SMART BUILDINGS BASED ON IOT

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ABSTRACT: There is an increasing interest in Internet of Thing (IoT) and using the IoT devices for making buildings more smart and an efficient manner. We can automate a variety of workplace tasks with the help of the features included in the presented model. The smart lighting system turns on and off based on how bright the natural light is and how many people are in the building. Smart dustbins, which opens when it detects a person and need less maintenance, By measuring the moisture content of the soil, smart watering systems aid in lawn maintenance. The earthquake detection module is used for detecting tilting and trembling or any shaking situation of an earthquake to alert people . The Arduino earthquake detector smart buildings concept is successfully developed, and the ThingSpeak server is brought into process for data analysis. This paper focus on enactment of digitalization and implementation of technology in buildings.

Key Words: ThingSpeak cloud , Accelerometer , Arduino UNO , ESP 8266 wi-fi module.

1.0 INTRODUCTION

People are looking forward to automating a variety of tasks at home and in the workplace as technology advances. I am eagerly anticipating easing work schedules, reducing workforce, and lowering daily facility maintenance costs. The development of technology in many places emphasis on sustainable development in order to guarantee a healthy environment. The main component of the model is made of Arduino Uno; because all of the events take place in accordance with the actions described in. Through thingspeak server the data is gathered from different units and sent to the users in simplest form to get access. Programming is done with embedded C. It adheres to the three-step IoT-based system methodology [1]. It gathers environmental data through a variety of sensors. The soil moisture sensor measures the amount of moisture in the model, which has separate modules, and sends the equivalent data to Arduino IoT cloud [2] in first section . The cloud sends data to the server based on the moisture content. Using servers information we can get to know when to water the plants in accordingly . An accelerometer is an instrument used for measuring the acceleration of a moving or vibrating body in second section .In the event of an earthquake, the system will sound an alarm to let everyone in the area know about the catastrophe if these values change significantly. Ultrasonic sensor used for measuring the distance at which an object is located and senses the existence of human in the third section. The lid of the trash can automatically opens when someone approaches it, allowing them to dispose of their waste. The LDR sensor in the smart Lightning system is used to measure light intensity and turn on lights as needed. An ultrasonic module will accompany this, turning off lights when no one is present. The whole data will be posted to the ThingSpeak server, where the data is been plotted and examined according to the frequency of garbage disposal in the third section [3].

2.0 Models and Explanation

A replica of a smart building with characteristics like smart dustbins, soil moisture measurement, an earthquake detector, and a smart lightning system is shown in this hypothesis. Although the initial cost of development may be higher than that of conventional buildings by 8-10%, the cost can be offset by 20-25%

savings in energy consumption [4]. It requires less staff and is simple to use. The extracted statistics are simple to acquire because they can be seen from anywhere in the world. The entire system is connected to the home Wi-Fi [5]. The system regularly brings the Server's data up to date. By logging into his/her ThingSpeak account at any time, the user can access the necessary data. In ThingSpeak, a channel is created. The Arduino IDE takes in the information and uses it to create graphs. The values are saved in accordance with the selection of the save channel option. A number of additional tabs are listed so that you can make any necessary adjustments to the channel. To read and write data to and from the channel, the API keys tab is utilized. Through the import/export tab, channel data can be imported or exported as needed. The graphs are plotted, as can be seen in the images below. The design of smart buildings is eco-friendly while simultaneously cutting costs.

2.1 Smart Lighting System

The purpose of this section of the design is to increase the system's efficiency and avoid unwanted daytime current loss. In this, an LDR has been installed outside the building to adjust the brightness of the LEDs in the room in response to changes in outside light. An additional feature is the possibility that nobody will be in the room at night. Therefore, an ultrasonic sensor was used to confirm this. The initial alignment with the wall is calibrated by this ultrasonic. If the person moves in its direction, the distance will be shorter. The lights will be turned on as necessary as a result of this sending an alert. As a result, the room will receive less light during the day. During the night the lights will change at night in response to the light from outside and the presence of people in the room. The smart lighting system shown in Figure 1 .

