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Designing of Home Automation based Switching System in PLC Applications using Phone Accelerometer

By Prashant Kumar

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Designing of Home Automation based Switching System in PLC Applications using Phone Accelerometer

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Abstract- With the reference for implement the useful things of old human beings which provide the concept for operating the system as Motion Sensing Based Switching Device. This project is an endeavour to help the old and paralysed human beings with reference to implement a new electronic gadget on home automation switching system which is controlled through gesture of human body parts. This project provides the very low cost implementation and easy handling for running this project in old and human beings.

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I. Introduction

The introduction for this project is based on the technology for Motion Sensing and Motion Detection System. The Motion Sensing Device plays a very important role as adventure, switching and various terminologies for implementing various projects. The motion sensing and detection based device enables the future for help the old and paralyzed people. This technology provides the helpfulness and user friendly for old human beings. This project also provides this technology which related as Automatic Switching in Home Appliances through Phone Accelerometer as Motion Sensing Device.

The Phone Accelerometer has treated as Motion Sensing Device for controlling the lights and home appliances through Cell Phone which might be connected as Bluetooth Connection for interfacing the device. The Bluetooth Connection will be treated as communication for connecting the device between Cell Phone and Automatic Switching in Lights and Home Appliances through Android Based Cell Phone as Android Application. The Android Application will connect the Home Automation Device and provide the Automatic Switching in the motion of Cell Phone. This project is also useful for helping the old and paralyzed people. This motion requires the very slow motion which is present on old and paralyzed people for help and guide to doing any things in the very small motion of his body parts.

This project responds to ATMEGA 8 Microcontroller which controls the all things and relates to controlling the all things. The Controlling Action is sent by Cell Phone for the motion and receives at Home Automation Switching Device for the controlling action of switches respond by Cell Phone. The Cell Phone is Android Based for connecting the device through BT Robot Controller Application for responding the action on device. This device provides the LCD Display which relates the things and displayed the present task for the memory purpose.

The LCD Display shows the things for the present task and provides the information for live project response. This project responds the motion of Cell Phone and provides the limited time for the motion given by Old and Paralyzed People. This project provides the working details for connecting this project with Bluetooth Range as 50-100 metre even while there is wall here. This project also tests the operations which might be done on another location for connecting the device through Home Automation Switching Purpose.

This project related and completed the all things which might be helpful for connecting the device and making this project better for old and paralyzed people. This project also responds the characteristics and provides the better life of old and paralyzed person for using this technology in Cell Phone as Home Automation Switching Based Device. This project also correspond the various terminologies which might be helpful for helping the old and paralyzed people to making his life better for connecting the world.

a) Industrial Automation Description

Industrial automation is the use of robotic devices to complete manufacturing tasks. In this day and age of computers, it is becoming increasingly important in the manufacturing process because computerized or robotic machines are capable of handling repetitive tasks quickly and efficiently. Machines used in this field are also capable of completing mundane tasks that are not desirable to workers. In addition, the company can save money because it does not need to pay for expensive benefits for this specialized machinery purpose.

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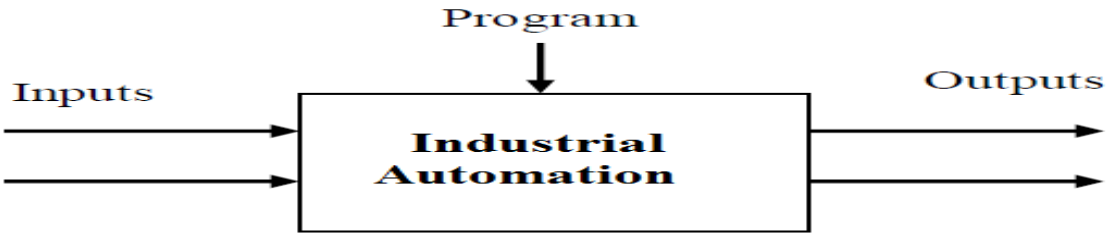
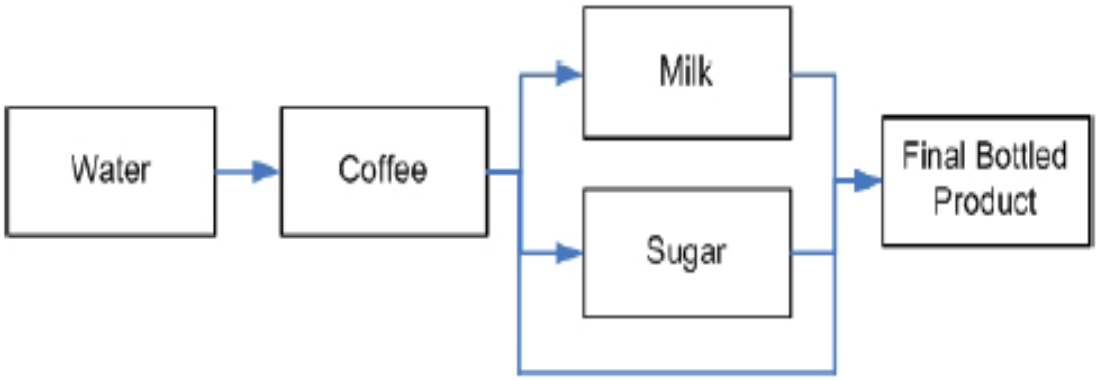


II. Industrial Automation System

Industrial Automation the use of various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens, switching in telephone networks, steering and stabilization of ships, aircraft and other applications with minimal or reduced human intervention. Some processes have been completely automated.



Basic Flow Diagram of Coffee Bottling Plant in Industrial Automation

III. Advantages and Description of PLC Applications

A PLC is a microprocessor based controller with multiple inputs and outputs. It uses a programmable memory to store instructions and carry out functions to control machines and processes.

