Transforming Institutes into Energy –Efficient Hubs through Automation

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A R T I C L E I N F O

A B S T R A C T

In the modern day's everyone uses smartphones and the internet. Therefore, every smartphone has Bluetooth System. In this project, we will design a simple Arduino Bluetooth Control Institution Automation using the HC-05 Bluetooth module, which is used to switch ON or OFF different electrical appliances remotely. Industrial Automation systems can make our life easy and secure. Here we will control 2 different Institution appliances using Smartphone App through Bluetooth communication.

Automation is today's fact, where things are being controlled automatically, usually the basic tasks of turning ON/OFF certain devices and beyond, either remotely or in close proximity. Automation lowers the human judgment to the lowest degree possible but does not completely eliminate it. The concept of remote management of devices over the Bluetooth today can be a reality. Assume a system where from the office desk, the user could view the status of the devices and decides to turns on the cooling system, say the air conditioner, and switches on or off some of the lights.

Wireless technology is one of the most widely used in Internet of Things (IOT). Wireless system can be use in different ways i.e., voice communication, remote control, etc. However, application with IOT can easily control using mobile app. Bluetooth module can exchange data wirelessly and control many devices.

Keywords: Automation, Bluetooth, IOT, Relay

I. INTRODUCTION

In this Project, Bluetooth module HC05 is used to control Institution appliances from the smart phone application 'Arduino Bluetooth control app'. Data from the mobile app is passed through Bluetooth HC05. HC05 send data to ARDUINO board. Relay acts as a switch and it is interfaced with ARDUINO board to control the Institution appliances. Using this wireless technology, we can control or convert man

appliances into Institution automation efficiently. Purposed Institution automation can be used in short range applications. Nowadays Automation is one of the most popularly trend in this world to control lightning, heating, remote control, voice communication, password lock system etc. Institution Automation can be done in two ways that is wire communication and wireless communication. Wire communication can be done in Institution Automation; however, wireless is more convenient to use while operating the system and make us easier to use them. In order to communicate wirelessly Bluetooth Module, WIFI module etc. are used. Bluetooth is widely used for only short-range communication. For long range communication-WIFI module or GSM module can be used however they are very costly in the market while comparing with Bluetooth module. Bluetooth is interfaced with ARDUINO board to design a wireless communication. ARDUINO offers high processing power and speed; this gives better response times and give overall improved performance as compare to another modern microprocessor. Most of the people use mobile phone and aware about many applications in the mobile phone. Using an application to control the Institution appliances would be very comfortable while using it. This will reduce the risk of shock from the electric that is even a child can operate easily without risk. So, in every field we need to reduce risk and need to improve the easiest and comfortable way while using it.

II. OBJECTIVE

This Project "Institution Automation" is a reliable circuit that takes over the task of controlling the lights as well as monitors persons / visitors in the room very accurately. First problem is to monitor room for any person or visitor so here is solution. When somebody enters into the room then the LED light and other appliances in the room will be switched ON and when any one leaves the room then the light will be only switched OFF until all the persons in the room go out. The Arduino does the above job. It receives the signals from the sensors, and this signal is operated under the control of software which is stored in ROM. Arduino continuously monitors the Infrared Receivers. When any object passes through the IR Receiver's then the IR Rays falling on the receivers are obstructed. This obstruction is sensed by the Arduino.

Second problem is how we turn on and off the devices in institution automatically aver mobile phone so solution is easy by using Arduino and Bluetooth this thing is possible. We connect Bluetooth module HC05 to Arduino and connect relay to Arduino. By program code in Arduino this task is done.
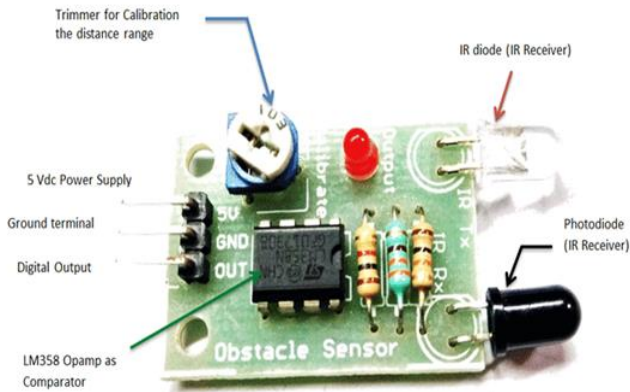
III. PART OF PROJECTS

1. Arduino

Arduino Uno is a popular microcontroller development board based on 8-bit ATmega328P microcontroller. Along with ATmega328P MCU IC, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller.

