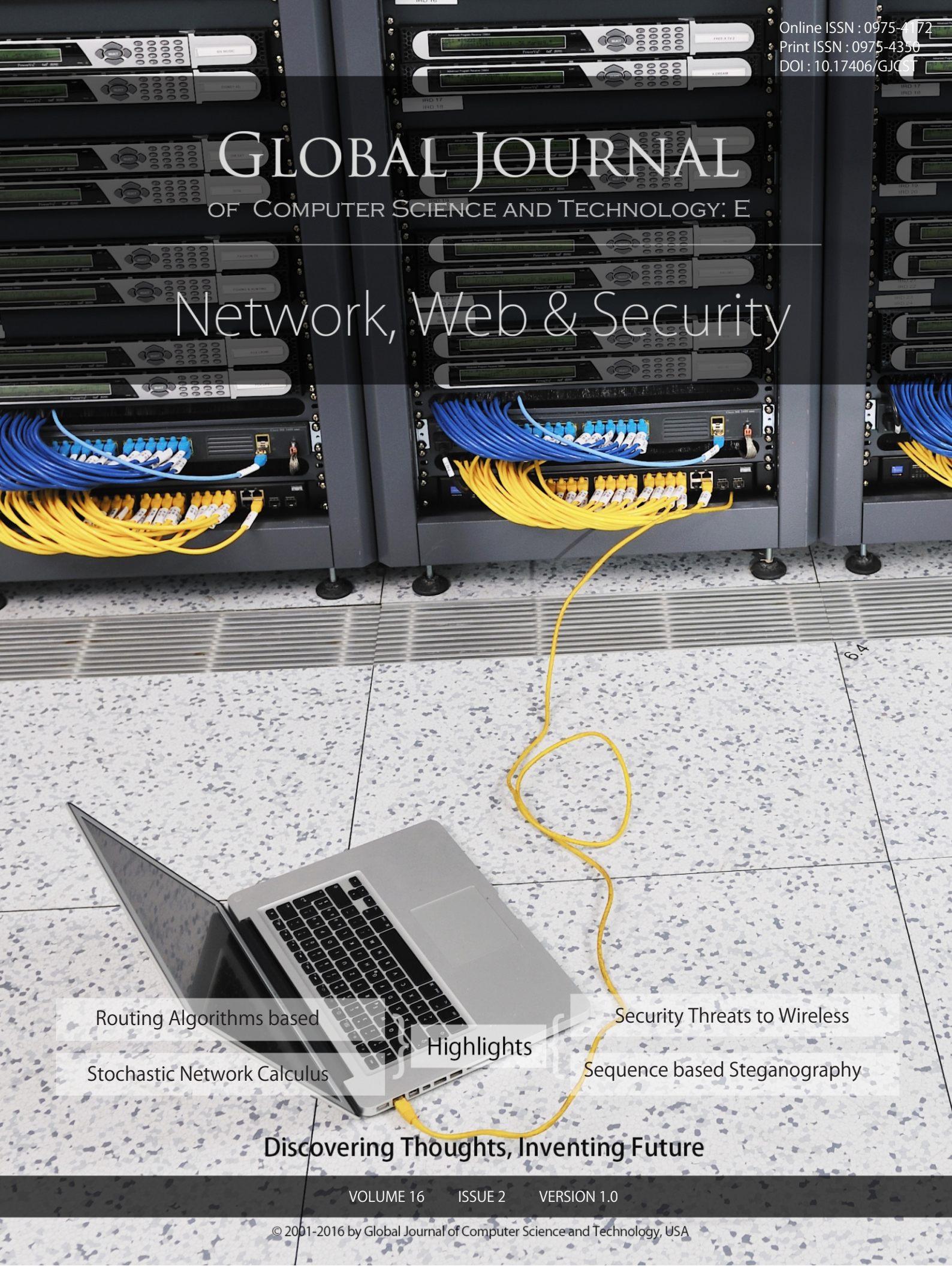

Routing Algorithms based Stochastic Network Calculus

Security Threats to Wireless Sequence based Steganography

Highlights

Discovering Thoughts, Inventing Future

VOLUME 16 ISSUE 2 VERSION 1.0

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Security Threats to Wireless Networks and Modern Methods of Information Security

By Dr. Yasser Elmalik Ahmed Seleman
Bisha University, Saudi Arabia

Abstract- Network is a technology used to connect computers and devices together. They allow people the ability to move easily and stay in touch while roaming the Internet in the coverage area. This increases efficiency by allowing data entry and access to the site. Comparing wireless networks wired networks in terms of cost, we find that wired networks are more expensive due to the cost of the network connections of electricity and running and add computers and change their positions to suit the network supply.

As a result, the use of widespread wireless networks. But there are security gaps in these networks may cause problems for users Security holes intended problem or weakness in the wireless network system may make it easier for hackers to penetrate and steal sensitive data and causing material losses to individuals and companies.

Keywords: protocol: language is between computers connected via the network, in order to exchange information. if we define the language of the protocol technology, we say that a formal description of the bodies messages and rules that must be followed on two computers to exchange those messages.

GJCST-E Classification : C.2.1 D.4.6

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Security Threats to Wireless Networks and Modern Methods of Information Security

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As a result, the use of widespread wireless networks. But there are security gaps in these networks may cause problems for users Security holes intended problem or weakness in the wireless network system may make it easier for hackers to penetrate and steal sensitive data and causing material losses to individuals and companies.

Knowing security holes and contributes significantly to the wireless network is immune from attempts to infiltrate and penetration design.

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I. Introduction

Wireless networks are a type of computer networks, and is working on the data and information transfer (send - reception) without wires (wirelessly), through electromagnetic waves carry this information.

Important wireless network to protect intruders from access to user information, most people have more than one computer and laptop at home and even phones and key servers and Xbox, and other devices that they use to store their information and their files and family photos and passwords, vulnerable to theft and access to information secret task such as banking bank statements and e-mails. of the most important things that contributed to the technical stability has become and therefore reliable in production in various business environments, especially with the ease of use and price of access points (Access Point) as well as to support wireless networks in portable devices processors and breadth of the spread of this technology, where there is almost devoid home or facility of WLAN access points.

As far as deployment of this technology as far as increase the importance of care by applying security measures to protect wireless networks, and the neglect of this aspect of user data and regulations relating to the wireless network at great risk from hackers and intruders to within it may displays.

The use of wireless networks is increasing dramatically due to the offered integration with modern electronics that are produced in all areas of our daily lives.

The importance of the different networks and their uses:

The networks that have been established precisely one of the most orderly and administrative components that depend on it most of the work because of their key role in the organization of the administrative process in the economic entity of different types, or at home, where networks provide a lot of important solutions, including:

1. Facilitate the exchange of documents and files process.
2. Several common printing methods provide.
3. Provide wireless network to access the Internet through mobile devices.
4. users' computers provide access management and determine their powers.
5. possibility of providing management of web content available at the users control and allow the blocking of sites.
6. connect servers to provide various data and deal with administrative programs that need communication between users.
7. The ability to make a local mail server to send and receive e-mail between the local network users.
8. provide a more flexible and safer operations for data backup mechanisms.
9. saving store shared information and access to centers in multiple ways.
10. saving mechanisms to link the branches over the Internet and the work of the so-called VPN - Virtual Private Network.

Clarify the types of protocols used and its advantages

First: Protocol (WEP), one of the oldest protocols used in wireless networks encryption, but it suffers from a big weak spot, registered any penetrative

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professional breaking this protocol over a short period, and are advised to use protocol (WEP) with key length of 128 bits, because it provides protection better than the shorter 64-bit key, and the key is created in the access point can then be copied to any device that is connected to the wireless network, and called this kind of common key encryption key (PSK).

Second Protocol (WPA) is the best protocol of the previous protocol, which provides the strongest encryption level, and often access and calling cards in the devices available in the market points of support over the past three years of this Protocol, and the availability of new operating systems support for the use (WPA), and can be used with an encryption key is shared (PSK) and with the encryption algorithm (TKIP), in Windows XP called Protocol (WPA - PSK), where should the user to copy the encryption key for the device to be connected to the wireless network, and can be used on a larger scale in institutions using Documentation / EAP 802.1 and in which the use of electronic certification mechanism.

Third Protocol (WPA2) which is an enhanced protocol (WPA) features that uses AES algorithm for encryption, it is also used in the bilateral networks, ad-hoc, and is available in a way (PSK) or using documentation / EAP 802.1 mechanism during which he can use the electronic certificates.

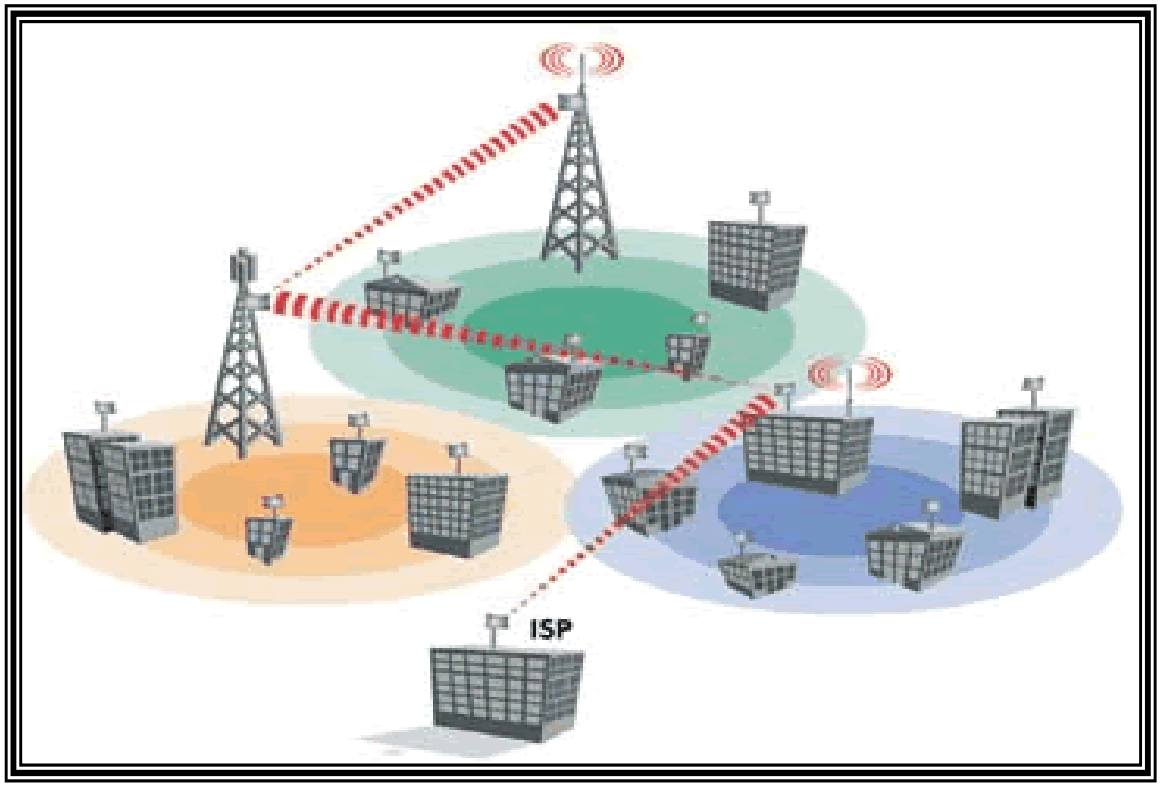

Fig. 1: Contact the wireless network

II. Wireless Networking Problems

Piracy operations on wireless networks in the recent period have become very many and varied the discovery of serious piracy operations targeting wireless routers (routers) to conduct malicious those changes, as the number of devices that have been controlled so far to 300 thousand sets of various types, including D-Link, Micro net, Tend, TP-Link, and other network routers. Hackers have resorted to the use of a variety of techniques that helped them access to these devices and make changes on the DNS system which is used to translate domain addresses and routed to the IP device user address of the computer to determine the device-specific Web servers, according to the published report pointed out last Monday by researchers at security firm Team Cymru.