The PLC performs the logic functions of relays, timers, counters and sequencers. It has the following advantages:

a) Low Cost
b) Reliability
c) Programmability

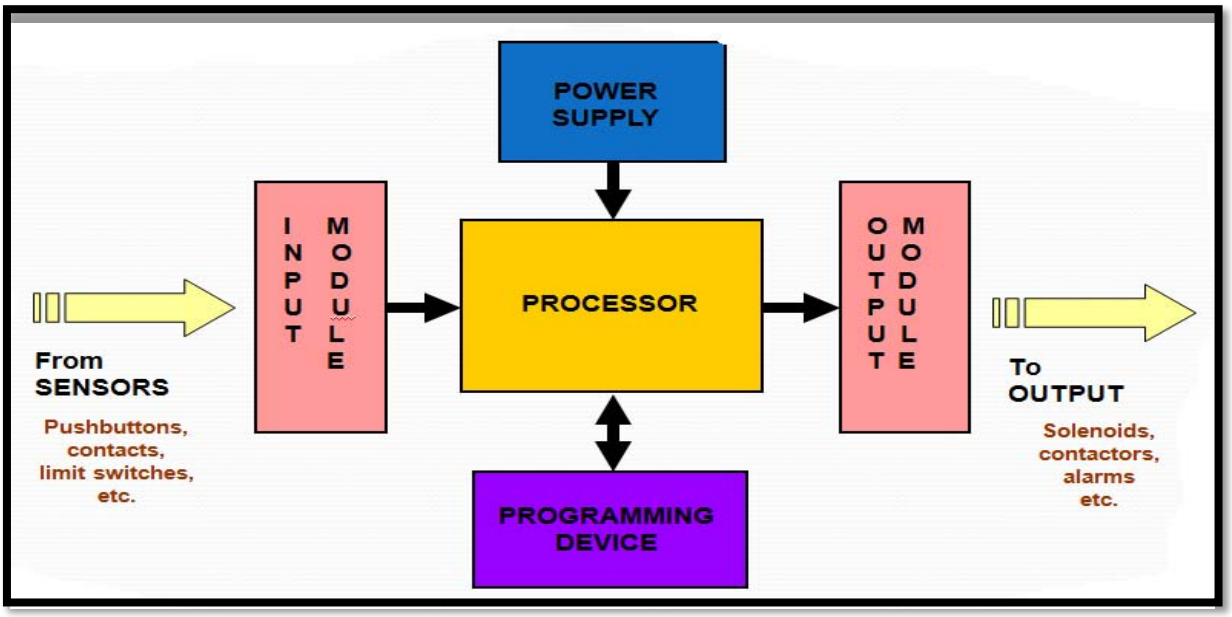


Diagram of Programmable Logic Controller

The PLC inputs give it information about the machine or process that it is controlling. These are typically switches and sensors. The switches are connected to an input module that provides the interface between the switches or sensors and the PLC.

The PLC Outputs are connected directly or indirectly to actuator controls. Examples include Solenoids on Directional Control Valves, Motors, Alarm and Warning Lights. There are three main type of Output Module:

a) *Relay:*-The Signal from the PLC operates a relay within the output module controlling connecting the control voltage to the output port and hence to the actuator.
b) *Transistor:*-A transistor is used to switch the output. This is faster than a relay output but is only suitable for low power direct current applications.
c) *Triac:*- This Solid State Device is used for switching alternating current devices. It requires some form of over current protection.

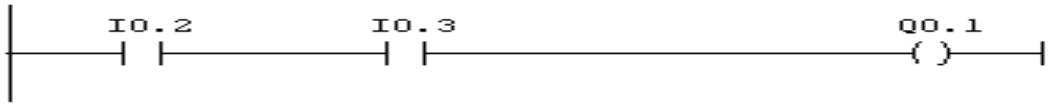
PLC will operate any system that has output devices that go on and off (Discrete, or Digital, outputs). It can also operate any system with variable (dynamic) outputs. The Programmable Logic Control can be operated on the input side by ON/OFF devices or by variable (dynamic) input devices.

A PLC or Programmable Logic Controller is a user friendly, microprocessor specialized computer that carries out control functions of many types and levels of complexity. Its purpose is to monitor crucial process parameters and adjust process operations accordingly. It can be programmed, controlled and operated by a person unskilled in operating computers. Essentially, a PLC's operator draws the lines and devices of ladder diagrams with a keyboard onto a display screen. The resulting drawing is converted into computer machine language and run as a user program.

Examples on PLC Applications Based Controlled Devices:

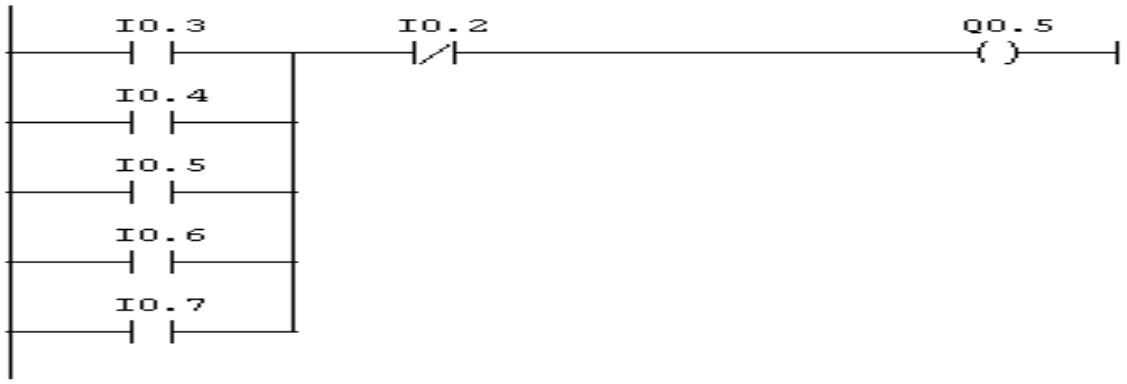
1. Develop ladder logic for a Car Door / Seat Belt Safety System. When the car door is open, or the seat belt is not up, the ignition power must not be applied if all is safe the key will start the engine.

