A Novel Approach for Lab Automation

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Abstract— Proposed system is a part of internet so it is easy to communicate and manage and control without human interference also it provide the high degree of security, safety, comfort and energy saving with the help of raspberry pi as a controller to improve the good management and faster development of the lab required necessity to upgrade healthy and safe lab that delivering the real time service and latest facility to implement the concept lab automation used the IoT concept by which easy wireless communication is possible. In this system we used different types of sensor or electromechanical system also used humidity sensor and ultrasonic sensor. Humidity sensor is used to measure the temperature in the lab and ultrasonic sensor is used to detect the garbage level and third one electromechanical system is used to cleaning the whiteboard in lab all this types of data transfer to the raspberry pi controller the required output is send to with the help of IoT to the mobile.
Key words: Raspberry Pi, IoT, Ultrasonic Sensor, Temperature Humidity Sensor, Servo Motor

I. INTRODUCTION

In this system we are using DHT11 sensor and it has three pins i.e. used for measuring the temperature and humidity of lab. While increase the temperature about the 20 degree the alert message will be send on mobile which is connected through IoT by using twillio application in which the mobile number is feed with that app. For using the app firstly mobile number is registered then account will be created and then token, passing number is generated used in raspberry pi programming. This programming will be save in memory card (chip).

Ultrasonic sensor is used for to sense the garbage in a dustbin the sensor model is use HC-SR04 it have 4 pins i.e. NCC, TRIGGER, ECHO, GND. The range of sensor is up to 4 meter if dustbin is full up to 4 meter then alert message will be send on mobile by that message we know about dustbin whether full or not environmental pollution in our surrounding.

Servo motor is used in this system it rotates in 90 degree and 90 degree means total 180 degree. It reduces human efforts by pressing button and white board cleaning mechanism is used which is electrical and mechanical purpose i.e. electromechanical system from which we can consumes our time this all process is observed on mobile phone.

Servo motor it has 3 pins i.e. VCC, GND, POWER when the button is pressed while board is get automatically clean and when it completed then the alert message send on mobile. This system is interface with raspberry pi 3 (B). In which Wi-Fi, Bluetooth is available by which IoT also can be used.

II. SYSTEM COMPONENT

A. Raspberry Pi

Raspberry Pi is as small as the size of a credit card; it works as if a normal computer at a relatively low price. It is possible to work as a low-cost server to handle light internal or web traffic. Grouping a set of Raspberry Pi to work as a server is more cost-effective than a normal server. If all light traffic servers are changed into Raspberry Pi, it can certainly minimize an enterprise's budget. The Raspberry Pi hardware has evolved through several versions that feature variations in memory capacity, and peripheral device support.
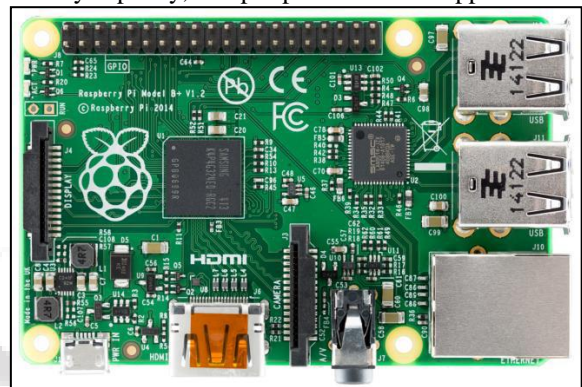

Fig. 1: Raspberry Pi

B. Ultrasonic Sensor

Ultrasonic sensors (also known as transceivers) work on a principle of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor.

Fig. 2: Ultrasonic Sensor

C. DHT11 Sensor

DHT11 is a Humidity and Temperature Sensor, which generates calibrated digital output. DHT11 can be interface with any microcontroller like Arduino, Raspberry Pi, etc. and get instantaneous results. DHT11 is a low cost humidity and temperature sensor which provides high reliability and long term stability.DHT11 Humidity Sensor consists of 4 pins: VCC, Data Out, Not Connected (NC) and GND. The

range of voltage for VCC pin is 3.5V to 5.5V. A 5V supply would do fine. The data from the Data Out pin is a serial digital data. All the DHT11 Sensors are accurately calibrated in the laboratory and the results are stored in the memory. The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and spits out a digital signal on the data pin (no analog input pins needed). It's fairly simple to use but requires careful timing to grab data.
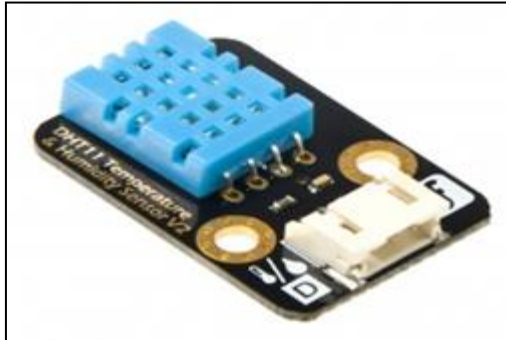