This allows the penetration process to hackers planted a blank password in the wireless routers for users of type TP-Link words, in addition to the other way allows them to control the passwords for wireless network WPA / WPA2 remotely, So far, these attacks, involving more than 300 thousand sets in a wide range of countries, include India, Italy, Thailand, Colombia, and Vietnam. The ultimate goal of this process is to redirect end users to malicious sites trying to steal your bank accounts passwords.

It is clear that there are weak points in the direction and the modem and other devices that rely on its own internal operating system devices, it is

necessary to fill these gaps exposed millions of users at risk.

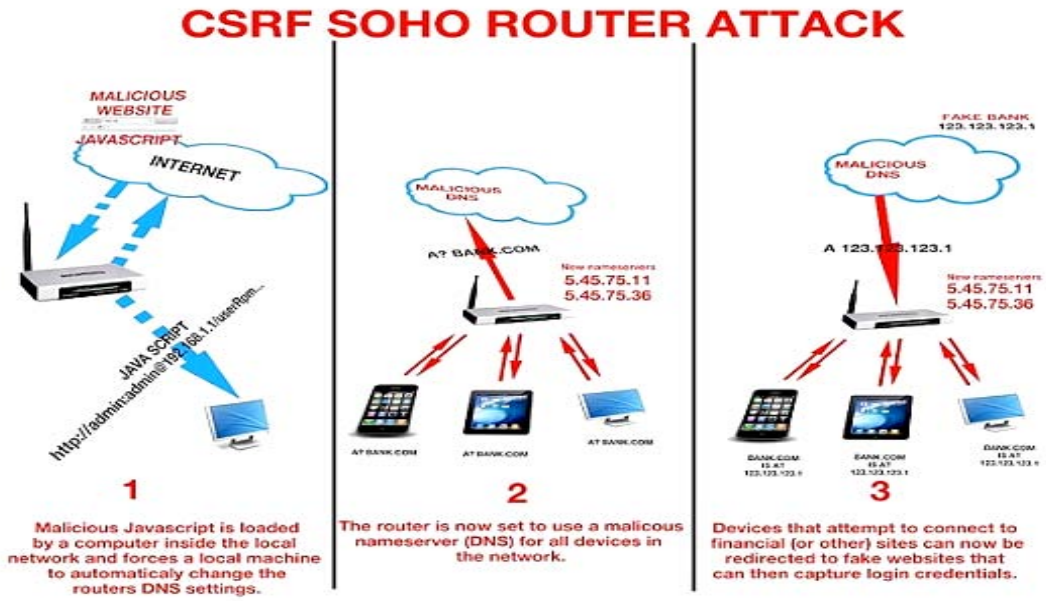

Fig. 2 : Piracy aimed at wireless routers (routers)

III. Protection for Wireless Network

Researcher explains a number of actions that should be applied to protect wireless networks are summarized below:

1. must be protected access as a user point and password are brought in whenever the user wants to change the settings of the access point, it should be noted that the new access points (or which has been to restore the default by the settings) be password-protected recognizable by the manufacturer, so be on the initiative to change the user password in order to avoid hackers to enter a network and controlled by changing the settings of the access point, and in general should the user choose the appropriate password consists of at least seven boxes to be a mixture of letters and numbers.
2. The most important protection methods are concentrated in the wireless network is encrypted, and there is more than one system (or so-called encryption protocol), a different protection force.
3. must wireless network ID change (SSID) so that does not imply access point type or her whereabouts, the default in new access points indicating the access and manufacturer her point type, allowing hackers an opportunity to attack the access and control points, taking advantage of the special gaps, You should also disable the announcement of the access point identifier option (Broadcasting SSID).

Researcher also adds steps to protect your wireless network

1. Encrypt wireless network

This step is the most important action taken to protect the wireless network. Used encryption means today is (WPA2) and (WPA-PSK) and (WEP). Without that go deeper in the encryption techniques (WPA2) is the latest in the world of encryption cry very favourite to buy Router supports this technique. By this encryption can be used for complex password consisting of 64 box (large and small letters, numbers, signs) and recommend everyone to exploit all available fields at secret word set. But how you will remember the pin number composed of 64 boxes? There is no need to write a PIN every time you want to enter the wireless network because it will remain preserved in the network settings, but preferred to write a PIN number on file Txt and keep it on an external USB memory card. Older routers used type of encryption technology (WPA) Note that the previous encryption (WPA2) better than him. For encryption (WEP) never think about using it because it is considered a weak encryption and can penetrate the network within 4 hours (maybe a few minutes) using special software.

2. Use the MAC Filtering

On each network card there is a special code called Pal Mac Address distinguishes it from other network card. I picked up a picture of your network card so you can see the Mac Address. In the router settings you can adjust most settings, so that this does not fall on the wireless network, but according to a specific list of Mac Address.

The researcher recommends some tips to protect

1. Use a firewall Firewall software on your mobile device.
2. Free hot contact points are often less secured than that paid. Points are paid to follow-up and protection of process and change all safety requirements have with encryption.
3. Turn off file sharing feature on the device to prevent the arrival of any person to own your files or even open the field to participate to do so, remove the property from the files in the Tools menu Folder Options.
4. If in your private and important files then tightly closed with a password. How easy Compress the files you want protected and in the options you'll find a special option put a password for the file even though the person taking the file from your computer will not be able slot and always use a password consisting of numbers, letters and punctuation and a low of eight characters it difficult to decrypt.
5. There are also programs you place after the files and folders words and also programs. To limit their use.
6. Turn off the wireless network card on your mobile device. It has not been operating mode button on the mobile device messes. But he was placed in order to close it after the completion of use. This will save you a first energy and will prevent other people from entering or even access to your device.
7. If you are working on a wireless network card remove the card from Mahmul. albages some tips to protect:
8. Do not connect to a wireless network and your device does not contain a virus protection program. Once you connect to the wireless network there is the possibility that either infected with HIV or electronic worm within 15 seconds if your computer did not contain the anti-virus software modern

IV. Conclusions

Due to the privacy of wireless networks, the security risks faced by the different from those that exist in Ethernet networks and may be the wireless network is breached gate to the wired network due to the easy access to him.

Where is the Access Point of exotic or alien computers (Rogue access point and Rogue Clients) is the security breach is common in wireless networks and this hack is happening as a result of the existence of these devices into the wireless network signal, allowing it to pick up its signal.

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Performance Analysis of Energy Efficient Grid based Wireless Body Area Network System

By Aashima Arya & Naveen Bilandi
DAV University, India

Abstract- Wireless Body Area Network makes it possible to monitor patient's health under critical situations by integrating bio-sensors with a mobile phone. With this WBAN has now become a emerging technology to improve patient's quality of life by enabling health monitoring at home instead of at a hospital. WBAN reduces the workload of medical practitioners as well as healthcare costs which further results in higher efficiency. This paper presents the architecture of existing wireless health monitoring system (WBAN system). Due to limited battery capacity of sensor nodes there is need to have energy efficient design. This work explores the grid based data dissemination model for WBAN. The grid model divides the network area into cells. All the nodes will not participate in data transmission which conserves energy. Further we compare existing model with the grid model on the basis of energy consumed, throughput and delay.

Keywords: *architecture; grid model; simulation; wireless body area network.*

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Aashima Arya[α] & Naveen Bilandi[σ]

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Keywords: architecture; grid model; simulation; wireless body area network.

I. Introduction

Advances in wireless sensor network technologies [1] leads to new opportunities to form WBAN for improving healthcare system and for remote sensing of biological parameters of human body. Hence became a cost effective solution in the field of health monitoring and fitness. WBAN use wireless communication technologies as well as biomedical signal processing in order to enable uninterrupted and long term monitoring of vital biological parameters under critical situations which can be either post operative care or old age homes. WBAN can be used to reduce mortality rate by early detection of the abnormalities and provide timely right treatment.

The strict requirement of WBAN [2] is reliable transmission due to limited battery resources of sensor nodes in order to collect information about the physiological parameters of the patient. These parameters such as Blood Pressure (BP), Electrocardiogram (ECG), and Electroencephalogram (EEG) etc are monitored and further collected on the base station. This collected data is then used or analyzed by various medical practitioners after being transmitted to the medical server. Fig1 illustrate the placement of sensor nodes on the body. Data from various nodes is transmitted to the sink node which is responsible for the data collection from various nodes. Sink node can be mobile phone o home personal computer. Sink node further transmits the data to the medical server.

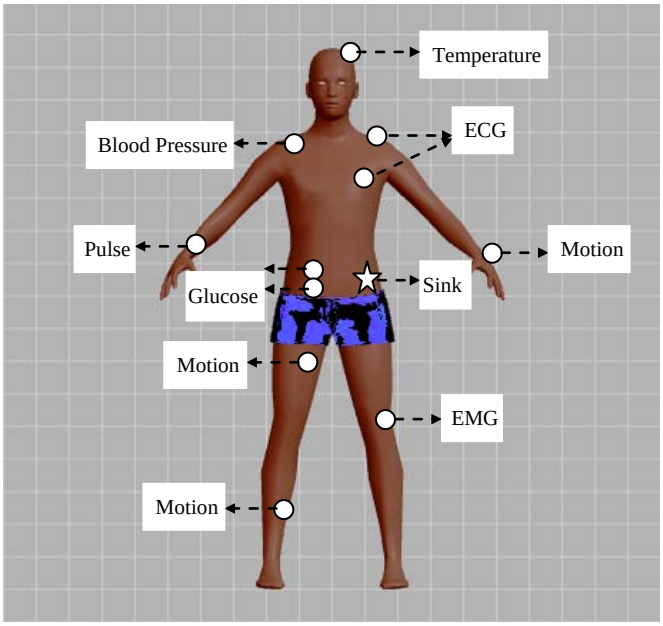

Fig. 1: Placement of WBAN nodes

The major requirements [3] for wireless medical sensors are:

1. Wearability - For effective WBAN, wireless sensors should be lightweight and small i.e. nodes should be easily wearable without restricting the mobility of patients in order to achieve non-invasive ambulatory health monitoring. The size and weight of batteries determines the size and weight of sensors.
2. Interoperability - Medical sensors should allow user to easily establish a WBAN depending on user's state of health by enabling health monitoring at home. Interoperability results in more affordable systems.
3. Reliable Communication - For the effective medical applications communication between the nodes must be reliable. To improve reliability, on sensor signal processing can be done. One example which leads to reliable communication is to extract some of the features on the sensors instead of transferring raw data and transfer only required information. This will reduce the load on communication channel

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which further save the energy and consequently increase the battery life of sensors.

