

# Smart Building Using IoT

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**ABSTRACT:** Automation is the new trend in technology and in the common world. This is a project in which we will build an IoT based electronic device that forms the basis of smart buildings. Smart buildings are the ones where various parameters like temperature, lights, water etc. are monitored and analysed so as to make it highly efficient. In this, we will work on smart lights in a smart building and to develop such a system and to send data from such a system to the cloud for analysis. We can sense the level of water tank with the help of ultrasonic sensors and automatically switch the lights ON/ OFF based on occupancy. In this we will able to monitor the level of dustbin continuously and automatically detect if it fill up and information will send to security guard using android app. Number of persons at various times of the day will be sense by PIR sensor and counted by counter. Parking light will ON/OFF base on light intensity and the power consumed.

**KEYWORDS:** IoT (Internet of things), Building automation, Energy crisis, Energy efficiency, Smart campus.

## I. INTRODUCTION

World is moving towards the “smarter” things rather than just smart. “Smarter” is a keyword in IoT (Internet of Things). IoT refers to making all the devices smart enough to communicate with other devices using any communication medium such as the internet for the purpose of automation, accessibility, data management, for solving complex environmental problems, etc. The “Internet of Things” term was first proposed by its inventor Peter T. Lewis in the year of 1985. Internet of Things is supposed to have a large scalable scope with an expectation of having more than 50 billion objects by 2020 communicating in several networks. It has emerged as a great implementation and efficient use of pre-existing technologies such as big data analytics (Handling and analyzing large amount of sensor data), cloud computing (For complex computation on sensor data for actuation and decisions), and software defined networks (For easy implementation of technology). Automation is a kind of necessity for everyone in this growing world. Every individual is busy in their day to day life and it is easy to overlook things such as the electricity consumption of their devices. The solution to such problems is brought up by IoT with automation. IoT devices can be used to monitor and control mechanical, electrical electronic or any kind of day to day devices (thing) if they are capable of being addressed on a network. These devices can be deployed in different types of buildings (e.g., public and private, industrial, institutions, or residential) for the automation purpose.

## II. HARDWARE DETAILS

### A. ATMEGA328P:

The Atmel® picoPower® ATmega328/P is a low-power CMOS 8-bit microcontroller based on the AVR® enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega328/P achieves throughputs close to 1MIPS per MHz. This empowers system designed to speed. The Atmel AVR® core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in a single instruction executed in one clock cycle.



Fig. 2:(a) ATMEGA328P

**B. LCD:**

We have used 16X2 LCD (JHD162A) in the „Radiation Survey Meter“ for its following features:- Wide viewing angle and high contrast,5-7 dot character matrix with cursor Interfaces with 4- bit or 8- bit MPUs,Display up to 226 character and special symbols, Custom character patterns are displayed with the character RAM , Abundant instruction set including clear display, cursor on/off, and character blinking. Operable on single 5V power supply. Low power consumption .

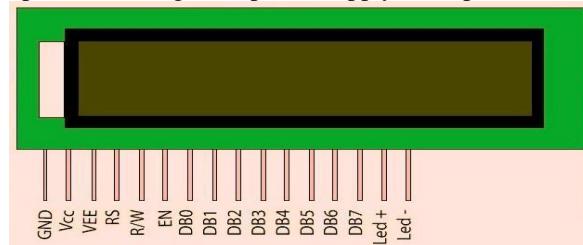


Fig .2:(b) LCD

**C. LDR sensor**

Two cadmium sulphide(cds) photoconductive cells with spectral responses similar to that of the human eye. The cell resistance falls with increasing light intensity. Applications include smoke detection, automatic lighting control, batch counting and burglar alarm systems.



Fig .2:(c) LDR sensor

**D. DC MOTOR**

DC motors are compact and display high output, and their speed is easy to control. They may be driven by battery or any other power supply and are therefore also easy to use. However, inappropriate power supply may lead to burnout or abnormal brush wear.

Fig .2:(d) DC motor

**E. ULTRASONIC SENSOR**

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work: (1) Using IO trigger for at least 10us high level signal, (2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back. (3) IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning. Test distance = (high level time×velocity of sound (340M/S) / 2.



Fig.2:(e) Ultrasonic sensor

**F. PIR SENSOR**

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in

appliances and gadgets used in homes or businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.