Answer:



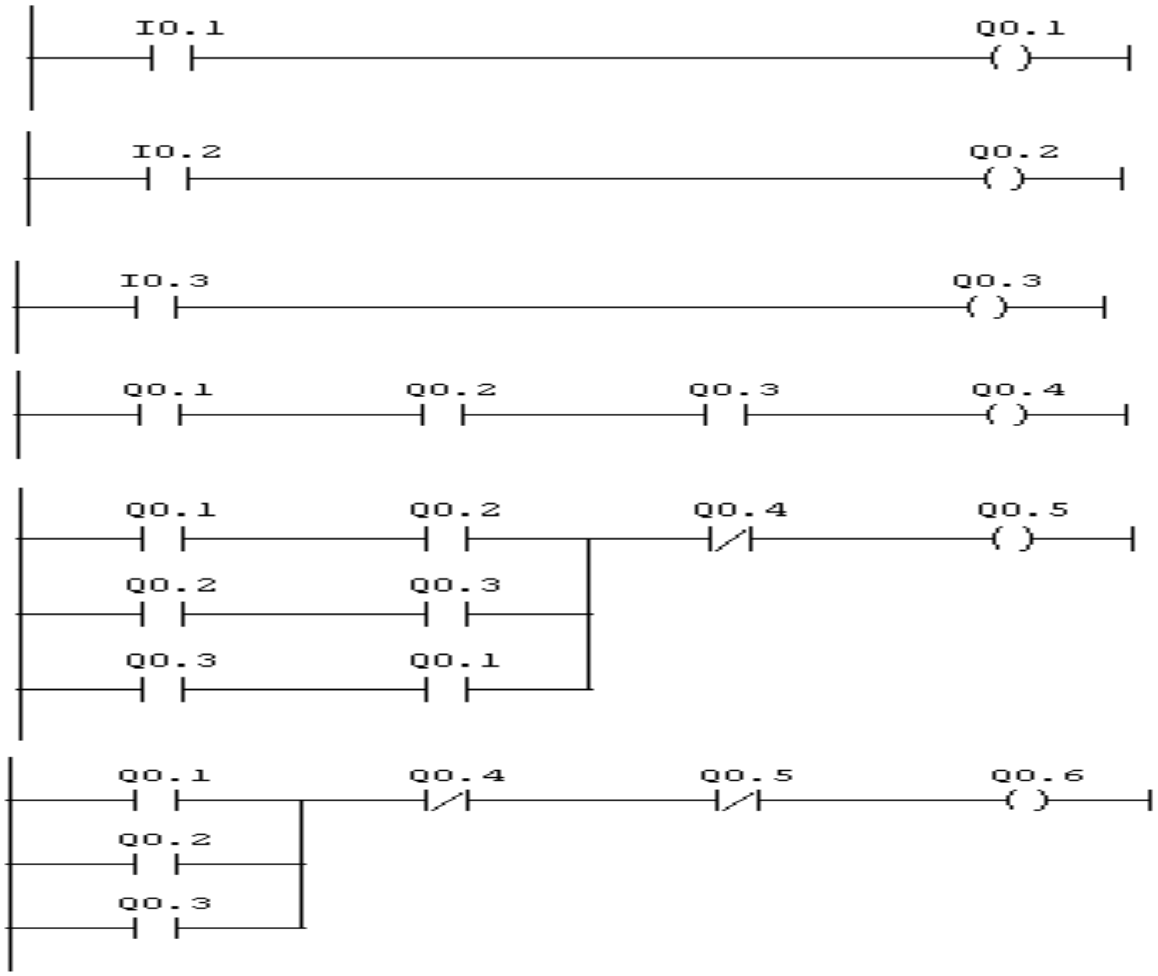
2. Develop Ladder Logic for a Car Door and inside light system if any Car Door. If any of the Car Door, out of the four doors is opened or a switch S1 inside the car is made ON, a lamp L1 inside the car gets ON. When all the four doors are closed and switch S1 is kept open the lamp inside the car gets OFF. If all the four doors are opened and switch S1 is made ON. The lamp inside the car can be made OFF by pressing another switch S2. If all the car doors are closed then the inside lamp can be made ON by switch S1 and can be made OFF by switch S2.

Answer:



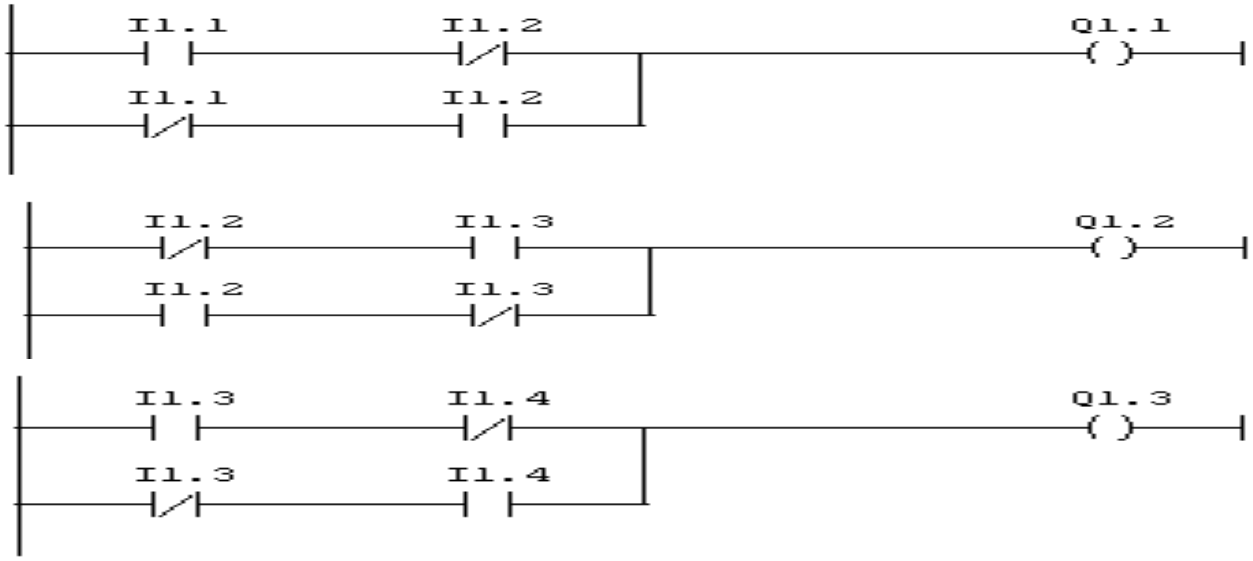
a) There are three fans in a room and are controlled by individually toggle switches there is a panel board outside the room. Draw logic in LAD such that when the following conditions are satisfied the indicator light should glow in panel board.If all the three fans are running the RED lamp L1 glows in panel board at that time L2 and L3 should off.
b) If any two fans are running the YELLOW Lamp L2 glows at that time L1 and L3 should off.
c) If any one fan is running the GREEN Lamp L3 glows at that time L1 and L2 should off.