4. Security - For the overall system security, wireless medical sensors must meet all the privacy requirements in order to guarantee data integrity. For this purpose key establishment, authentication etc can be done.

a) Existing Architecture of WBAN

Fig 2 describes the system architecture of wireless body area network [4] for remote healthcare monitoring system.

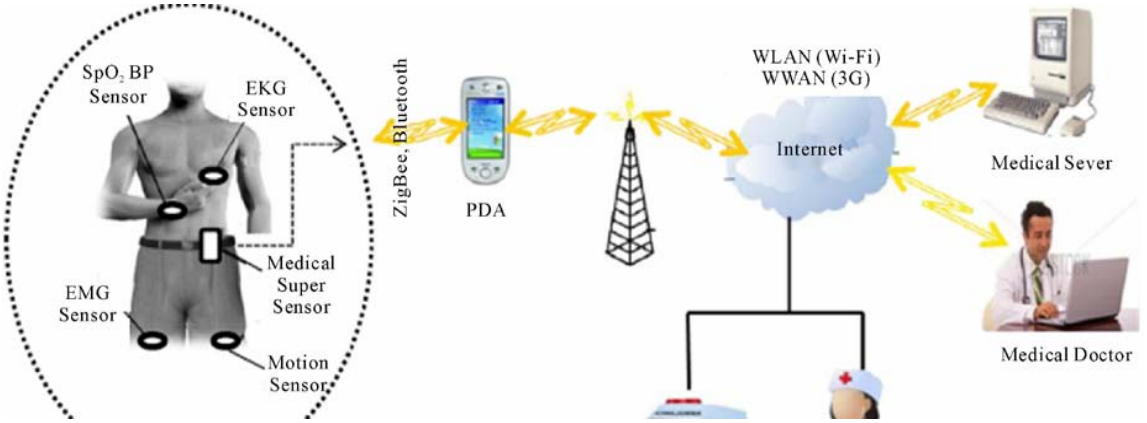


Fig. 2 : Existing WBAN system Architecture

The architecture is composed of three tiers:

First Tier (Wireless Body Area Network)

Patient is considered as the main part of this system. This tier includes integration of low power pervasive sensor nodes. These wireless medical sensor nodes combine to form a WBAN. These nodes have capability of sensing, processing and forwarding of one or more physiological signals of the human body. E.g. ECG sensor uses to monitor heart activity etc. These sensors are mainly consists of five main components: Sensor, Memory, Radio Transceiver, Microcontroller and Power Supply.

Second Tier (Personal Server)

This tier includes personal server (PS) application that can be run on PDA, cell phone or home personal computer. PDA has the capability to perform number of tasks. These tasks include providing interface to user, interface to wireless sensors and interface to medical server. The PS holds the authenticated patient information and IP address of medical server is stored in PDA in order to interface medical services. The various biological signals from WBAN are collected by PS, processes them and prioritization is done for the transmission of critical data with less delay when there is sudden change in current patient condition. Then PS establishes a connection with medical server and sends patient's report that can be combined with the patient's medical record. If link between PS and medical server is not available then PS will store the data locally and initiate the transmission when the connection is established.

Third Tier (Medical Server)

This tier encompasses a medical server for health monitoring that is accessed via internet. This is the backbone of the entire architecture as it analyzes the data received from PS and provides feedback accordingly. This tier may include various other servers that can be informal caregivers, emergency servers etc. the service provided by server can issue various recommendations and even issue alerts if any abnormal condition persists.

b) Grid Model for WBAN

Due to limited battery capacity of the nodes we need more energy efficient design of the WBAN model as energy consumption in WBAN includes the energy consumption by nodes and the overall lifetime of the network. It is not feasible to replace the power source for implanted bio-medical sensors and replacing batteries for wearable medical sensors might lead o discomfort of patients. If each sensor node transmits its information to the sink node directly, then it may exhaust its power and become out of service. This direct transmission scheme is preferred when the network is confined in a limited coverage. For this purpose we proposed a grid model for WBAN. In this model energy is utilized more efficiently as compared to existing model.

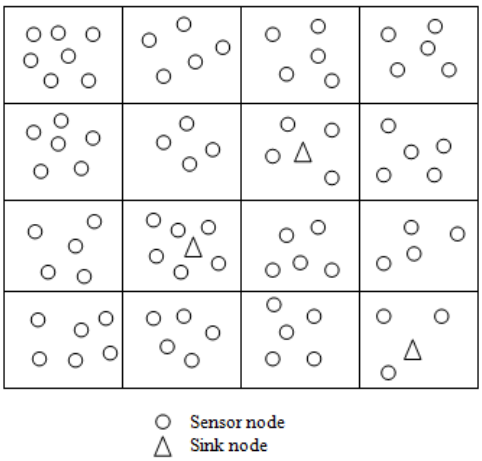


Fig. 3 : Grid based Data Dissemination

In fig 3, the network field [5] is divided into grids of square shape of certain length. All the energized sensor nodes are placed randomly in the network and sink node is kept fixed in the network.

After the grid based data dissemination one node per cell is selected as the cell head which is responsible for data transmission and local data collection. Other nodes of the cell considered as member nodes transmit their data to the cell head which further sends the data toward another cell head for onwards transmission towards the sink. Communication between the nodes can be done by selecting the path between cell heads on the basis of shortest path. The cell head remains active until it runs out of energy. The cell head is selected on the basis of node having highest energy in the cell. Other member nodes power down their radio power to save energy.

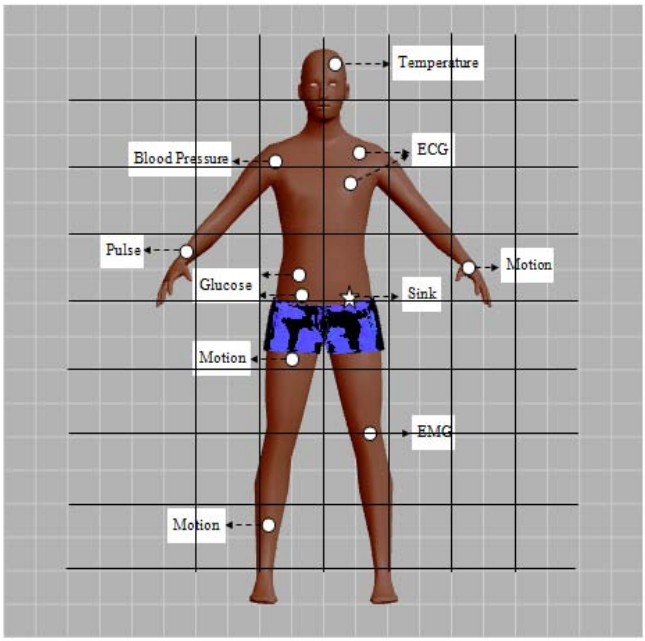


Fig. 4 : Grid based WBAN

Fig 4 illustrate the concept of grid based WBAN. In this body area is divided into cells. The data from nodes is transmitted to the sink node. In this model as only one node is responsible for data transmission; therefore energy consumed will be less. Nodes are selected as cell head on the basis of highest energy or the largest ID. Other members will sleep while cell head routes the packet. Since member nodes power down, the overall energy is conserved.

II. Related Work

The devices used in WBAN are battery operated therefore energy issue is present in almost every application of WBAN. The network consists of two types of nodes: wearable and implantable. In case of wearable sensors replacement of batteries is easier as compared to implantable sensors. So in order to make WBAN more energy efficient, energy of different nodes need to be utilized more efficiently.

From our literature survey we have observed that nodes in WBAN consume energy mainly for sensing/actuating, communication and data processing. Energy for these operations is mostly drawn from batteries. So there is need to have energy efficient design strategy. Therefore for this purpose, in this work we look into issue of energy consumption as sensor nodes have limited battery capacity and hence we design a grid based wireless body area network system. This system will minimize the energy consumed by the sensors. The basic idea of grid based system is to design an energy efficient network in which network is divided into a structure which provides reliable data collection.

In [6], mixed integer linear programming model is proposed, energy-aware wireless body area network design model which optimizes location and number of relays to be deployed, minimizing both energy consumed by wireless sensors and relays and network installation cost. Then proposed model is compared with other notable approaches.

The need for new energy efficient routing techniques is discussed in [7]. They study the effect of three different routing protocols on WBAN system in order to make the system more energy efficient. They study the failure and success of different routing protocol on the various parameters in body area network.

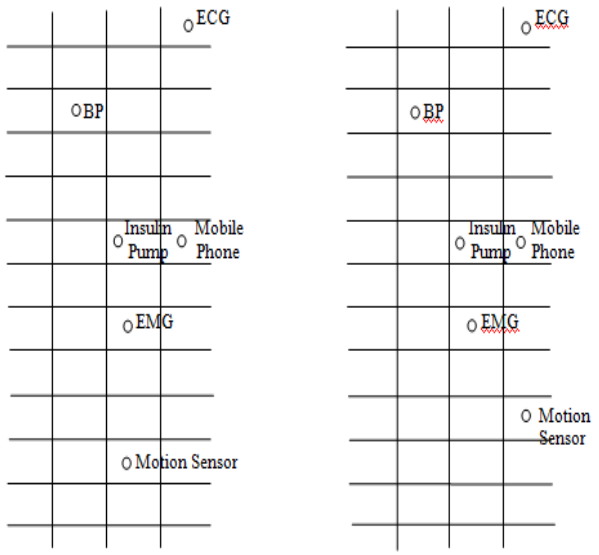
The two techniques for grid based network are proposed in [5] and author compared it with existing schemes using ns2. This is required due to limited battery capacity of wireless sensor nodes. They analyzed the efficiency of techniques in terms of data aggregation, network management and fault tolerance.
In [8], author explored the QoS of wireless sensor networks, the size of the grid area, and how the coordinator nodes are elected that will minimize the total

energy consumption and extend the lifetime of the network. The grid based coordinated routing is studied in wireless sensor networks and the energy available in the network is compared for different grid sizes.

III. Simulation Environment and Research Methodology

We have implemented grid model in ns2. Ns2 is a discrete event simulator written in C++ and OTcl. The primarily use of NS2 is to simulate local and wide area networks. To setup and run a simulation network, a user should write an OTcl script that initiates the simulation, sets up the network topology using the network objects and tells traffic sources when to start and stop transmitting packets through the event scheduler. When simulation is finished, NS produces one or more text-based output files that contain detailed simulation data, if specified to do so in the input Tcl script. The data can be used for simulation analysis or as an input to a graphical simulation display tool called Network Animator (NAM).