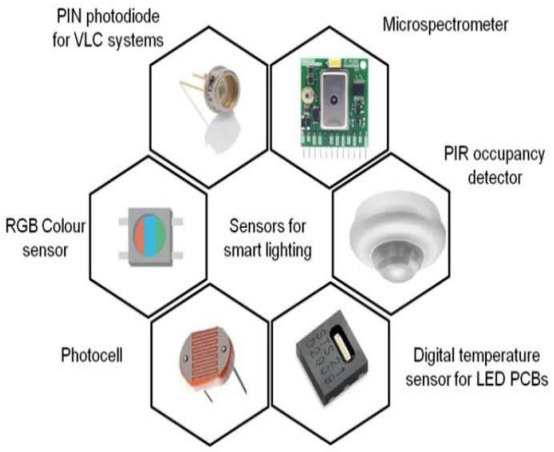

Figure 1. Smart lightning system

2.2 Earthquake Detection System

We are keeping an eye on the earthquake in this processed system to see if the earth's surface moves or shakes; The system will issue alerts and keep track of each status via IoT. As a result, we are developing this device to prevent life and financial loss. An accelerometer is an electromechanical device for measuring acceleration forces, sensing system vibrations, and orienting purposes. Therefore, a message indicating an earthquake will be displayed on the LCD whenever the earth's surface changes orientation in accordance with the x, y, or z axes. Earthquake detection and monitoring via IoT is a cost-effective project for electronics engineering and core electronics, making it a very comparable engineering endeavour. Hardware requirements of this design are Arduino cloud , vibrator sensor , accelerometer sensor , buzzer , LCD display , ESPP 8266 wi-fi module , transformer , rectifier and regulator. Software requirements of this design are eagle , proteus and Arduino : programming language. We are introducing the result of the two sensors for example the vibrator sensor and the accelerometer in graphical design. The magnitude of the earthquake can be determined using these pulses . As a result, this system generates an earthquake alert. Earthquake detection system flowchart is shown in the figure 2 below.

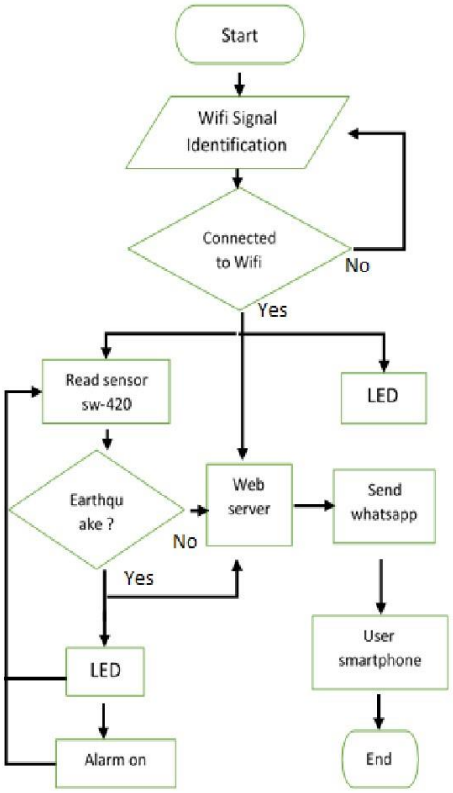

Figure.2. Flowchart for Earthquake detection system

2.3 Soil Moisture Measurement

A straightforward instrument for measuring the moisture content of soil and other related materials is the soil moisture sensor. The use of the soil moisture sensor is simple. The sensor is probed by the two large exposed pads, which together serve as a variable resistor. The better the conductivity between the pads, the lower the resistance, and the higher the SIG out, the more water there is in the soil or any other material. Connecting the VCC and GND pins to your Arduino cloud -based device will enable the soil moisture sensor to function. Depending on the amount of water in the soil, you will receive a SIG output. The sensor has a jumper wire assembly with three pins that can be easily wired. Make use of the Soil Moisture Sensor for determining the rate of moisture loss over time caused by plant uptake and evaporation and determining the moisture levels for various plant species in the soil .Soil moisture system and flowchart is shown in Figure.3 and Figure .4.

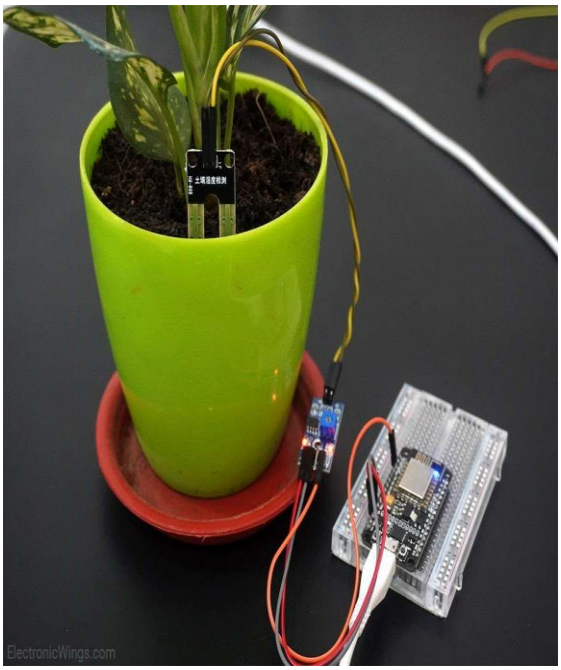

Figure.3. shows picture depicts for soil moisture measurement.