Answer:



3. In a corridor there are four switches and three bulbs. When a man enters from one side to the corridor and press switch 1, bulb 1 gets ON. When the man presses switch 2, bulb 2 gets ON and bulb 1 gets OFF. When the man presses switch 3, bulb 3 gets ON and bulb 2 gets OFF. When the man presses switch 4, bulb 3 gets OFF. The same thing can happen if at any instance a man enters from any side.

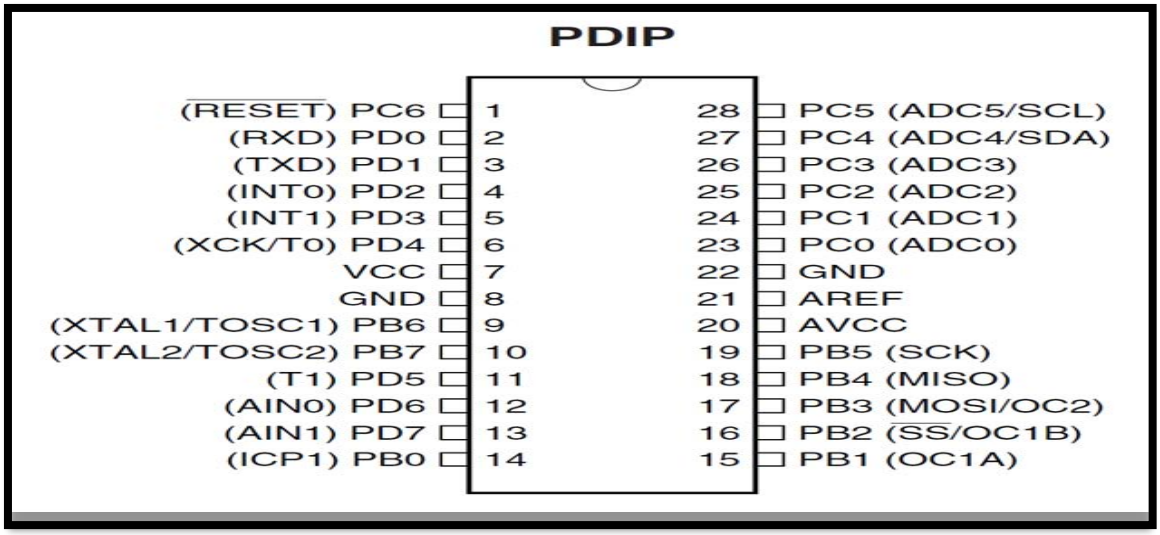
Answer:



Description of AVR Microcontrollers: Atmel microcontrollers (MCUs) deliver wireless and security support solution based devices. The specification of various ATMEL Microcontrollers which tends to provide the different features and range of operations are:

- Atmel AVR 8- and 32-bit Microcontrollers:- Atmel AVR 8- and 32-bit Microcontrollers deliver a unique combination of performance, power efficiency and design flexibility. They are based on the industry's most code-efficient architecture for C and assembly programming language. The extensive AVR portfolio, combined with the seamlessly-integrated Atmel Studio development platform, makes it easy to reuse knowledge when improving your products and expanding to new markets.
- Atmel SMART ARM-based Microcontrollers:- The broad portfolio of 32-bit Atmel ARM Microcontrollers based solutions can meet the needs of virtually any device. Atmel SMART ARM-based solutions are designed to optimize system control, wired and wireless connectivity, user interface management, low power and ease of use for human interfacing of devices.