In our simulation, there are eleven sensor nodes, one sink node and one base station node. In Fig 5 dissemination of nodes in the grid in standing and sitting posture is presented.



(a) (b)

Fig. 5 : Data dissemination in grid (a) Standing (b) Sitting postures

The various sensor nodes used are ECG, EMG, BP, Insulin pump and motion sensors. Mobile phone is used as a sink node which collects data from all the sensor nodes. Data is further transmitted to the base station node. The complete set of the parameters that are used in the simulation are given in the table 4.1.

Table 4.1: Simulation Parameters

Parameter	Value
Topology Size	2400 × 1200
Number of sensors	13
Traffic type	Constant Bit Rate (CBR)
Simulation time	10.0
Channel	Wireless
MAC Protocol	802.11
CBR Data rate	0.5 Mb

Fig 6 illustrates the concept of grid model. Cell containing ECG node has other member nodes. These nodes will transmit the data to the cell head which further transmits the data to mobile phone. Rest of the sensor nodes in the other cells will also transmit the data in the same way. If the cell is farther from the mobile phone node then data from the cell head is transmitted to mobile phone by using multi hop technique. Fig 7 explains the concept of existing model of WBAN. All the sensor nodes are dispersed on the body. The data is transmitted from the sensor nodes to sink. Farther node transmits the data by using relay nodes.

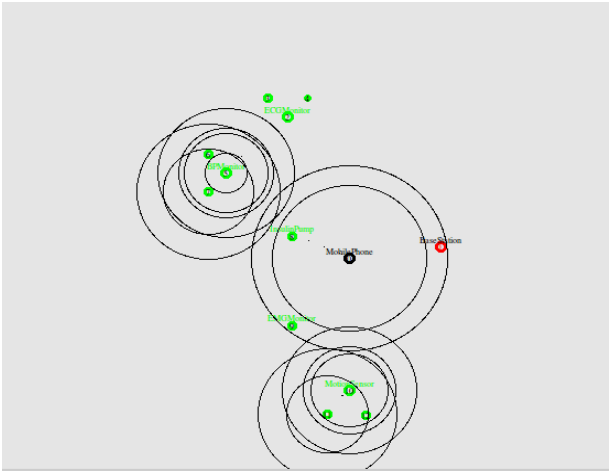


Fig. 6 : Grid model of WBAN in ns2

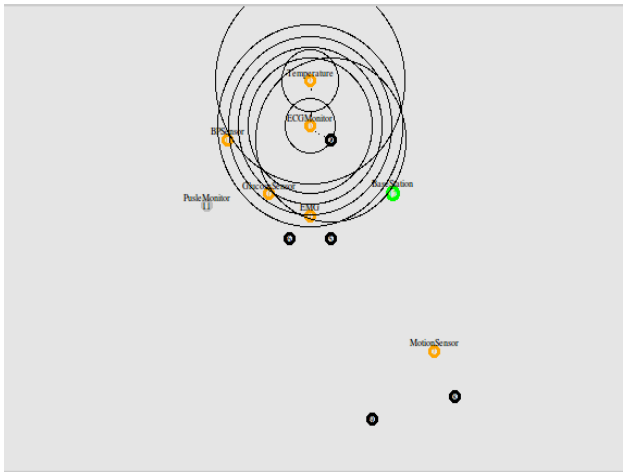


Fig. 7 : Existing model of WBAN in ns2

IV. Comparative Result Analysis

The results of the grid model are compared to the existing model of the WBAN on the basis of Energy consumed, throughput and delay.

a) Energy Consumed

In Fig 8 the energy decreases similarly as it decreased with time in the base model but the rate of decrease was steadier in the base model as compared to the grid body network. The rate with which the network looses energy is more in base model in comparison to grid body network. It is clearly seen in Fig 9 that energy of all sink nodes decrease almost constantly with time.

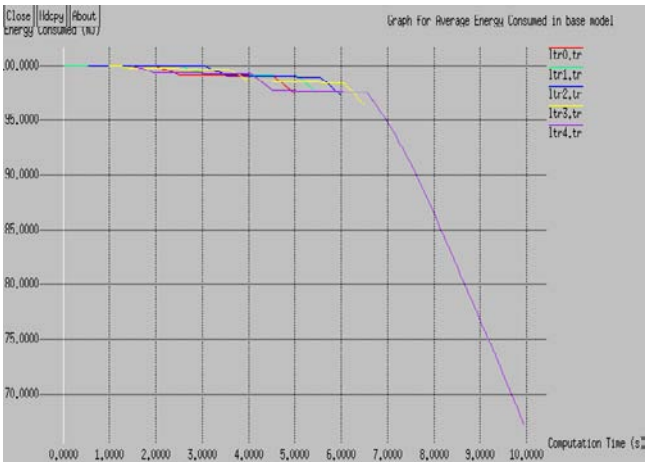


Fig. 8 : Energy consumed by grid model

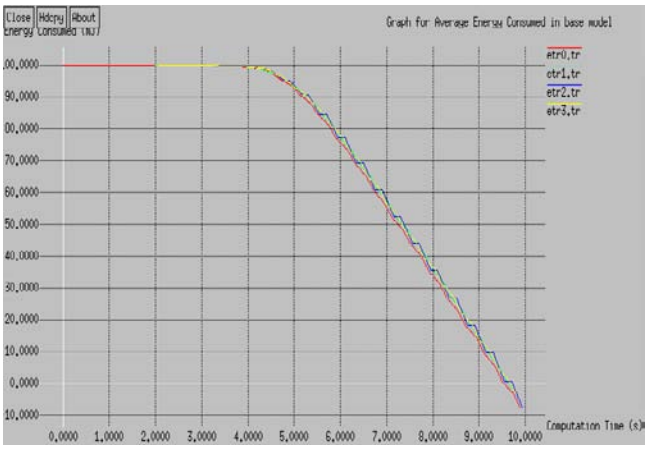


Fig. 9 : Energy consumed by existing model

b) Throughput

Fig 10 shows constant increase in the cumulative throughput of the mobile device with the body. But in Fig 11, ten different lines in the graph represent ten different links. We can at one time see only eight links in the simulation because the link which is paused when one of the receiver nodes gets overloaded is also plotted in the graph and also the new formed link with the new receiver node is plotted separately.

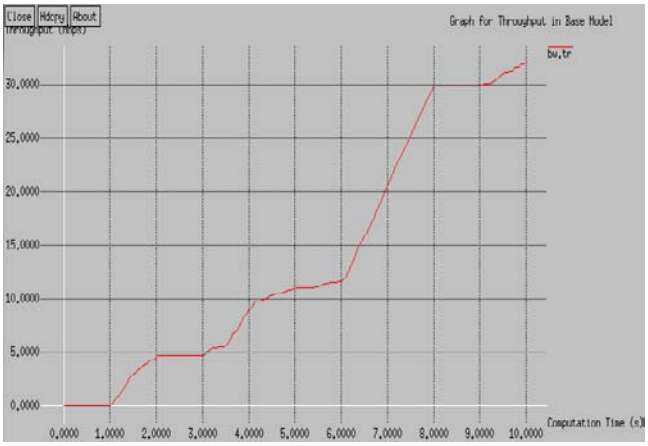


Fig. 10 : Throughput of grid model

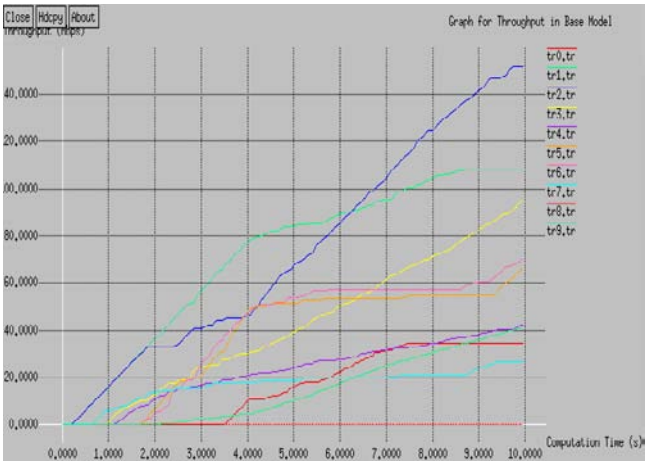


Fig 11 : Throughput of existing model

c) Delay

In Fig 12 the delay raises steeply then settles down to and around a particular flow depicting less fluctuation in the network which proves better performance. But in Fig 13 all the links are working fine without the queue length being full or any other problem that is why all the delay values are negligible. Only two receiver nodes which get overloaded causes delay which can be seen clearly in the graph.

Fig. 12 : Delay in grid model

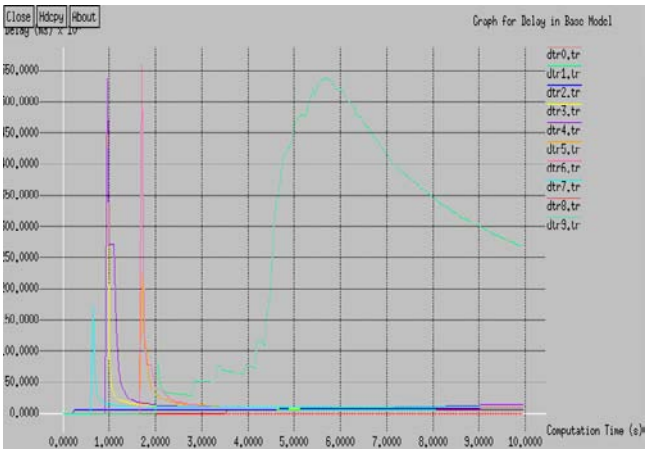


Fig. 13 : Delay in existing model

V. Conclusion

This paper completely deals with the need for energy efficient design for WBAN system by describing the grid based model for WBAN. For this we divide network into structure which provides reliable data collection. In this way energy of the nodes are better utilized to design energy efficient WBAN system. In this paper, details of our implementation of existing and grid model of WBAN based on ns2 as well as the simulation results are provided. The simulation result show the energy consumed, throughput and delay of the system. Further results of existing model and grid model are compared with each other. From the comparison we analyze that the energy consumed of grid model is less than that of existing model. There is need to use data routing techniques in grid model to make it more energy efficient.

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Chaotic Sequence based Steganography for Pair-Wise Communication

By Mr. Harsha S, Mr. Shailesh Kumar, Dr. Khalid Nazim Abdul Sattar, Dr. Keshava Prasanna & Mr. Shantanu A D

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Abstract- Steganography is the art and science of hiding sensitive data inside an image. There are so many cryptosystems that use Steganography as a major tool. Also in recent years there is a rising trend towards chaotic sequence based cryptosystems. This paper attempts to combine the two with a new algorithm for data hiding. Here key images required for Steganography are generated using chaotic sequence. Also an attempt is made to overcome the limitations of Steganography on the file size ratio and the security offered by Steganography.

