

Smart Air-conditioning Control System

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ABSTRACT

Nowadays, one of the most used electrical appliance is the Air Conditioner. Utilization of energy in Electronic equipments is quite a lot especially in Air Conditioners. At the same time, it is essential to efficiently manage the temperature of the Air Conditioner. Also wastage of energy happens a lot with the Air Conditioner. The main objective of the Smart AC Control System is to minimize the wastage of electricity. Our system provide to control the AC temperature based on people traffic by using GSM module. Depending upon the IR sensors interruption the system identifies the entry and exit of the visitor. This system presents the development and implementation of GSM based remote control system for AC temperature control of the interface on which it is based. GSM shield was used for receiving SMS from the operators mobile phones that enable an Arduino microcontroller to take the necessary actions like switching OFF/ON and increase or decrease temperature.

Keywords -Cognitive IOT,Arduino Microcontroller, IR Sensor, GSM model, Database.

I. INTRODUCTION

Today, demand for development of internet applications is very high. Internet of Things(IoT) is a technology with the help of which one can produce different kinds of applications that uses Internet to function. Basically, Internet of Things is a network in

which all physical components are connected to the internet through routers or network devices and exchange data. The versatility of IoT has become very popular in recent years. There are many advantages on having devices based on IoT. There are lots of applications which IoT based devices can have in general, in this project the prime focus is on avoiding wastage of electricity.

II. RELATED WORK

In 2018, Patil Varsha et al have proposed the Energy utilization of Electronic equipment is large especially in Air Conditioning. At the same time, we need to able to efficiently manage the temperature of AC.If the number of people increases in a room then automatically the room temperature should get decrease. And if the number of people is less than the room temperature should increased or remain default temperature. Therefore it is important to optimize the energy consumption of air conditioning.[1]

In 2016, Winfred Adjardjah have proposed the design and construction of a digital bidirectional visitor counter (DBVC). The DBVC is a reliable circuit that takes over the task of counting number of persons / visitors in the room very accurately The total number of persons inside the room is also displayed on the LCD (Liquid Crystal Display)[2]

In 2016, Effah E., Aryeh F. L. and Kehinde had presents the development and implementation of

a Global System for Mobile Communication (GSM) based remote control system for electrical appliances and lighting that enables complete control of the interface on which it is based. GSM Shield was used for receiving short message service (SMS) from the homeowner's mobile phone that automatically enables an Arduino microcontroller to take the necessary actions like switching OFF and ON electrical appliances such as fan, light, air-conditioner, supply mains and so on.[3]

III. PROPOSED SYSTEM

To optimize the usage of electricity consumption of air conditioner. This Paper proposes IoT based real time temperature control system for air conditioners[1]. We are designing system to control Air Condition temperature based on public traffic through GSM module with Arduino. We are design system to count the entry and exit people and display on the LCD. We are using IR sensors, Microcontroller, Arduino, LCD, LED for people counting.

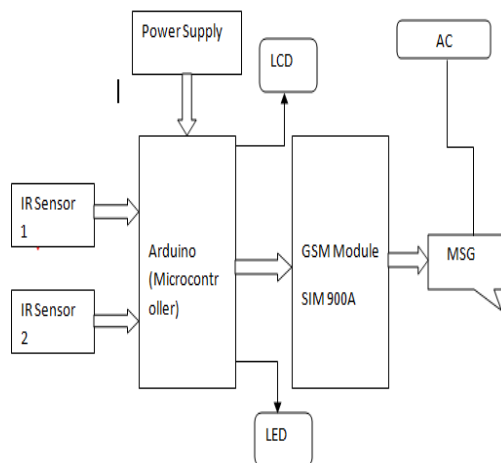


Fig 1: Block diagram

1) IR Sensor

This comprises the IR sensor which consists of a transmitter and a receiver. The emitter passes an infrared beam which is detected by an IR receiver (phototransistor). When a person walks

by, he "breaks" the beam. Upon this event, the phototransistor no longer can detect infrared light and another event is triggered (door opens). The infrared sensor also called IR sensors consists of two parts, namely, IR transmitter circuit and IR receiver unit. The transmitter unit consists of an infrared LED and its associated circuitry as well as the receiver[2]. This system use two IR sensor IR1 and IR2 on the single door. IR1 used for Counting entry persons and IR2 used for exit persons.

