International Journal of Interdisciplinary Innovative Research & Development (IJIIRD)
ISSN: 2456-236X
Vol. 03 Special Issue | 2019

IoT Based Portable Data Logger

Urvi Telang[1], Snehal Jagdale[2], Ashish Birajdar[3], Mansee Bhangale[4], Juilee Bharate[5]
[1, 2, 3, 4, 5] *Department of Electronics, Terna Engineering College, Navi Mumbai, Maharashtra, India*

ABSTRACT

An electronic tool which records data over a period of time is called as a data logger. The measurements may include air temperature, relative humidity, light intensity, soil moisture, position (accelerometers), room occupancy, and so much more depending on the application data logger. Typically, they are compact and have an internal micro - controller, data storage and a sensor or more. It can be used indoors, outside or underwater and it is possible to record data for up to months at a time. Data loggers may be self - contained with internal sensors or multichannel with one or more external sensors. In this paper, we have made efforts to build a manual data logger that has an interface to a sensor. The sensors can be analog or digital. Data are transmitted using HTTP protocol and are logged in to MySQL database.

Keywords—Data, IoT, Portable, Temperature, Moisture

1. INTRODUCTION

A data logger is a device that records measurements at certain intervals over a period of time. According to the specific data logger, measurements may include air temperature, relative humidity, light intensity and soil moisture. Data loggers usually have batteries that are compact, have an internal microprocessor, data storage devices and a sensor, or more sensors. They can be used inside, outside and underwater and collect data for months unattended. [10].

A data logger can be a one - unit, the independent device with internal sensors fitting in a hand palm, or a multi-channel data collection device equipped with one or more external sensors. Data loggers are useful tools for anyone wanting to monitor conditions continuously without being on site. Because of their low cost, long battery life, reliability and real-time data, environment consultants, building managers, energy auditors, scientists and other domains of industry rely on the data loggers [10].

2. ARCHITECTURE

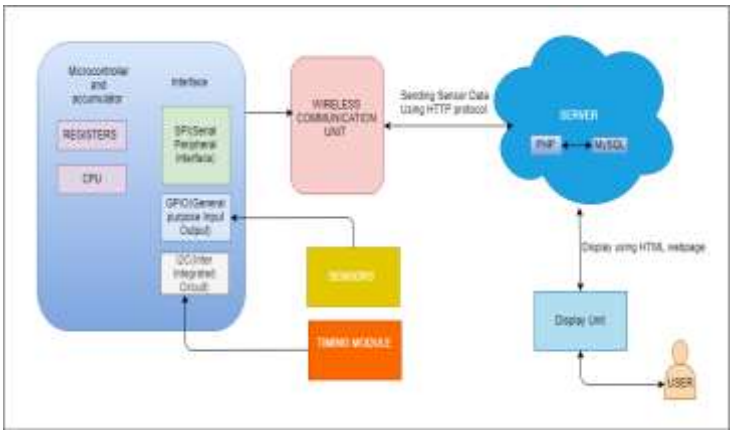

Fig. 1 Architecture

2.1 Sensors

A sensor is a device, module or subsystem that is intended to detect and transmit information to other electronics, often computer processors, in order to identify or modify the environment. This system incorporates sensors DHT11 (Temperature Sensor), PIR Motion Detection Sensor, MQ135, Air Quality Measurement Sensor, Soil Moisture Sensor, BMP 180 for Air Pressure Measurement.

2.2 Timing Module

A timing module consists of a real-time (RTC) clock, which is most often a computer clock in the form of an integrated circuit that keeps track of current times.

2.3 Wireless Communication Unit

A wireless communication module uses a variety of wireless communication protocols to send the data to the server to establish a wireless connection and transfer the data. The microcontroller or processor unit is interfaced or the module as a chip system can be integrated. NodeMCU is used as a wireless communication unit by the ESP8266 Development Board.