Keywords: *steganography, chaotic sequence, data hiding, PRNG.*

GJCST-E Classification : *I.4.0 I.2.1*

Strictly as per the compliance and regulations of:

Chaotic Sequence based Steganography for Pair-Wise Communication

Mr. Harsha S [α], Mr. Shailesh Kumar [σ], Dr. Khalid Nazim Abdul Sattar [ρ], Dr. Keshava Prasanna [ω] & Mr. Shantanu A D [¥]

Abstract- **Steganography is the art and science of hiding sensitive data inside an image. There are so many cryptosystems that use Steganography as a major tool. Also in recent years there is a rising trend towards chaotic sequence based cryptosystems. This paper attempts to combine the two with a new algorithm for data hiding. Here key images required for Steganography are generated using chaotic sequence. Also an attempt is made to overcome the limitations of Steganography on the file size ratio and the security offered by Steganography.**

Keywords: steganography, chaotic sequence, data hiding, PRNG.

I. Introduction

Steganography refers to covered writing [1]. Digital images, videos or files can be used as cover to hide the message that has to be communicated. Steganography is different from Cryptography. Cryptography involves encryption which is scrambling the information in a systematic way that renders the message unintelligible, whereas Steganography is information hiding using basic Boolean operations inside an image, video or another file [3]. Steganography is the art and science of communicating in a way which hides the existence of the communication. In contrast to cryptography, where the enemy is allowed to detect, intercept and modify messages without being able to violate certain security premises guaranteed by a cryptosystem, the goal of Steganography is to hide messages inside other harmless messages in a way that does not allow any enemy to even detect that there is a second secret message present[4].

The basic idea behind cryptography is that one can keep a message a secret by encoding it so that no one can read it. If a good cryptographic cipher is used, it is likely that no one, not even a government entity, will be able to read it. However, sometimes merely communicating in secret can trip up alarms and make others suspicious. This is where cryptography fails. While it may very well be unbreakable by all available standards, an encrypted message is easy to detect and flag as secret[1].

This is where Steganography comes in. Unlike cryptography, the purpose of Steganography is to hide a message. All Steganography requires is a cover text, which is where data will be hidden, a message that is made up of data, an algorithm that decides how to hide the data, and frequently, a key that will be used to randomize the placement of the data and perhaps even encrypt it.

Steganography has its own limitations [1]. They are as follows;

- The file size ratio of Key and plain text has to be >=8:1.
- The only bit altered is the least significant bit [2] of each byte making it easy to crack.
- The images that are used for key are not completely offline and many are easily available.

In this paper we have made an attempt to overcome the said limitations of Steganography by developing a new algorithm.

II. Methodology

Our proposed algorithm is developed in two phases.

Phase 1: Key generation

Here images having chaotic number sequences for pixels are generated according to the user requirement. In the experimentation such a generation of 10 images with 600X800 pixels is shown. Each pixel is having 24 bit depth indicating 1 byte per colour in the R-G-B palette [5]. The images are numbered sequentially. This number forms another key for pair-wise encryption.

Phase 2: Encryption/Decryption

The plain text file [6] inclusive of the header is converted into a bit stream. This is ex-ored with the selected image using the hop length selected by the user. The hop length is the third key towards enhancing the security offered by the proposed system. For decryption the new image generated will be ex-ored with

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the original image. The result will be written into a file which would be the plain text file that was hidden.

The idea here is to avoid using publicly available or regular images. For this system to work, we propose a new system of images that use a chaotic sequence for hiding the information.

III. Implementation

The implementation of our system is divided into 4 modules.

Module 1. Image generation: Here a simple program is used to generate the key images. The images are bitmaps (.bmp) having dimensions of 600X800 pixels. The entire image will be a chaotic sequence of numbers. Hence the image looks like noise as shown in Fig.1. First the image header is written into a key file having 53 bytes (for .bmp format). Then the pixels are loaded with 24 bit random numbers that make up Red, Green and Blue coloursin each pixel.

Module 2. Image exchange module: In this module the images generated are exchanged between the pair of users as the title suggests. Each time a pair of users decides to use this system, before communication they use the image generation module and exchange the images. The image set can be exchanged physically/offline or online via a secure channel. In this paper we have generated 10 images per set and 6 possible hop lengths per image. So, each set can be used for 60 independent communications between the pair.

Module 3. Encryption Module: This module is built to hide the data inside the chaotic image. Here a bitwise EXOR operation is done with the bits from the information (plain text) file and the key file. The advantage of the proposed system is evident here. In Steganography the file size is limited by the ratio 8:1. Where as in our system, each bit in a pixel can be altered without changing the appearance of the key file. This is due to the random nature of the key image files. Also for large files, multiple images can be used in sequence or if the file size is not an integral multiple of the hop count, the same image can be used in a cyclic repetitive fashion for data hiding.

Module 4. Decryption Module: In this module the image received (containing the hidden message) is first used to get the key image ID and the hop count. Then it is ex-ored with the key image file in the image set having the same ID and the bits at the hop count are written into a file. This file forms the decrypted message.

IV. Experimentation and Results

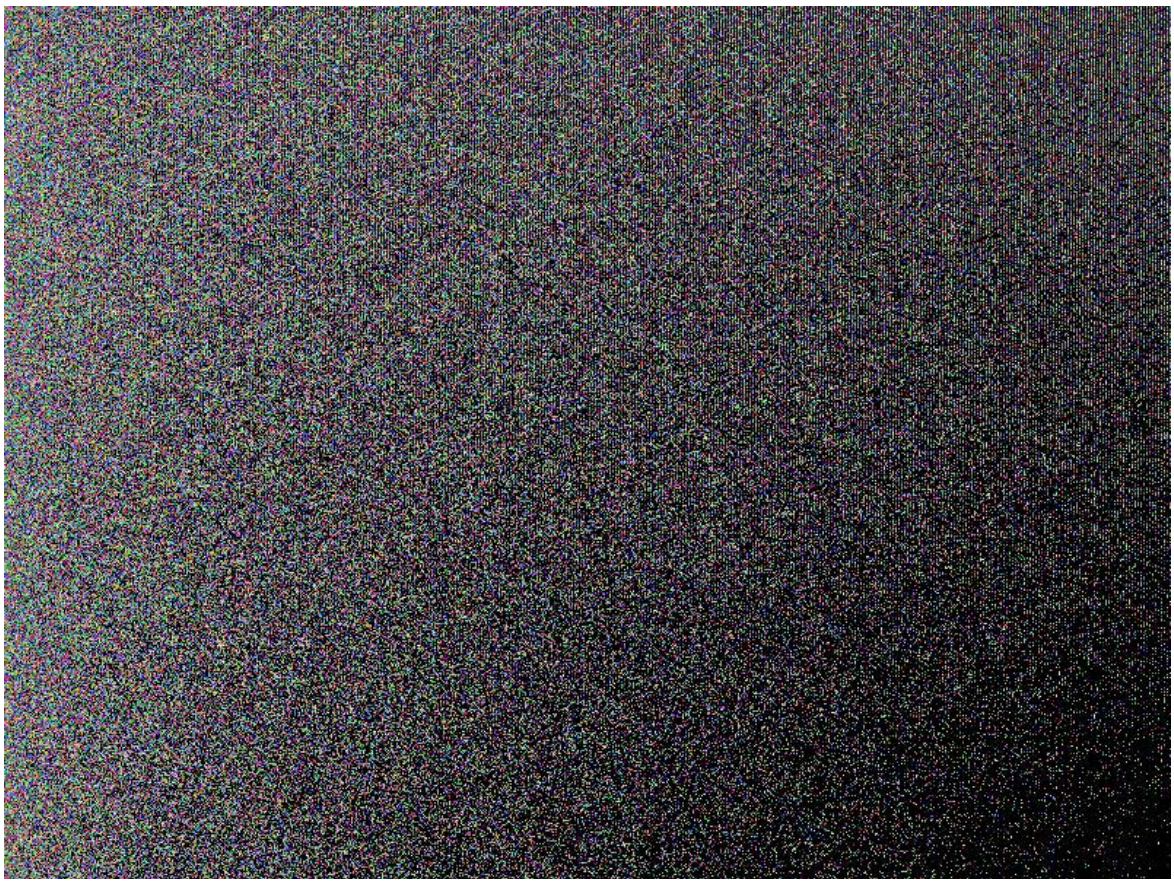

Fig. 1 : A sample of generated image using chaotic sequence for pixels.

As shown in Fig. 1. A set of images are generated and then used for hiding different types of files. The key images and the images with hidden data are shown in Fig. 2.1 through 2.10. Due to the randomness in the image the hidden message will be rendered invisible to the naked eye as well as computer programs. This image is then embedded with the key file ID and the hop count using the file footer system or any available data embedding system such as water marking at the pixel level or salt and pepper data hiding method[7][8]. This is left to the user to choose. Or the user may choose to communicate the key file ID and hop count in a separate message using a different hand-shake method. Once the data (plain text) is hidden in the key file, it can be sent in any open channel. Also as an added measure, the key image after the data hiding operation can be given a new extension (.DUS (Data Under Steganography or. VE (Visual Encryption)[9]) to avoid most operating systems from attempting to open it.

It can be clearly seen from Fig. 2.1 through 2.10 that there is visibly no way to cryptanalyse the cipher text without access to the original key image set. Even then the attacker needs the hop count as the image can be used in a cyclic fashion. When analysed with available cryptanalysis methods, Brute force method known as Dictionary attack [10] yields parts of the plain text in $7.7176X10^{23}$using the formula

Cryptanalysis time $T_c=2^{L}$ where L=Key length in bits. (1)

The analysis also indicates that the system is breakable if the attacker has copies of all communications and by happenstance obtains the same key image used repeatedly[11]. The occurrence of this demands that the attacker monitors each and every communication between the pair of users. Hence the possibility of the system being cracked is very low. The regression analysis shows that the relevance between Plain text and Cipher text for a 1 kB text file is less than 0.18 using the Pearson Product moment correlation[12]. This shows that a simple backtracking method will not succeed in breaking our method.