Fig. 3: DHT11 Sensor

D. Servo Motor

A Servomotor or servo is a small device that has an output shaft. This shaft can be positioned to specific angular positions by sending the servo a coded signal. As long as the coded signal exists on the input line the servo will maintain the angular position of the shaft. As the coded signal changes the angular position of the shaft changes. Servos are extremely useful in practice. They may be used to operate remote-controlled toy cars, robots, or airplanes. Servos are also used in industrial applications, robotics, in-line manufacturing, pharmaceutics and food services.

Fig. 4: Servo Motor

III. PROPOSED SYSTEM

The main objective our project is to do 3 functions in one system i.e. temperature and humidity measurement, to detect the garbage level and cleaning the white board. For measurement of temperature and humidity measurement we are using DHT11 sensor the sensor detect temperature and humidity and send it to raspberry pi.

For measurement of garbage level ultrasonic sensor is used which is based on principle of sound wave and getting echo back if the garbage reaches the limit it will send

message to raspberry pi and then process information is send to mobile.

Servo motor is used for cleaning the white board and after board is clean it will send the message to the mobile in this way the 3 application are incorporated in a single system.
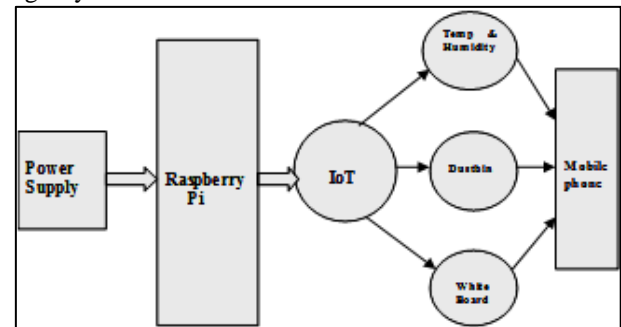

Fig. 4: Block Diagram of Lab Automation

IV. ADVANTAGES AND DISADVANTAGES

A. Advantages

1) Keeps the environment clean and fresh.
2) Reduces environmental pollution.
3) Maintain the room temperature.
4) Reduces the human efforts.
5) Many times Garbage dustbin overflow and many animals enter inside or near the dustbin which creates bad scene and causes diseases which will be eliminated.

B. Disadvantages

1) Cost is high as compared to existing system.
2) Life span is not very long.

V. CONCLUSION

Now a days the world is controlled by automation so implementing lab automation by using the sensor network to use for temperature and humidity control, ultrasonic sensor is use to detect the garbage level of dustbin and for white board cleaning purposed used DC servo motor all these functions are used to reduce the manual power & to increase the accuracy of regarding for humidity and temperature and it is also helpful to contribute for "DIGITAL INDIA".

REFERENCES

[1] Prof. S.A. Shaikh, Suvarna A. Sonawane "Monitoring Smart City Application using Raspberry PI Based on IoT" International Journal for Research in Applied Science & Engineering Technology (IJRASET) Volume 5 Issue VII, July 2017.

[2] Upadhye Madhuri Ganesh, R.A.Khan "Raspberry Pi Home Automation Based on IoT" International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE) ISSN: 2278-1021 Vol. 4 Issue 12, December-2015.

[3] Vishesh Kumar Kurre, "Smart Garbage Collection Bin overflows Indicator using IoT", International Research Journal of Engineering and Technology (IRJET) Volume: 03 Issue: 05|May- 2016.

[4] Amit Tiwari "Design and Fabrication of Automatic Blackboard Duster", International Journal of Immerging

Technology and Innovative Engineering, Volume I Issue 2, February 2015.

[5] Abhishek Dev, Maneesh Jasrotia, Muzammil Nadaf, Rushabh Shah, "IoT Based Smart Garbage Detection System", Volume: 03 Issue: 12 | Dec -2016.

[6] Monika K A, Nikitha Rao, Prapulla S B, Shobha G, "Smart Dustbin-An Efficient Garbage Monitoring System", International Journal of Engineering Science and Computing, Volume: 06 Issue: 06 | June -2016.