2.4 Microcontroller Unit

A small computer in one integrated circuit is a microcontroller. One or more of these microcontrollers contain memory and programmable peripherals of input/output. The main unit of control is NodeMCU. It works in master mode with other slave devices.

2.5 Server

In computing, a server is an architecture called the "client/server" model and the overall computation is distributed through several procedures or devices, which offers functionality for other programs or devices known as customers. In this, the NodeMCU is customer. The device that displays data acts as the customer. Using XAMPP software, the server is set up. As both clients/servers, the computer can be operated.

3. IMPLEMENTATION

Any type of sensor, such as Temperature, Damp, Passive Infrared Sensors, a soil sensor, gas sensor, etc., can be used for the sensors. We used the Temperature and Moisture Sensor and PIR Sensors for testing purposes. In this project, DS3231 is the real-time clock (RTC). The current time and date will be given. It uses the protocol of communication I2C (Integrated Circuit) during communication with the microcontroller and acts as the slave. The parameters will be translated to digital signals using analog to digital converter (ADC) when analog sensors are used. In addition, the microcontroller receives data to the server that has been switched to XAMPP software. For testing and development purposes, XAMPP creates a local web server. The data appears on a dynamic webpage in PHP format.

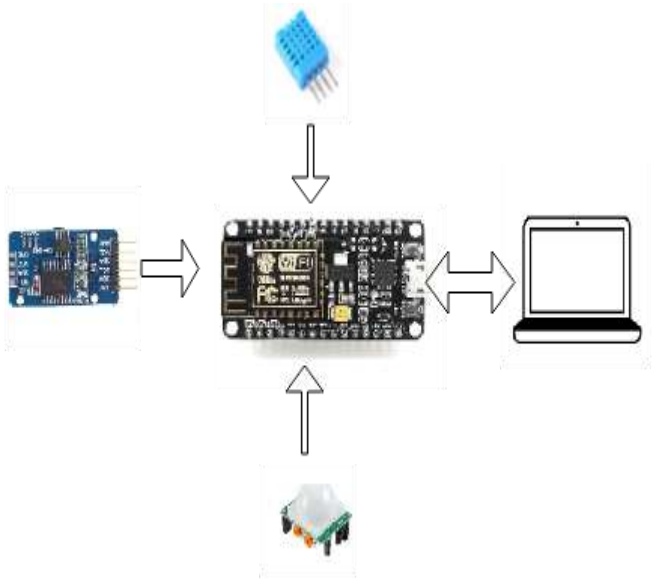

Fig 2. Implementation of the system

3.1 DHT 11

The DHT11 is the basic digital temperature and humidity sensor at extremely low cost. In order to measure the air surrounding it uses a moisture sensor and a thermistor and spends a digital signal over the data pin. Temperature range is 0-50ºC and Humidity is 20-80%. When interfaced with a microcontroller it uses an electrical protocol to provide temperature and humidity values. The temperature range is 0 - 50^{o} C and the humidity is 20 - 80 %.

3.2 Passive Infrared Sensor

In order to feel motion, PIR sensors are used almost always to detect if the person moves in or out of the sensor range. PIRs are essentially a pyro electrical sensor capable of detecting infrared radiation levels. All objects emit a certain quantity of low-level radiation and the hotter something will be, the more radiation will be

emitted. The reason for the change is that we are looking at a move not to detect an average level of IR, and the two halves are connected in such a way as to cancel one another away [8].

3.3 XAMPP

XAMPP is an open source web solution package which can be used for testing and development purposes to create a local web server. Using MySQL databases, XAMPP integrates the data that can be saved directly.

3.4 Real Time Clock

The DS3231 is low cost, very precise I2C (RTC), with a crystal oscillator integrated (TCXO) and crystal temperature (CCT) compensation. This chip consist of 4 pins. The microcontroller is connected to the SDA pin (serial data line) and the SCL (serial clock line) is connected to the microcontroller's SCL pin. The other two pins are ground and power supply.