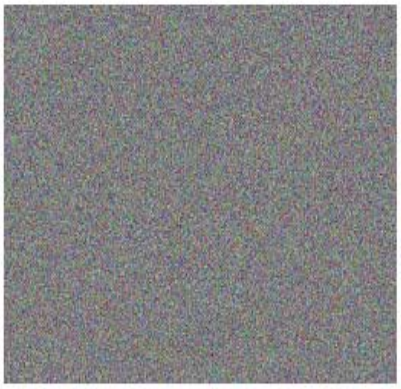

Fig. 2.1 : Key Image 1

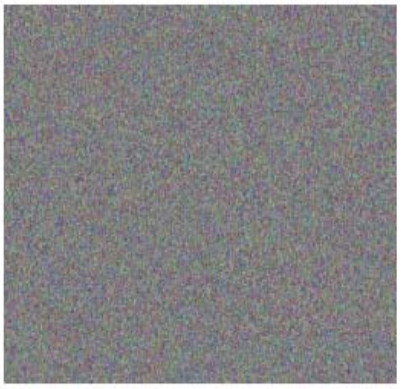

Fig. 2.2 : Key image 1 with hidden data (plain text)

```
#nclude<dos.h>
#include<stdio.h>
#include<conio.h>
#nclude<graphics.h>
#nclude<dos.h>
#include<stdlib.h>
union REGS in , out ;
scrnone(int a)
{
setfillstyle( SOLID_FILL , WHITE );
setcolor(WHITE);
rectangle ( 0 , 0 , getmaxx() , getmaxy() );////border
floodfill( 2,2,WHITE );
```

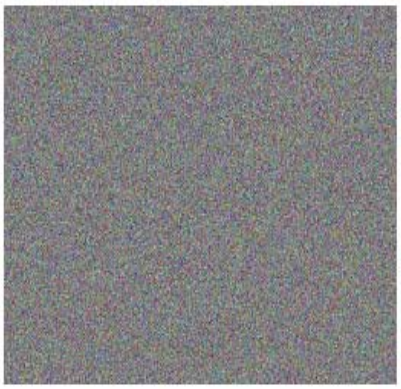

Fig. 2.3 : Key Image 7

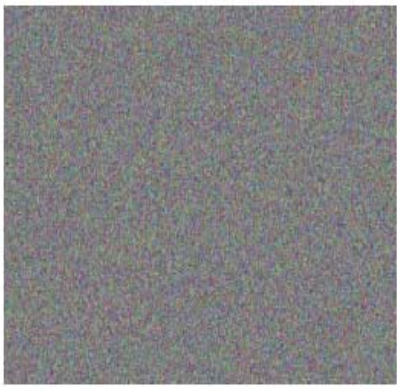

Fig. 2.4 : Key Image 7 with hidden data (Image)

Fig. 2.5 : The Image hidden (jbg)

Fig. 2.1 : Through 2.10. Key image files(Left), Corresponding Cipher text files (Middle) and Files hidden in them (Right)

Fig.2.6 : Key Image 4

Fig.2.7 : Key image 4 with hidden data (formatted text)

Steganography is the art and science of hiding sensitive data inside an image. There are so many cryptosystems that use Steganography as a major tool. Also in recent years there is a rising trend towards chaotic sequence based cryptosystems. This paper attempts to combine the two with a new algorithm for data hiding. Here key images required for Steganography are generated using chaotic sequence. Also an attempt is made to overcome the limitations of Steganography on the file size ratio and the security offered by Steganography.

Fig. 2.8 : Key Image 4

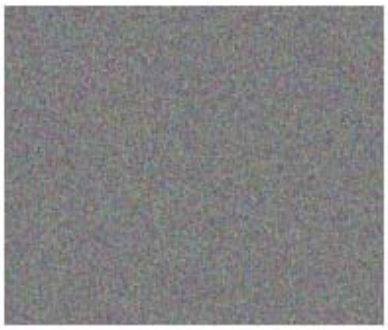

Fig.2.9 : Key Image 4 with hidden data (aframe of avideo file)

Fig 2.10 : A frame from a video file

V. Conclusion

From our work it can be concluded that, Steganography, even though shunned as old, can be altered to prove very useful [13]. The tweaks and added features that we have shown in this paper make sure that the communication is safe and secure if only the pair of users can maintain the key files are safe and offline all the time. Thus our proposed system works better on any type of file with any operating system. It also fares well against most of the known cryptanalysis methods. Hence it proves to be an efficient and universal steganographic system for individual as well as organizational users for pair wise communication. This also opens up a line of research for developing methods based on our work to have the following features

- Larger key sets with verifiable randomness
- Sequential steganpgraphy of larger files using multiple key images
- Design and development of a server to function as arbitrator of generalised system, to overcome the limitation of pair wise communication.

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Analysis of Routing Algorithms based on the Natural Inspiration

By H. Fathima
Bharathiyar University, India

Abstract- Nature is a great and immense source of inspiration for solving hard and complex problems in computer science since it exhibits extremely diverse, dynamic, robust, complex and fascinating phenomenon. Nature inspired algorithms are metaheuristics that mimics the nature for solving optimisation problems opening a new era in computation. A new agent-based routing algorithm using optimisation techniques is implemented in this paper. The different optimisation techniques are warty frog fish, artificial ant, ant, ant lion, grey wolf, genetic algorithm (GA) are the combinations used in the packet delivery between the networks. The routing is a process of carrying the data from source to destination in the network. The output of these algorithms is determined by the simulation time. The experiments are implemented with the NS2 software platform, which is based on the basics of C, C++ and TCL scripting language. The results of the algorithm showed that the grey wolf optimiser (GWO) is much better than the other algorithms in the packet delivery between the networks.

Keywords: *optimisation techniques, genetic algorithm, fish, ant, routing, networking.*

GJCST-E Classification : *C.2.2 C.2.1*

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Keywords: optimisation techniques, genetic algorithm, fish, ant, routing, networking.

I. Introduction

Bio-inspired computing, short form biologically inspired computing, is a field of study that loosely knits together subfields related to the topics of connectionism, social behaviour and emergence. It is often closely related to the field of artificial intelligence (AI), as many of its pursuits can be linked to machine learning. It relies heavily on the fields of biology, computer science and mathematics. Briefly put, it is the use of computers to model the living phenomena, and simultaneously the study of life to improve the usage of computers. Biologically inspired computing is a major subset of natural computation. The way in which bio-inspired computing differs from the traditional AI is in how it takes a more evolutionary approach to learning, as opposed to what could be described as "creationist" methods used in traditional AI. Bio-inspired computing, on the other hand, takes a more bottom-up, decentralised approach; bio-inspired techniques often involve the method of specifying a set of simple rules, a set of simple organisms which adhere to those rules, and a method of iteratively applying those rules. In internetworking, the process involves moving a packet of data from source to destination. Routing is usually performed by a dedicated device called a router. Routing is a key feature of the Internet because it enables messages to pass from one computer to another and eventually reach the target machine. Each intermediary computer performs routing by passing along the message to the next computer. Part of this process involves analysing a *routing table* to determine the best path. Routing is often confused with *bridging,* which performs a similar function. The principal difference between the two is that bridging occurs at a lower level and is therefore more of a hardware function whereas routing occurs at a higher level where the software component is more important. And because routing occurs at a higher level, it can perform more complex analysis to determine the optimal path for the packet. A computer network or data network is a telecommunications network which allows computers to exchange data. In computer networks, networked computing devices exchange data with each other along network links (data connections). The connections between nodes are established using either cable media or wireless media. The best-known computer network is the Internet. Network computer devices that originate, route and terminate the data are called network nodes [1]. Nodes can include hosts such as personal computers, phones, servers as well as hardware. Two such devices can be said to be networked together when one device is able to exchange information with the other device, whether or not they have a direct connection to each other.

II. Warty Frogfish

Frogfishes, are known as anglerfishes in Australia. Frogfishes are found in almost all the tropical and subtropical oceans and seas around the world, the primary exception being the Mediterranean Sea. Frogfishes are small, short and stocky, and sometimes covered in spinules and other appendages to aid in camouflage. The camouflage aids in protection from predators and to enables them to take prey. Many species can change colour; some are covered with other organisms such as algae or hydrozoa. In keeping with this camouflage, frogfishes typically move slowly, lying in wait for prey and then striking extremely rapidly, in as little as 6 ms. Frogfishes live in the tropical and subtropical regions of the Atlantic and Pacific, as well as

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in the Indian Ocean and the Red Sea. Their habitat lies for the most part between the 20-degree isotherms, in areas where the surface level water usually has a temperature of 20 degree Celsius. The greatest diversity of species is in the Indo-Pacific region, with the highest concentration around Indonesia. Frogfish live generally on the ocean floor around coral or rock reefs, at most up to 100 m deep.

Fig. 1: Warty Frog Fish

There are a few exceptions to these general limits. The brackish water frogfish is at home in ocean waters as well as brackish and fresh water around river mouths [4]. The sargassum fish lives in clumps of drifting sargassum, which often floats into the deeper ocean and have been known to take the sargassum fish as far north as Norway [5].Frogfishes generally do not move very much, preferring to lie on the sea floor and wait for prey to approach. Once the prey is spotted, they can approach slowly using their pectoral and pelvic fins to walk along the floor

[8, 10]. They rarely swim, preferring to clamber over the sea bottom with their fins in one of two "gaits" [6]. In the first, they alternately move their pectoral fins forward, propelling themselves somewhat like a two-legged tetra pod, leaving the pelvic fins out. Alternately, they can move in something like a slow gallop, whereby they move their pectoral fins simultaneously forward and back, transferring their weight to the pelvic fins while moving the pectorals forward. With either gait, they can only cover short stretches. In open water, frogfishes can swim with strokes of the tail fin. They also have a kind of jet propulsion that is often used by younger frogfish. It is achieved by rhythmically forcing their breath-water out through their gill openings, which lie behind their pelvic fins [10]. The sargassum frogfish has adapted fins which can grab strands of sargassum, enabling it to "climb" through the seaweed [2].The reproductive behaviour of the normally solitary frogfish is still not fully researched. There are few observations in aquariums and even fewer from the wild. Most species are free-spawning, with females laying the eggs in the water and males coming in behind to fertilise them. Anywhere from eight hours to several days before the egg-laying, the abdomen of the female starts to swell as the eggs absorb water, sometimes as many as 180,000 eggs [7]. The male begins to approach the female around two days before the spawning. It is not known if the spawn is predetermined by some external factor, such as the phase of the moon, or if the male is attracted to a smell or signal released by the female. In all hitherto observed breeding pairs, one partner was noticeably, sometimes as much as ten times, larger than the other. When the gender could be determined, the larger partner was always the female. During the free-spawning courtship ritual, the male swims beside and somewhat behind the female, nudges her with his mouth then remains near her cloaca. Just before the spawning, the female begins to swim above the ocean floor towards the surface. At the highest point of their swim they release the eggs and sperm before descending back. Sometimes the male pulls the eggs out of the female with his mouth. After mating the partners depart quickly as otherwise the smaller male would likely be eaten. A few species are substrate-spawners, notably the genera *Lophiocharon*, *Phyllophryne* and *Rhycherus*, which lay their eggs on a solid surface, such as a plant or rock. Some species guard their eggs, a duty assigned to the male in almost all the species, while most others do not [7] [8]. Several species practice brood carrying, for example the three-spot frogfish, whose eggs are attached to the male, and those in the genus *Histiophryne*, whose brood are carried in the pectoral fins. The eggs are 0.5-1mm (0.02-0.04) large and cohere in a gelatinous mass or long ribbon, which in sargassum fish are up to a metre (3.3 ft) long and 16 cm (6 inches) wide. These egg masses can include up to 180,000 eggs. For most species, the eggs drift on the surface. After two to five days, the fish hatch

and the newly hatched alevin are between 0.8 and 1.6 mm long (0.03 and 0.07 inches). For the first few days they live on the yolk sac while their digestive systems continue to develop. The young have long fin filaments and can resemble tiny, tentacle jellyfish. For one to two months they live planktonically. After this stage, at a length of between 15 and 28 mm (0.6-1.1 in), they have the form of adult frogfish and begin their lives on the sea floor. Young frogfish often mimic the colouration of poisonous sea slugs or flatworms.