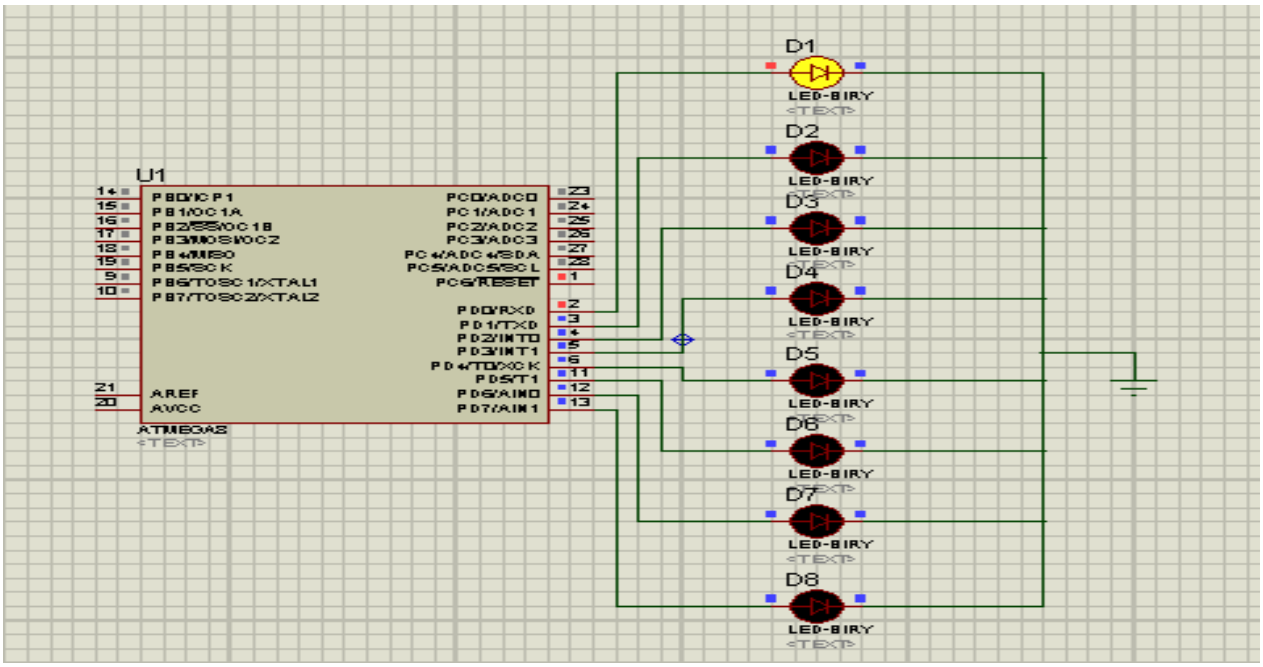
Pin Diagram of ATMEGA 8 Microcontroller



Examples on AVR Microcontrollers Devices based on Real Applications:

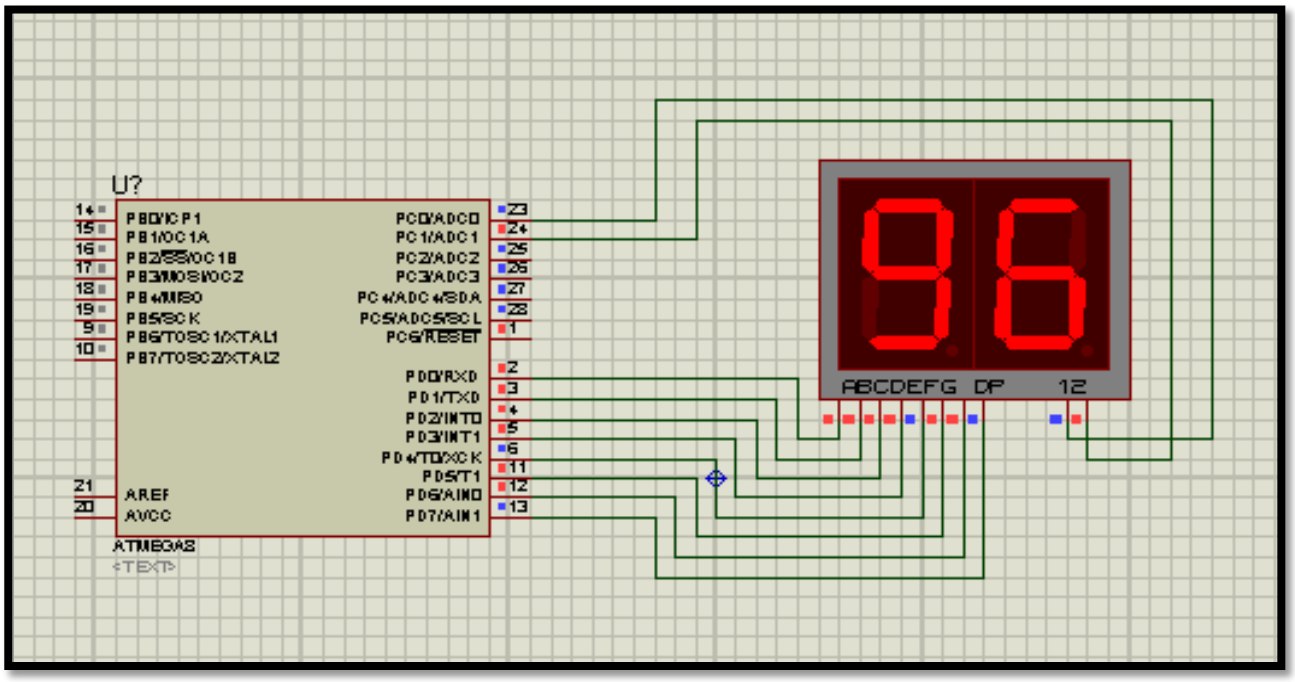
1. Program for design the Sand Glass or Light Attraction through ATMEGA 8 Microcontroller.

Answer:



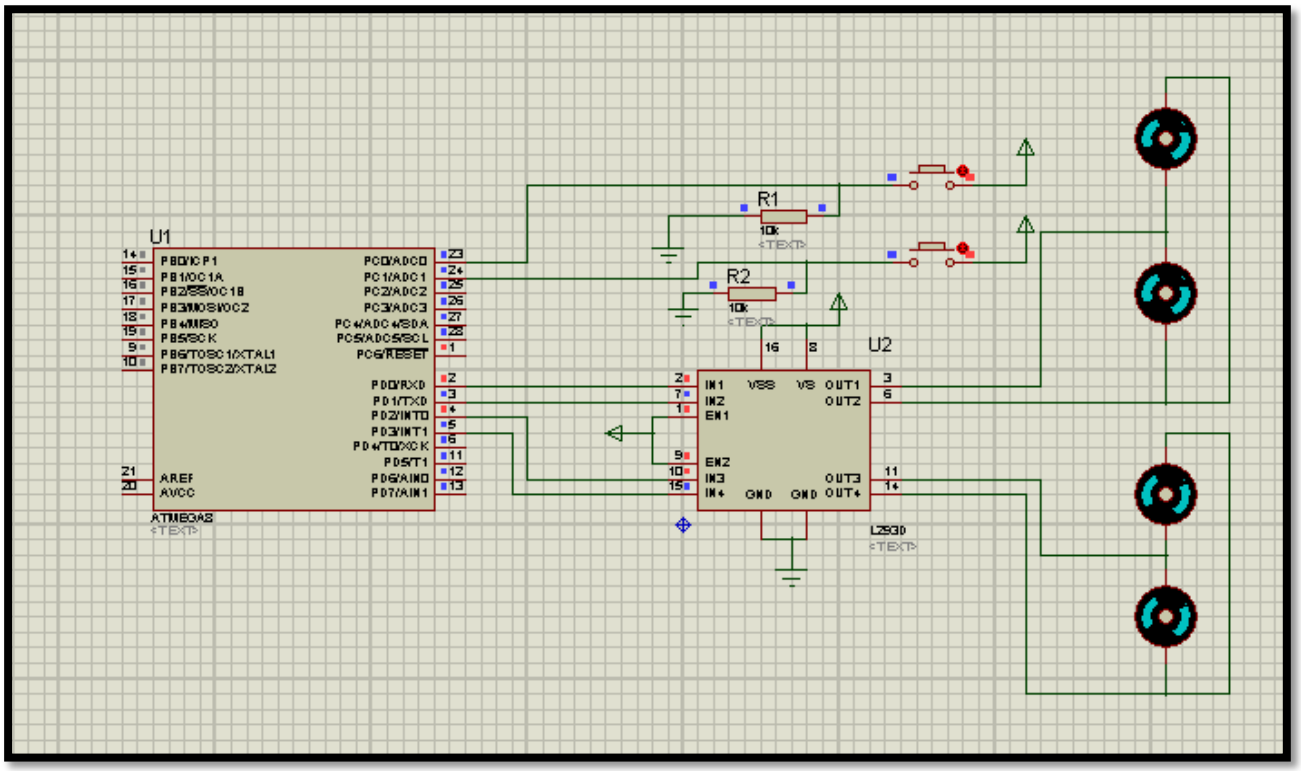
2. Program for increment or decrement the Seven Segment through Switch in ATMEGA 8 Microcontroller.

Answer:



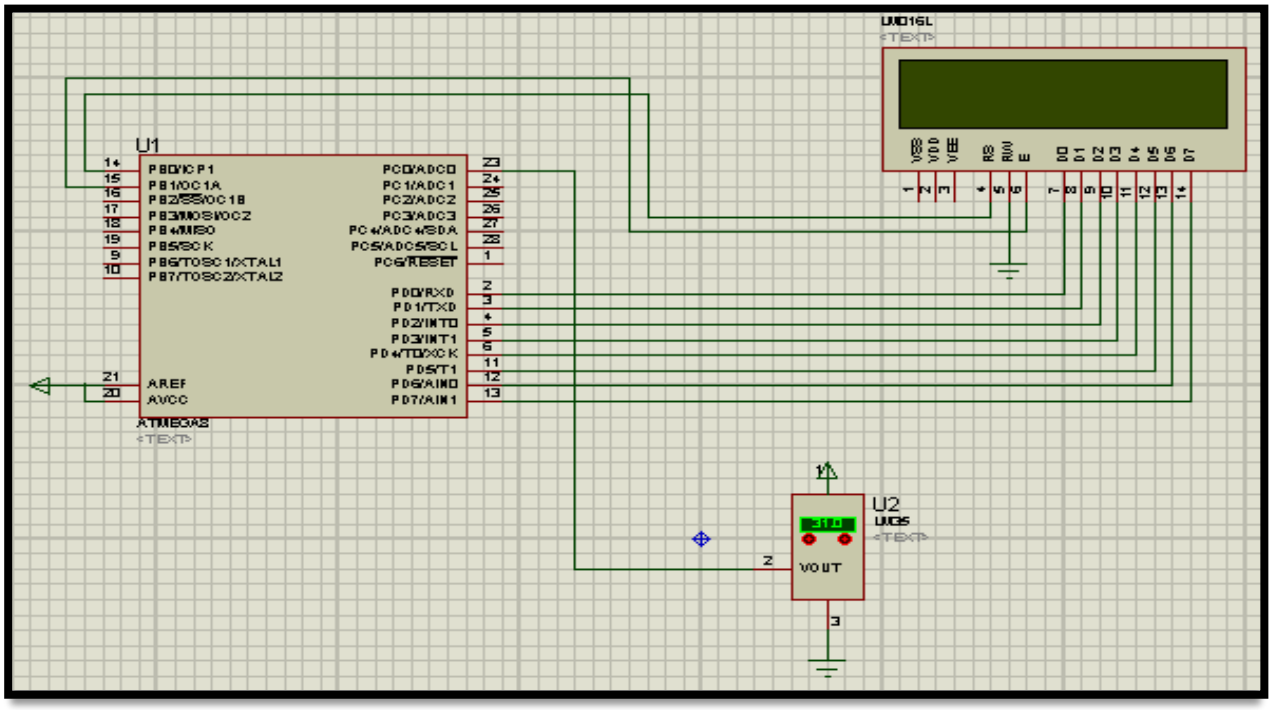
3. Program for making the Object Follower Robot in ATMEGA 8 Microcontroller.