1) If IR1 senses person, it informs to the Arduino controller the person has entered then Arduino increment the count[4].

2) At the same time it gives a delay of 1 sec, the person cross the IR2 the Arduino decrement the count by 1[4].

2) Arduino (Microcontroller)

Arduino microcontroller work as a counter controller. Arduino is used to inform the GSM module about the count increment or decrement. It has 16 KB flash memory, static RAM of 1KB and EEPROM of 512 bytes[4]. There are 14 digital I/O lines and 6 Analog I/O pins[4].

3) Power Supply

Power supply block consists of following units: Step down transformer; Bridge Rectifier Circuit, Input Filter and Voltage Regulator[2].

4) LCD

LCD is used for display the counter. LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of application[4].

5) LED

Two LED's were also incorporated in the circuit to serve as immediate action indicator. The green LED lights when a visitor enters while the red LED lights when a visitor exit a room.

6) GSM SIM900A

Global System for Mobile communication (GSM) is digital cellular system used for mobile devices..SIM900A module allows users to send/receive data over GPRS, send/receive SMS and make/receive voice calls[5]. AT commands are used to configure the module in different modes and to perform various functions like calling, posting data to a site, etc[5].

CIOT Framework

Cognitive IoT enables us to learn from, and infuse intelligence into, the physical world to transform business and enhance the human experience. Cognitive IOT is the combination of data integration by smart sensors and the actions performed by the devices[1].

This project present the design and construction of a Bidirectional visitor counter. This reliable circuit that takes over the task of counting number of persons or visitors in the room. When single person enters the room then the counter is increased by one and when single person leaves the room then the counter is decreased by one.

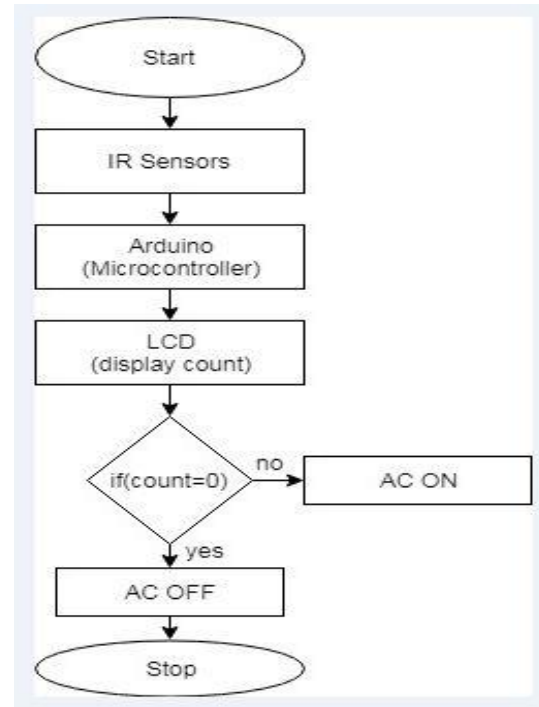


Fig 2: IR sensor based people counting

- 1.The total number of person inside the room is displayed on the LCD.
- 2.IR sensor motion detect the entry and exit people.
- 3.Arduino microcontroller count the people come and leave and no of people count input to the LCD.
- 4.LCD display the people counting.
- 5.if count=0,then switch off the AC.
- 6.Otherwise, switch on the AC.