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2.   IR sensor module

The IR sensor module consists mainly of the IR Transmitter and Receiver, Op-amp, Variable Resistor (Trimmer pot), output LED along with few resistors.

IR LED Transmitter

IR LED emits light, in the range of Infrared frequency. IR light is invisible to us as its wavelength (700nm – 1mm) is much higher than the visible light range. IR LEDs have light emitting angle of approx. 20-60 degree and range of approx. few centimeters to several feets, it depends upon the type of IR transmitter and the manufacturer. Some transmitters have the range in kilometers. IR LED white or transparent in colour, so it can give out amount of maximum light.

Photodiode Receiver

Photodiode acts as the IR receiver as its conducts when light falls on it. Photodiode is a semiconductor which has a P-N junction, operated in Reverse Bias, means it start conducting the current in reverse direction when Light falls on it, and the amount of current flow is proportional to the amount of Light. This property makes it useful for IR detection. Photodiode looks like a LED, with a black colour coating on its outer side, Black colour absorbs the highest amount of light.

LM358 Opamp

LM358 is an Operational Amplifier (Op-Amp) is used as voltage comparator in the IR sensor. the comparator will compare the threshold voltage set using the preset (pin2) and the photodiode's series resistor voltage (pin3).

Photodiode's series resistor voltage drop > Threshold voltage = Opamp output is High

Photodiode's series resistor voltage drop < Threshold voltage = Opamp output is Low

When Opamp's output is **high** the LED at the Opamp output terminal **turns ON** (Indicating the detection of Objective.

1.   Arduino Uno R3

- It is an ATmega328P based Microcontroller
- The Operating Voltage of the Arduino is 5V
- The recommended input voltage ranges from 7V to 12V
- The i/p voltage (limit) is 6V to 20V
- Digital input and output pins-14
- Digital input & output pins (PWM)-6
- Analog i/p pins are 6
- DC Current for each I/O Pin is 20 mA
- DC Current used for 3.3V Pin is 50 mA
- Flash Memory -32 KB, and 0.5 KB memory is used by the boot loader
- SRAM is 2 KB
- EEPROM is 1 KB
- The speed of the CLK is 16 MHz
- In Built LED
- Length and width of the Arduino are 68.6 mm X 53.4 mm
- The weight of the Arduino board is 25 g

2.   Relay Driver ULN2003 module

- Contains 7 high-voltage and high current Darlington pairs
- Each pair is rated for 50V and 500mA
- Input pins can be triggered by +5V
- All seven Output pins can be connected to gather to drive loads up to (7×500mA) ~3.5A.
- Can be directly controlled by logic devices like Digital Gates, Arduino, PIC etc
- Available in 16-pin DIP, TSSOP, SOIC packages

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3. Relay
   - Max Current: 5A AC/DC (max).
   - Max Voltage: 250V AC/30V DC.
   - Nominal Voltage: 12V.
   - Coil resistance: 270Ω.
   - Coil Current: 44.4Ma.

IV. ADVATAGES

1. Home automation using Bluetooth and Arduino can prove to be very useful for Elderly/Handicapped people
2. A single android smartphone can control multiple devices
3. Any android phone can be used, no internet required once the app is downloaded.
4. Reduces power usage
5. Improves efficiency of devices

V. DISADVANTAGES

1. Needed Android Smartphone
2. Unusable for long range communication because range of Bluetooth is limited.

VI. APPLICATION

1. It is specially developed for use in institute but also use in Home, Shops, Offices.
2. Used to on off the fan in institute
3. Used for on off the light bulbs in the institutions.

VII. CONCLUSION

This project was designed by using Bluetooth protocol and Bluetooth has limited range of communication so there is scope to extend this communication rang by using internet or GSM module. Second future scope is we are able to display the count persons inside the room on seven segment display.

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