*Fig .2(f) PIR sensor*

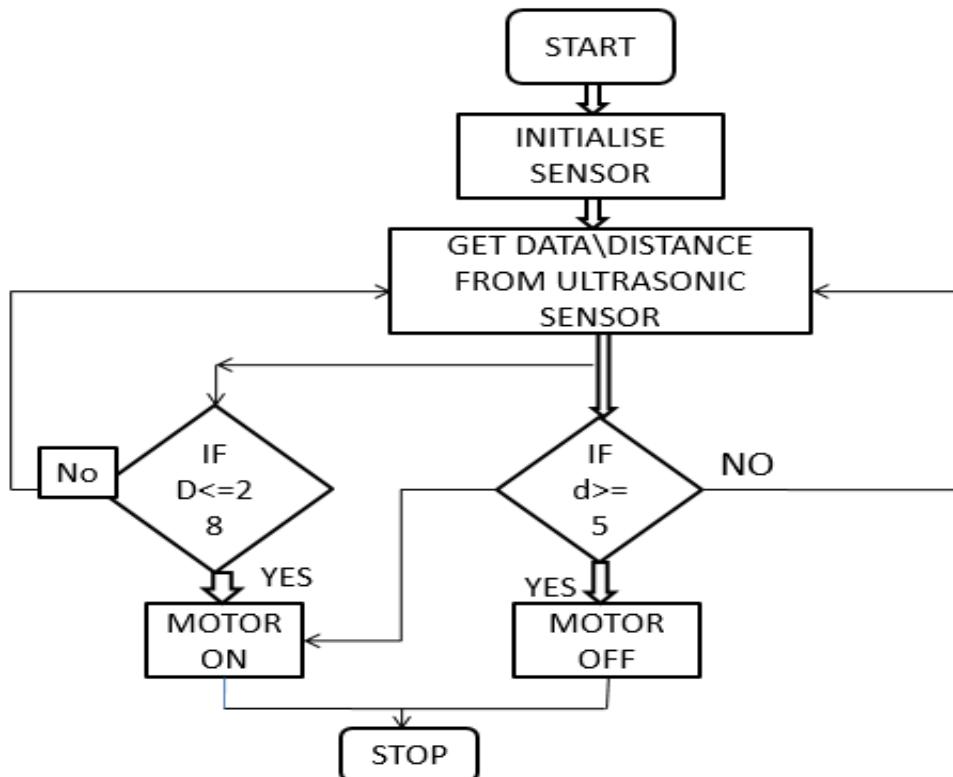
### III. MODULE

Many different parameters like water level measurement, automatic parking & staircase light monitoring, person counting, garbage level can be monitored. Smart Building Solutions are an intelligent automated system to create a comfortable environment that helps in efficient building operation and improved energy efficiency.

Five major key aspect of the smart building system are as follows.

#### A. Water level system

To measure water level of tank we set certain threshold value .If water level is above that threshold value the motor will be off where as the water level below the threshold value motor will be on.



*Fig .3:(a) water level system*

#### B. Garbage level system

To measure garbage level of dustbin we set a certain threshold value. when garbage reached to that threshold value the system sends the message to security guard & secretary. Then security guard will call municipal corporation for garbage collection.

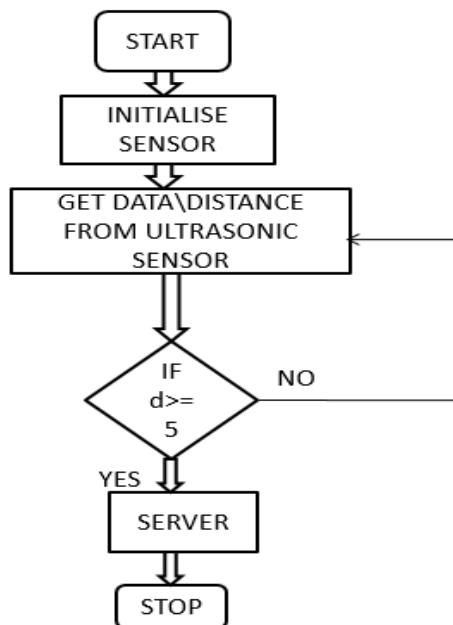


Fig .3:(b) garbage level system

### C. Staircase light

For staircase light we used PIR sensor. If person pass through stairs lights will be on else lights will be off

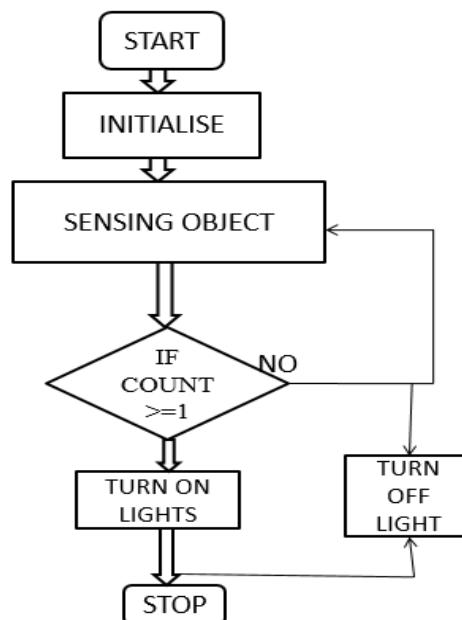


Fig .3:(c)Staircase light

### D. Person counting

The counting of persons will be done here with the help of PIR sensor. And this data will be stored on cloud by using IoT.