Answer:



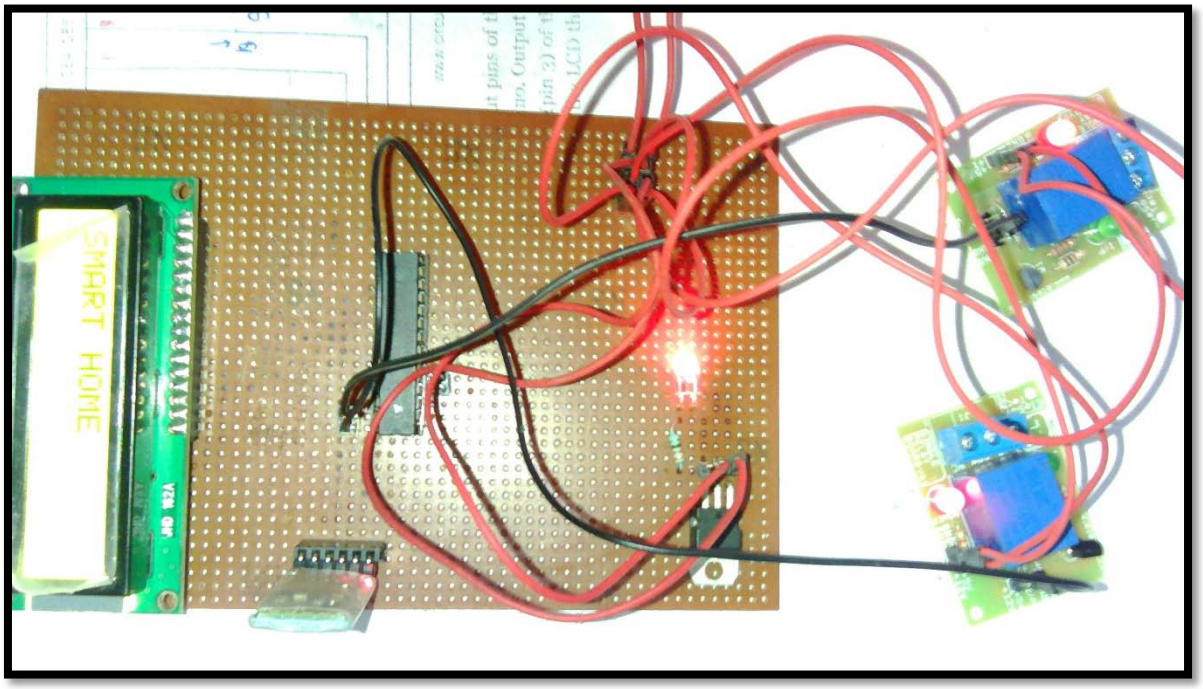
4. Program for design the Temperature Sensor in ATMEGA 8 Microcontroller.

Answer:



Practical and Working Analysis of Project: The methodology of this project is based on the concepts for designing the module and Coding Part for creating the idea and describes this for practical implementation process. The practical implementation process follows the various processes which tend to Reliability and Adaptability of Project. This project corresponds for designing the modules and then performs the coding on this project. The Coding Project performs the various concepts for designing the circuit in Proteus 7.8 Software Version.

The completion of Project Coding assigned as module for designing the Circuit and operated through ATMEGA 8 Microcontroller. The operations of this project are done and provide the concept of Hardware Implementation for this project. The Hardware Implementation of this project starts from soldering and mounting the components. The components are soldered and assigned to make a circuit. These things provide the testing of this circuit is to make or run the project and it has completed for testing all the things and working analysis for running this project as Automatic Motion Switching through Bluetooth Interfacing in Cell Phone Devices.



Hardware Implementation of Project Work on Home Automation Switching in PLC Applications Using Phone Accelerometer

Program Coding and Circuit Description: This project implements the concept of Embedded Systems as the basic need to control the ATMEGA 8 Microcontroller which deals to controlling the all functions of this project. This project can also be interfaced with LCD Module and Bluetooth Wireless Module. In this project there is a switch which is connected with two devices to implement the motion sensing. Now, the controlling this device with Cell Phone through Bluetooth Interfacing with an Android Application for the Motion Sensing Detection System.

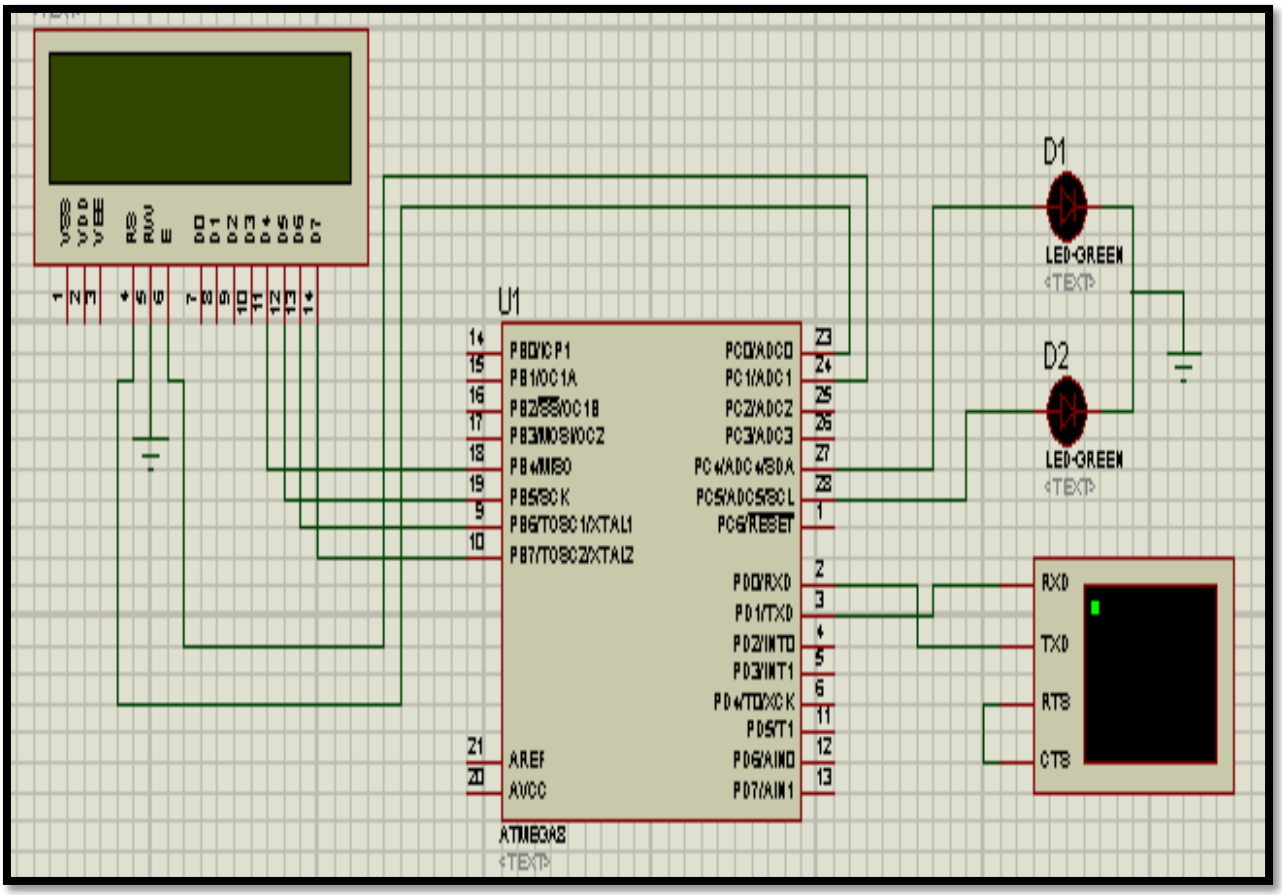
The implementation of this project is done by the module of Embedded System which shows the application of Switching and Home Automation using Lights, Fans, Machines and Other Equipments through Old People and Paralyzed Person in terms of Physically Disabled Person for the human mankind and development resources which provide the Circuit Description and Coding Part of this project that tends to following features:

Program Coding for implement this project through ATMEGA 8 AVR Microcontroller

```
#include<avr/io.h>
#include<util/delay.h>
void LCD_Init()
{command(0x32);
command(0x28);
command(0x06);
command(0x0C);
command(0x01);
}
void command(unsigned char a)
{PORTB=a;
PORTC&=0XFE;
_delay_ms(30);
PORTC|=0X02;
_delay_ms(30);
PORTC&=0XFD;
_delay_ms(10);
a=a<<4;
PORTB=a;
PORTC&=0XFE;
_delay_ms(30);
PORTC|=0X02;
_delay_ms(30);
PORTC&=0XFD;
}
void display(unsigned char a)
{PORTB=a;
PORTC|=0x01;
_delay_ms(30);
PORTC|=0X02;
_delay_ms(30);
PORTC&=0XFD;
_delay_ms(10);
a=a<<4;
_delay_ms(10);
PORTB=a;
_delay_ms(10);
PORTC|=0X01;
_delay_ms(30);
```

```
PORTC|=0X02;
_delay_ms(30);
PORTC&=0XFD;
}void string(unsigned char *a)
{while(*a!='\0')
{display(*a);
a++;
}}
void USART_Init()
{UBRRL=51;
UCSRB=(1<<TXEN)|(1<<RXEN);
UCSRC= (1<<URSEL)|(1<<UCSZ1)|(1<<UCSZ0);
}void USART_Transmitter(unsigned char data)
{while(!(UCSRA&(1<<UDRE)));
UDR=data;
}
unsigned char USART_Receiver(void)
{while(!(UCSRA &(1<<RXC)));
return UDR;
}
void main()
{DDRC=0XFF;
DDRB=0XFF;
USART_Init();
LCD_Init();
unsigned char a;
command(0x01);
string("SMART HOME");
while(1)
{command(0x80);
a=USART_Receiver();
if(a=='A')
{command(0x01);
PORTC|=0X10;
_delay_ms(10);
string("BULB1 ON");
_delay_ms(40000);}
else if(a=='B')
{command(0x01);
_delay_ms(10);
PORTC&=0XEF;
string("BULB1 OFF");
_delay_ms(40000);}
else if(a=='C')
{command(0x01);
_delay_ms(10);
PORTC|=0X20;
string("BULB2 ON");
_delay_ms(40000);}
else if(a=='D')
{ command (0x01);
_delay_ms(10);
PORTC&=0XDF;
string("BULB2 OFF");
_delay_ms(40000);
}}}
```

Circuit Description for Home Automation through USART Communication in PLC Application Using Phone Accelerometer



IV. Result and Conclusion

There are various facilities required for this Project Work which might be present as various Electronic Components, Proteus 7.8 Software, Atmel AVR Software, Solder in Zero PCB and other required components. The Project can be designed on the idea which might be required for the concepts then it has started the program and coding of this project in USART Module for working at ATMEGA 8 Microcontroller.

The Project had required the circuit design which would be done by Proteus 7.8 Software for designing the circuit. This process requires the implement on Hardware for the running stage and version of this project. These things arise the running stage which would be done by the need for developing the project in running implementation for development of this project.

The facilities would be required for developing the project based on the concept of Embedded Systems. The Embedded Systems of facilities would be assigned as Software in Program Coding and Circuit Design then the facilities would be required as Hardware for the components in Electronics and the Soldering Components for which the Circuit can be assigned that would be designed by this project.

These proper facilities provide the working details of this project which may be detail as provide the running details of this project. The running project provides the various features which may be seen for the completion of this project work. This project work provides the very limited resources with the very smart idea for the reduction cost of this project. This feature may avail the cheap price for the design of this project and provide very limited resources for this project. The result work of this project provide the important result and practical application as live project for implementing the electronic device controlled by old and paralyzed human beings through monitor the human body parts as to manage the Home Automation System using Phone Accelerometer in Electronic Devices.

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