III. Artificial Ant Algorithm

In computer science, artificial ants stand for multi-agent methods inspired by the behaviour of real ants. The pheromone-based communication of biological ants is often the predominant paradigm used [2]. Combinations of artificial ants and local search algorithms have become a method of choice for numerous optimisation tasks involving some sort of graph, for example, vehicle routing and internet routing. The burgeoning activity in this field has led to conferences dedicated solely to artificial ants, and to numerous commercial applications by specialised companies such as Ant Optima. As an example, ant colony optimisation (ACO) [3] is a class of optimisation algorithms modelled on the actions of an ant colony. Artificial ants locate optimal solutions by moving through a parameter space representing all possible solutions. Real ants lay down pheromones directing each other to resources while exploring their environment. The simulated ants similarly record their positions and the quality of their solutions, so that in later simulation iterations more ants locate better solutions [4]. One variation on this approach is the Bees Algorithm, which is more analogous to the foraging patterns of the honey bee, another social insect. The inventors are Frans Moyson and Bernard Manderick. Pioneers of the field include Marco Dorigo and Luca Maria Gambardella [5].New concepts are required since intelligence is no longer centralised but can be found throughout all minuscule objects. Anthropocentric concepts have always led us to the production of IT systems in which data processing, control units and calculating forces are centralised. These centralised units have continually increased their performance and can be compared to the human brain. The model of the brain has become the ultimate vision of computers. Ambient networks of intelligent objects and, sooner or later, a new generation of information systems, which are even more diffused and based on nanotechnology, will profoundly change this concept. Small devices that can be compared to insects do not dispose of a high intelligence on their own. Indeed, their intelligence can be classed as fairly limited.

Fig. 2 : Artificial Ants

It is for example, impossible to integrate a high performance calculator with the power to solve any kind of mathematical problem into a biochip that is implanted into the human body or integrated in an intelligent tag which is designed to trace commercial articles. However, once those objects are interconnected they dispose of a form of intelligence that can be compared to a colony of ants or bees. In the case of certain problems, this type of intelligence can be superior to the reasoning of a centralised system similar to the

brain[6].Nature has given us several examples of how minuscule organisms, if they all follow the same basic rule, can create a form of collective intelligence on the macroscopic level. Colonies of social insects perfectly illustrate this model which greatly differs from human societies. This model is based on the co-operation of independent units with simple and unpredictable behaviour [7]. They move through their surrounding area to carry out certain tasks and only possess a very limited amount of information to do so. A colony of ants, for example, represents numerous qualities that can also be applied to a network of ambient objects. Colonies of ants have a very high capacity to adapt themselves to changes in the environment as well as an enormous strength in dealing with situations where one individual fails to carry out a given task. This kind of flexibility would also be very useful for mobile networks of objects which are perpetually developing. Parcels of information that move from a computer to a digital object behave in the same way as ants would do. They move through the network and pass from one knot to the next with the objective of arriving at their final destination as quickly as possible [8].

IV. Ant Lion Optimiser

Ant lion, also spelled ant-lion and ant lion, is a name applied to a group of about 2,000 species of insects in the family myrmeleontidae. The most well-known genus is myrmeleon. Strictly speaking, the term "ant lion" applies to the larval form of the members of this family, but while several languages have their own terms for the adult, there is no widely used word for them in English. Very rarely, the adults are called "ant lion lacewings". The length of a fully-grown well-nourished predatory larva is typically up to 1.2 cm, and that of an adult up to 4cm [1]. The ant lion larva is often called "doodlebug" in North America because of the odd winding, spiralling trails it leaves in the sand while looking for a good location to build its trap, as these trails look as if someone has doodled in the sand [2].

The ant lion optimiser mimics the hunting mechanism of ant lions in nature. Five main steps of hunting prey such as the random walk of ants, building traps, entrapment of ants in traps, catching prey and re-building traps are implemented in this algorithm. This algorithm was proposed in 2015 [5].Ant lions are worldwide in distribution, most common in arid and sandy habitats. A few species occur in cold-temperate places. They can be fairly small to very large neuroptera. The ant lion larvae eat small arthropods mainly ants while the adults of some species eat small pollen and nectar, while others are predators of small arthropods in the adult stage too [3]. In certain species of myrmeleontidae, such as dendroleon pantheormis, the larva, although resembling that of myrmeleon structurally, makes no pitfall, but seizes passing prey from any nook or crevice in which it shelters. The adult has two pairs of long, narrow, multi-veined wings in which the apical veins enclose regular oblong spaces, and a long, slender abdomen. Although they greatly resemble dragonflies or damselflies, they belong to an entirely different infraclass among the winged insects. Ant lions are easily distinguished from damselflies by their prominent, apically clubbed antennae which are about as long as head and thorax combined. Also, the pattern of wing venation differs with the very long hypo stigmatic cell being several times as long as wide. They also are very feeble fliers and are normally found fluttering about in the night, in search of a mate.

Fig 3 : Ant Lion

The adult is thus rarely seen in the wild because it is typically active only in the evening. The life cycle of the ant lion begins with oviposition. The female ant lion repeatedly taps the sand surface with the tip of her abdomen. She then inserts her abdomen into the sand and lays an egg. The ant lion larva is a ferocious-

appearing creature with a robust, fusi form body, a very plump abdomen, the thorax bearing three pairs of walking legs. The prothorax forms a slender mobile ''neck'' for the large, square, flattened head, which bears an enormous pair of sickle like jaws with several sharp, hollow projections. The jaws are formed by the maxillae and mandibles, which in each pincer enclose a canal for injecting venom between them. Depending on species and where it lives, the larvae will either hide under leaves or pieces of wood, in cracks of rocks, or dig pits in sandy areas. Ant lion larvae are unusual among the insects as they lack an anus. All the metabolic waste that is generated during the larval stage is stored and is eventually emitted as meconium near the end of its pupal stage [4]. The pupal stage of the ant lion is quiescent. The larva makes a globular cocoon of sand stuck together with fine silk spun from a slender spinneret at the posterior end of the body. These cocoons may be buried several centimet deep in the sand. It remains there for one month, until the completion of the transformation into the sexually mature insect, which then emerges from the case, leaving the pupal integument behind, and climbs to the surface. After about 20 min, the adult's wings are fully opened and it will fly off in search of a mate. The adult is considerably larger than the larva; they exhibit the greatest disparity in size between larva and adult of any type of holometabolous insects, by virtue of the adults having an extremely thin, flimsy exoskeleton – in other words, they have extremely low mass per unit of volume.

V. Grey Wolf Optimiser

The grey wolf optimiser (GWO) algorithm mimics the leadership hierarchy and hunting mechanism of grey wolves in nature proposed by Mirjalili *et al*. In 2014[11], four types of grey wolves such as alpha, beta, delta and omega are employed for simulating the leadership hierarchy. In addition, three main steps of hunting, searching for prey, encircling prey and attacking prey are implemented to perform optimisation. The leaders are a male and female, called alphas. The alpha is mostly responsible for making decisions about hunting, sleeping place, time to wake and so on. The alpha's decisions are dictated to the pack. However, some kind of democratic behaviour has also been observed, in which an alpha follows the other wolves in the pack. In gatherings, the entire pack acknowledges the alpha by holding their tails down. The alpha wolf is also called the dominant wolf since his/her orders should be followed by the pack. The alpha wolves are only allowed to mate in the pack. Interestingly, the alpha is not necessarily the strongest member of the pack but the best in terms of managing the pack. This shows that the organisation and discipline of a pack is much more important than its strength. The second level in the hierarchy of grey wolves is beta. The betas are subordinate wolves that help the alpha in decision-making or other pack activities. The beta wolf can be either male or female, and he/she is probably the best candidate to be the alpha in case one of the alpha wolves passes away or becomes very old. The beta wolf should respect the alpha, but commands the other lower-level wolves as well. It plays the role of an adviser to the alpha and discipliner for the pack. The beta reinforces the alpha's commands throughout the pack and gives feedback to the alpha. The lowest ranking grey wolf is omega. The omega plays the role of scapegoat. Omega wolves always have to submit to all the other dominant wolves.

Fig 4 : Grey Wolf

They are the last wolves that are allowed to eat. It may seem the omega is not an important individual in the pack, but it has been observed that the whole pack face internal fighting and problems in case of losing the omega. This is due to the venting of violence and frustration of all wolves by the omega(s). This assists satisfying the entire pack and maintaining the dominance structure. In some cases the omega is also the babysitters in the pack. If a wolf is not an alpha, beta or omega, he/she is called subordinate. Delta wolves have to submit to alphas and betas, but they dominate the omega. Scouts, sentinels, elders, hunters, and caretakers belong to this category. Scouts are responsible for watching the boundaries of the territory and warning the pack in case of any danger. Sentinels protect and guarantee the safety of the pack. Elders are the experienced wolves who used to be alpha or beta. Hunters help the alphas and betas when hunting prey and providing food for the pack. Finally, the caretakers are responsible for caring for the weak, ill and wounded wolves in the pack.

VI. Experimental Results

Table 1 : Packets Dropped Ratio

Algorithm	PacketsDropped- Ratio
Warty frogfish	7.881
Artificial ant	5.725
Ant lion optimiser	8.326
Greywolf optimiser	9.462

Graph 1 : Packets Dropped Ratio

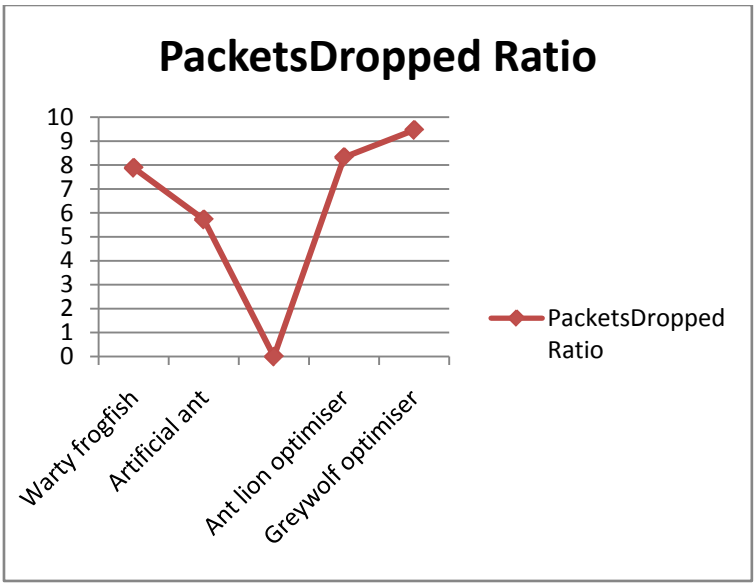
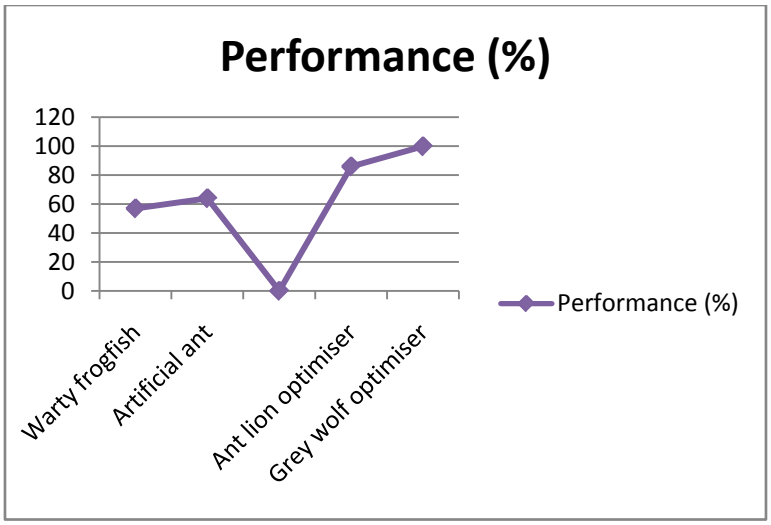