### E. Parking light

For parking lights, we used LDR sensors. If the intensity of light is low than parking lights will be on otherwise lights will be off.

## IV. PROPOSED SYSTEM

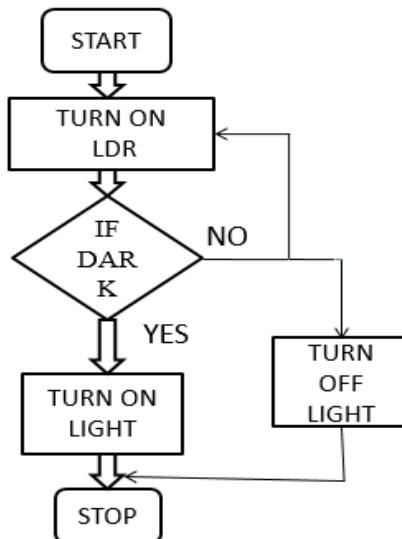
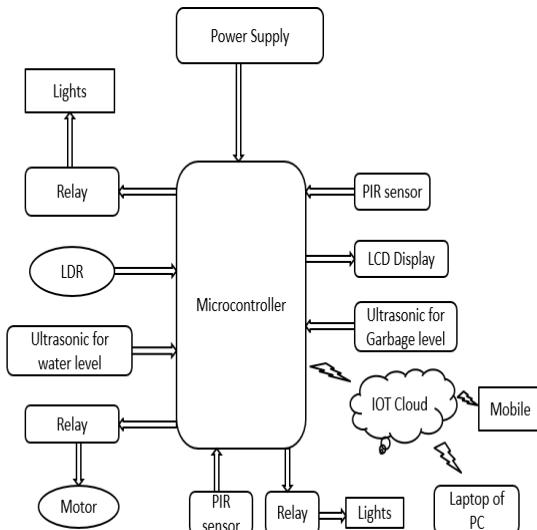


Fig .3:(d) parking light



With the advancements in all the fields of life, it becomes important to create new paradigms to sustain growth and elevate customer value in the fast-paced business environment. Smart Building Solutions are an intelligent automated system to create a comfortable environment that helps in efficient building operation and improved energy. In this project we have introduced framework to integrate smart building to the IoT. Our framework uses cloud computing capabilities to provide with computational power to the smart building and at the same time save energy. The framework was tested in a real scenario having a good feedback in terms of communication from the cloud and from the building itself.

## V. SOFTWARE DETAILS

After the text edit has been completed, the paper is ready for the template. Duplicate the template file by using the Save As command, and use the naming convention prescribed by your conference for the name of your paper. In this newly created file, highlight all of the contents and import your prepared text file. You are now ready to style your paper; use the scroll down window on the left of the MS Word Formatting toolbar.

**Embedded C:**

Embedded software is a computer software, written to control machines or devices that are not typically thought as a computers, commonly known as embedded system. It is typically specialized for particular hardware that it runs on and has time and memory constraints. This term is sometime used interchangeably with firmware, although firmware can also be applied to ROM based code on a computer on top of which the OS runs.

**Arduino IDE:**

The Arduino integrated development environment (IDE) is cross platform of windows and Linux which is written in Java programming language. Which is used to upload and write programs to Arduino board. The Arduino IDE support the languages C and C++. The source code for the IDE is released under GNU (General public license). The Arduino IDE supplies a software library, which provide many common input and output procedures. Arduino board designs use a variety of microprocessor and controller. The board are equipped with sets of digital and analog input/output pins. That can be interface to various expansion boards or breadboard and other circuits. A program for Arduino hardware may be written in any programming languages with complier that produce binary machine code. It also contains a message area, a text console, a toolbar with button for common function and a hierarchy of operation manus.

**VI. RESULT AND DISCUSSION**

The proposed system to monitor the 1. water level of tank according to threshold value the motor turns on and off. 2. garbage level of dustbin whenever its reached to the threshold value system sends the message to security guard and then security guard will call to municipal corporation for garbage collection. 3. staircase lights turn on and off according to human motion by PIR sensor. 4. no of persons at a various time of the day will be sensed. 5. parking lights will be turn on and off according to light intensity. Hence human efforts will be less, power will be consumed, energy saved and everything will be automatic.

**VII. CONCLUSION**

Thus it allows each node with message to decide whether to copy the message to a path node by optimizing its transmission effort in order to provide a sufficient level of message delay. Using a channel selection scheme provides spectrum utilization while it minimizes the interference level to primary system. Using trustworthy algorithm, it improves the trustworthiness of the Spectrum sensing in CR-Networks. It enables network nodes to adaptively regulate their communication strategies according to dynamically changing network environment.

**VIII. REFERENCES**

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