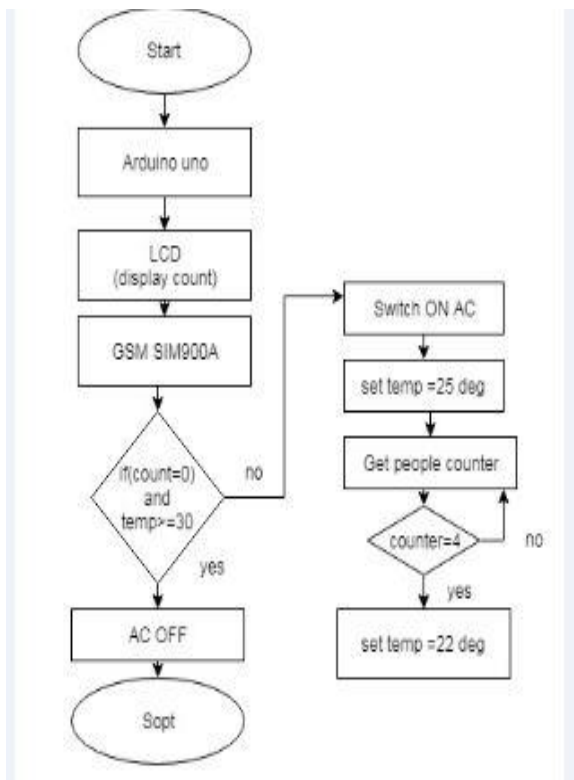


Fig 3: GSM Module control AC temperature

When the 4 people enter in the room and if its temperature (T) > 30 degree then AC will switched ON, Ac will continue to run till the temperature of the room becomes 25 degree.[1]

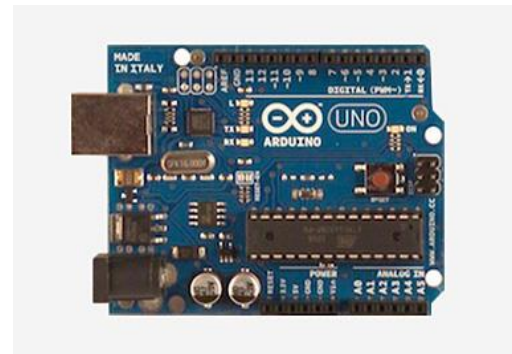
When the people entering in the room increases and if more than 4 people inside the room again temperature is lower to 22 degree[1].

As if all people leaving room and arduino will send SMS via GSM module to operators then AC will OF[1].

Components

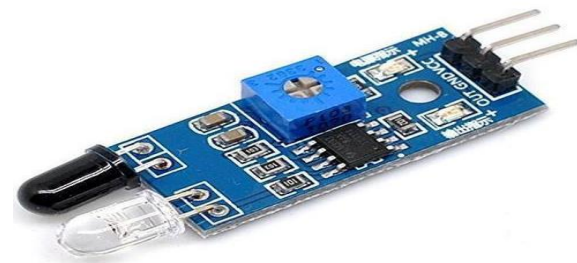
- AIR CONDITIONER
- TEMPERATURE SENSOR
- SOFTWARE REQUIREMENTS
- ARDUINO UNO

Arduino Uno Board:-



This is the latest revision of the basic Arduino USB board. It connects to the computer with a standard USB cable and contains everything else you need to program and use the board.

IR sensor:-(Infrared Sensor)



Infrared Sensor Module has built-in IR transmitter and IR receiver that sends out IR rays and looks for reflected IR rays to detect presence of any obstacle in front of the sensor module.

Air Conditioner:-(AC)



It is the process of removing heat and moisture from the interior of an occupied space.It improve the comfort of person.

SIM900A GSM Module:-

The SIM900A is a complete Dual-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications allowing you to benefit from small dimensions and cost-effective solutions.

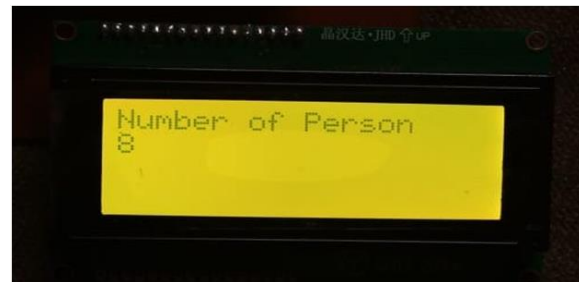
IV. IMPLEMENTATION DETAILS**People Counting Algorithm**