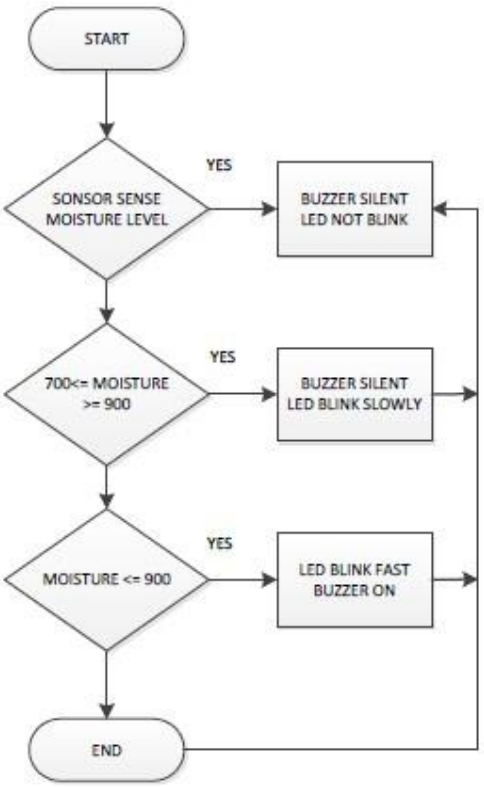

Figure.4. Flowchart for Soil moisture measurement

2.4 Smart Dustbins

The fundamental idea is to evolve normal dustbins into smart one . When the dustbin receives the signal, the dustbin automatically closes its hatch and opens it . Furthermore , the dustbin is equipped with a level sensing ultrasonic sensor that automatically detects when the bin is about to overflow by continuously measuring the amount of garbage present. Hardware specifications used in smart dustbins are Arduino UNO , ultrasonic sensor , mic sensor , capacitor ,resistors , transistors , bread boards , IC sockets , bin & supporting frame and so on . Software specifications applied in smart bins are Arduino compiler , programming language : c and IOTGecko . The main motive of smart bins is , waste management costs are removed by intelligent bins. The cities can use this to distribute funds to other main projects. Appropriately , it is possible to say that using smart bins can potentially save time and money[3].The smart dustbin system is shown in Figure.5.

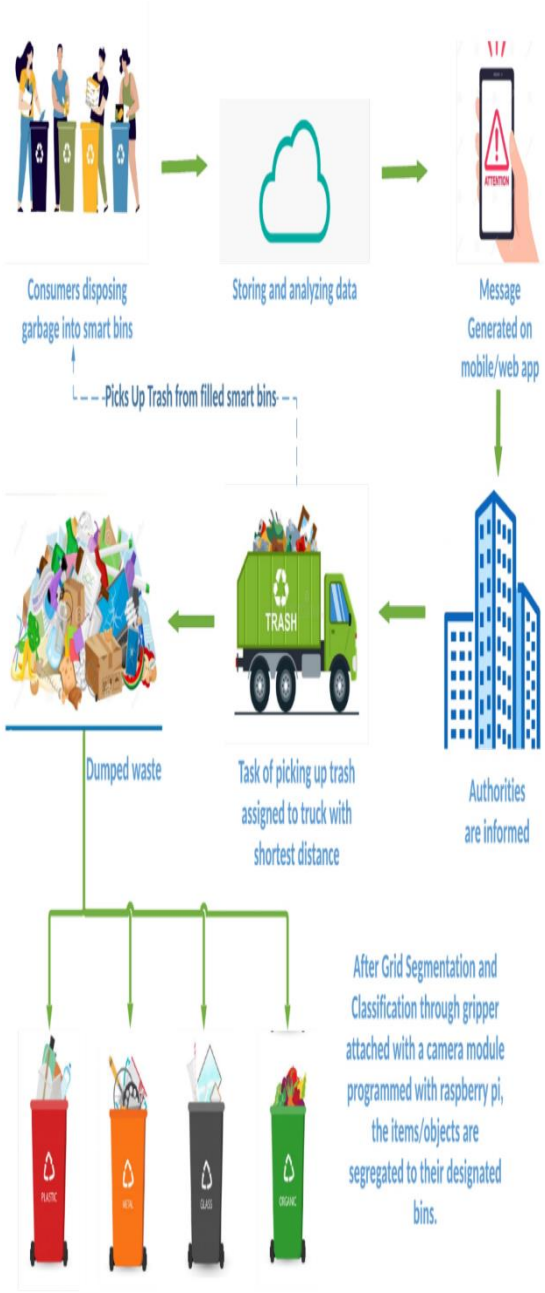

Figure.5. Smart dustbin system

3.0 Conclusion

In this paper, the idea of smart buildings has been explained in few aspects and successfully implemented. Brilliant structures are safer than conventional structures. The smart building has a water management system and uses environment friendly building materials. For the use of these technologies to become widespread, many changes and initiatives are required, and smart buildings are brought into implementation in few metropolitan cities . The initial setup costs for smart buildings are higher, but the overall savings in terms

of energy and labor costs can reach 20 to 25%. The Arduino cloud makes it easier for users and administrators to use. RFID and biometric authentication can be used to construct intelligent buildings. Prior to any person entering the building, their fingerprints will be used to verify their identity, and relative data will be sent to a server detailing who entered and exited throughout the entire day. This will raise the level of security.

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