Table 2 : Performance

Algorithm	Performance (%)
Warty frogfish	57
Artificial ant	64
Ant lion optimiser	86
Grey wolf optimiser	99.90

Graph 2 : Performance of the Algorithms



VII. Conclusion

The GWO is much suitable for dynamic and real computer networks where the failures of some routers are anticipated. Bio-inspired algorithms are going to be a new revolution in computer science. The scope of this area is really vast since as compared to nature, computer science problems are only a subset, opening a new era in next generation computing, modelling and algorithm engineering. It has been witnessed that the applications and growth of natural computing in the last years is very drastic and has been applied to numerous optimisation problems in computer networks, control systems, bioinformatics, data mining, game theory, music, biometrics, power systems, image processing, industry and engineering, parallel and distributed computing, robotics, economics and finance, forecasting problems, applications involving the security of information systems and so on. The experimental results showed that GWO is better than the other algorithms. Nevertheless, nature-inspired algorithms are among the most powerful algorithms for optimisation which is going to have a wide impact on future generation computing.

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A New Modified Collection Selection Algorithm using Optimal Term Weight for Web based Applications

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Abstract- As the number of electronic data collections available on the internet increases, so does the difficulty of finding the right collection for a given query. Often the first time user will be overwhelmed by the array of options available, and will waste time hunting through pages of collection names, followed by time reading results pages after doing an adhoc search. Collection selection using optimal weight methods try to solve this problem by suggesting the best subset of collections to search based on a query. This is of importance to fields containing large number of electronic collections which undergo frequent change, and collections that cannot be fully indexed using traditional methods such as spiders. This paper presents a solution to these problems of selecting the best collections and reducing the number of collections needing to be searched.

Keywords: *singular value matrix(s), term matrix (u), collection matrix (v).*

GJCST-E Classification : *H.3.5 I.1.2*

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A New Modified Collection Selection Algorithm using Optimal Term Weight for Web based Applications

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Abstract- As the number of electronic data collections available on the internet increases, so does the difficulty of finding the right collection for a given query. Often the first time user will be overwhelmed by the array of options available, and will waste time hunting through pages of collection names, followed by time reading results pages after doing an adhoc search. Collection selection using optimal weight methods try to solve this problem by suggesting the best subset of collections to search based on a query. This is of importance to fields containing large number of electronic collections which undergo frequent change, and collections that cannot be fully indexed using traditional methods such as spiders. This paper presents a solution to these problems of selecting the best collections and reducing the number of collections needing to be searched.

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I. Introduction

The 21st century is the age of Internet and World Wide Web. The Web revolutionizes the way we gather, process, and use information. At the same time, it also redefines the meanings and processes of business, commerce, marketing, finance, publishing, education, research, development, as well as other aspects of our daily life [1]. *Modified Collection selection* is the selection of an optimal weight subset of collections from a large set of collections for the purpose of reducing costs associated with Distributed Information Retrieval. The goal of modified collection selection is to make searching multiple collections appear as seamless as searching a single collection. Another requirement of a modified collection selection using optimal term weighting system is to learn which collections contain relevant information and which collections contain no relevant information. This reduces the number of overall search requests needed. If only a small high quality subset of the available collections is searched then savings can be made in time, bandwidth, and computation [4]. Web based collection selection is significant because as the internet grows the number of internet based collections grows. It is now impossible to anually track and index all collections as they number in the thousands. This method will enable users to choose the best collections for their needs without having to sift through irrelevant collections. Collection selection optimal term method reduces expenses, increasing search speed, learning to adapt to change in the search environment, using ontology to increase precision, and learning to adapt to the users preferences.

The paper is organized as follows. Section 2 discusses main difference between traditional method in web based collection and optimal term weight method for collection selection Section 3 presents application of the approach. Conclusion presents main features of the system that help fulfill fundamental demands of the intelligent Web's design and development

II. Modified Collection Selection

Modified Collection Selection using optimal term is the selection of an optimal set of information sources from a large set of information sources. An information source can be a Web interface, a standard relational collection, a file, a search engine, or any other textual representation of information. Collection Selection aims to be efficient with respect to bandwidth and computation, and decreases both resource usage and time taken to return a set of results for a query. Well planned collection selection can have a large influence on the efficiency of a query. Collection selection is significantly different to document selection in a number of areas. Collection selection uses different methods to document selection for scoring items relevance [3]. Document selection commonly uses a binary relevance value, which collection selection cannot use. Instead collection selection must use a floating point number to represent relevance.

Collection selection also differs from document selection in that it uses different ways of calculating term weighting. (terms distributed across all documents in a collection are worth more than terms clustered in one document of a collection) Another difference between collection selection and document selection is that different content selection methods are needed, with Web based collection selection commonly using partial collection sampling, and document selection using full document indexing. These differences mean that

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collection selection using optimal term requires a significantly different approach to document selection

III. Modified Collection Selection Algorithm

In this section, we give the details of our collection selection algorithm. The inputs of the algorithms include a query, a selected set of terms (key words), and a set of sample documents from each collection.

a) Algorithm

1. Calculate the term-collection matrix *A* where we view the query as a new collection.
2. Use singular value decomposition. $U \sum V T = A$
3. Sort the collections according to the values in the query row in the matrix *V T*
4. Use the threshold to calculate a rank of collections.
5. After ranking the collection we need to find the optimal term weight to find the relevant pages which are more appropriate.

Term-collection matrix is created, adding the query to the matrix in the form of a new (small) document column. Negative weights can be given to terms that are not to be returned in the query. Applying Singular Value Decomposition to the matrix returns a term matrix (U), a Singular Value matrix(S), and a collection matrix (V). For every search performed, the user will give the top *n* collections (*n* is currently 10) a floating point precision ranking in the range of 0 to 1.

The higher the ranking the more precise the results. After training run of (say) twenty searches collection matrix and the latent statistical relationships between collections computed [5].The returned values are a score for each collection, with zero being not relevant and one being most relevant. This will find relationships existing between collections that are not immediately obvious, and will result in a more personalized search which will over time learn the user's preferences.

IV. Conclusions

A solution to the Web Based Collection Selection problem has been presented, and preliminary results indicate that the technique is suited to the task of selecting the most relevant collections and learning user preferences in collections. The approach uses short queries and is thus suitable for use on the Web. This approach also reduces the need for ontologies and thesaurus. With some modification, this collection selection method is suitable for traditional information retrieval systems across servers and databases. A problem is that these systems do not rank the data before returning it. This could be solved using simple sampling techniques that would grab a representative sample of the collection, rank it, then compare it across collections. As the number of collections indexed grows, so does the number of terms and the size of the matrix.

However in this research, only the top *n* most representative documents from each collection are sampled so it is possible to compare hundreds of collections in a reasonable time if *n* is small. Due to the time expense of writing screen scraping applications for web based collections and comparing the results to human rankings of the documents in the collections, the researchers were unable to perform large scale tests of the methods presented in this research. Work still needs to be done to on the optimal sample size taken from each collection.

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Before start writing a good quality Computer Science Research Paper, let us first understand what is Computer Science Research Paper? So, Computer Science Research Paper is the paper which is written by professionals or scientists who are associated to Computer Science and Information Technology, or doing research study in these areas. If you are novel to this field then you can consult about this field from your supervisor or guide.

TECHNIQUES FOR WRITING A GOOD QUALITY RESEARCH PAPER:

1. Choosing the topic: In most cases, the topic is searched by the interest of author but it can be also suggested by the guides. You can have several topics and then you can judge that in which topic or subject you are finding yourself most comfortable. This can be done by asking several questions to yourself, like Will I be able to carry our search in this area? Will I find all necessary recourses to accomplish the search? Will I be able to find all information in this field area? If the answer of these types of questions will be "Yes" then you can choose that topic. In most of the cases, you may have to conduct the surveys and have to visit several places because this field is related to Computer Science and Information Technology. Also, you may have to do a lot of work to find all rise and falls regarding the various data of that subject. Sometimes, detailed information plays a vital role, instead of short information.

2. Evaluators are human: First thing to remember that evaluators are also human being. They are not only meant for rejecting a paper. They are here to evaluate your paper. So, present your Best.

3. Think Like Evaluators: If you are in a confusion or getting demotivated that your paper will be accepted by evaluators or not, then think and try to evaluate your paper like an Evaluator. Try to understand that what an evaluator wants in your research paper and automatically you will have your answer.

4. 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.

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

6. Use of computer is recommended: As you are doing research in the field of Computer Science, then this point is quite obvious.

7. Use right software: Always use good quality software packages. If you are not capable to judge good software then you can lose quality of your paper unknowingly. There are various software programs available to help you, which you can get through Internet.

8. Use the Internet for help: An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

9. Use and get big pictures: Always use encyclopedias, Wikipedia to get pictures so that you can go into the depth.

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

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

12. Make all efforts: Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

13. Have backups: When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

14. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several and unnecessary diagrams will degrade the quality of your paper by creating "hotchpotch." So always, try to make and include those diagrams, which are made by your own to improve readability and understandability of your paper.

15. Use of direct quotes: When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

16. Use proper verb tense: Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

17. Never use online paper: If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

18. Pick a good study spot: To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

19. Know what you know: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. 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 to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

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

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

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

27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. Think technically: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After 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 to 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 in 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 criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of 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 the 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 evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

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

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing 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 approach 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. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than 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 maintain the initial two items to no more than one ruling each.

- Reason of the study - 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 quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness 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 to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled 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 with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose 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 sound written Procedures segment allows a capable scientist to replacement 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 for the least amount of information that would permit another capable scientist to spare 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 object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text 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:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

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

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- 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 a 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. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

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

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to 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 part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a 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 implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly 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 with prospect, and let it drop at that.

- Make a decision if each premise is supported, 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
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One 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?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

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	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

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