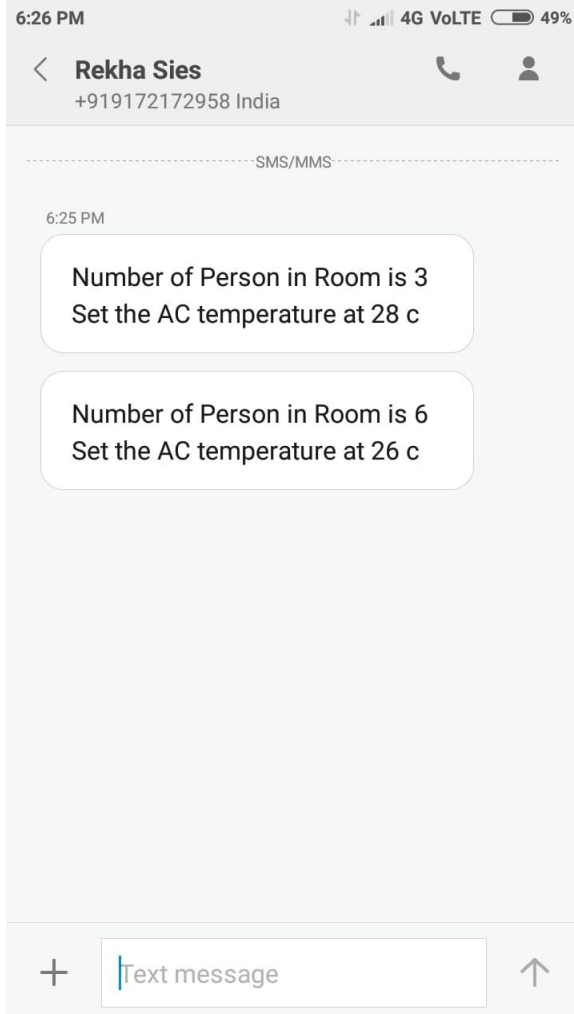
- 1) Start
- 2) Initialize Arduino(UNO)Microcontroller
- 3) Set IR Sensors
- 4) Check For IR1 or IR2
- 5) If (IR1=3) (Increment Sensor)
 - 1) Counter display on LCD.
 - 2) No of people in the room 3.
- Else (Decrement Sensor)
 - 1) Counter display on LCD.
 - 2) No of people in the room 0.
- 6) Stop

Message Based Algorithm

- 1) Start
- 2) Initialize Arduino (UNO)
- 3) Initialize GSM Module

- 4) If (Count <3)
 - 1) Send msg to operator.
 - 2) Set AC temperature 25 degree.
- Else if (Count =9)
 - 1) Send msg to operator.
 - 2) Set AC temperature 20 degree.
- Else
 - 1)Send msg to operator for Switch-off AC.
- 5) Stop.

Output :-**People entering in the room****People exit the room****Gsm Module send the message**



V. CONCLUSION

The IOT Smart Air Conditioning Control System would thus make a pleasant work environment without the need of constantly switching the AC on and off when there are more important work to do. The IR sensors will keep the count of people entering the room and going out and send it to the microcontroller. The Arduino MicroController will adjust the AC temperature depending on the number of people present in the room. It saves a lot of electricity and also reduces the human effort of adjusting the temperature every now and then.

VI. REFERENCES

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[2] Winfred Adjardjah Design and Construction of a Bidirectional Digital Visitor Counter Computer Engineering and Intelligent Systems ISSN 2222-1719 (Paper) ISSN 2222-2863 (Online) Vol.7, No.2, 2016.

[3] Effah E., Aryeh F. L. and Kehinde W. K. (2016), “GSM Based Home Appliances Control System (HACS) for Domestic Power Users in Ghana”, 4th UMaT Biennial International Mining and Mineral Conference, pp. CE 58-64

[4]<https://www.slideshare.net/Abhishekvb/a-report-on-bidirectional-visitor-counter-using-ir-sensors-and-arduino-uno-r3>

[5]<http://www.electronicwings.com/arduino/sim-900a-gsm-module-interfacing-with-arduino-uno>.