4. RESULTS

DHT11 and PIR sensors have been used for simulation purposes. The Node MCU was interfaced with the Real Time Clock module, so that time - set data were provided. On the PHP scripted host webpage, the current temperatures and humidity were displayed. The graph has been drawn against the current time for temperature and humidity values. Experimental results are illustrated in Fig. 3 and 4.

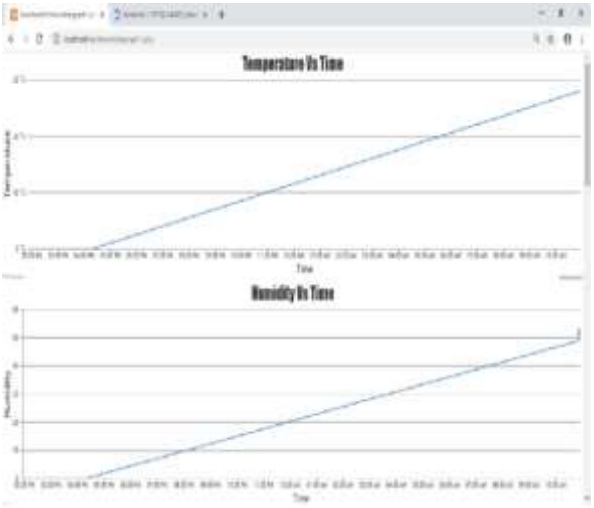

Fig.3 Temperature and Humidity vs. time graph

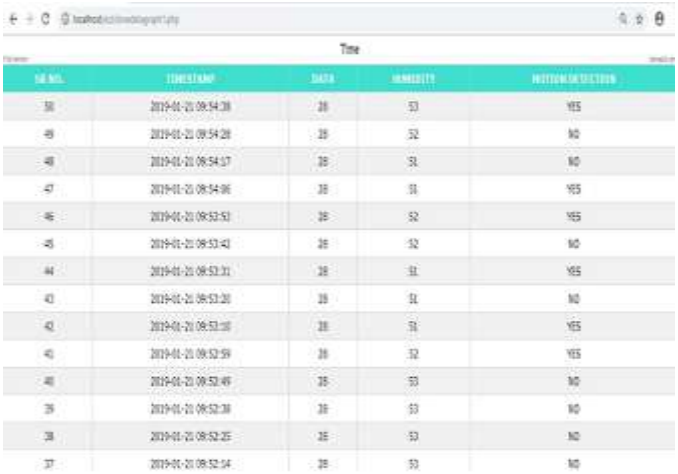

Fig.4 Simulation Results

5. CONCLUSION AND FUTURE SCOPE

5.1 Conclusion

In conclusion, in accordance with the structure shown above, a wireless data logger system for real-time monitoring is developed. The PC or smartphone monitoring software can view and record data logger real-time information. The user has authentication, which can be accessed and changed via software monitoring.

5.2 Future Scope

For future applications, the interface can be used to monitor data with reference to the precise location. The number of sensors is currently limited to 7. For biotechnical applications, the data logger can be expanded. Offline storage is not currently available. An external memory data logger can store sensed data so that data is not lost when the wireless connection is lost.

6. REFERENCES

[1] Kondamudi Siva Sai Ram1, 2. A.N.P.S.Gupta "IoT based Data Logger System for weather monitoring using Wireless sensor networks" International Journal of Engineering Trends and Technology (IJETT) – Volume 32 Number 2- February 2016

[2] Sudha C, Ankita Bung, "IOT BASED SMART DATA LOGGING SYSTEM" IJESR/June 2017/ Vol-7/Issue-6/64-70 Sudha C ET. al., / International Journal of Engineering & Science Research

[3] Saraswati Teli1, Mani. C2, "SMART REAL TIME EMBEDDED ARDUINO BASED DATA ACQUISITION SYSTEM" IJRET: International Journal of Research in Engineering and Technology eISSN: 2319-1163 | pISSN: 2321-7308

[4] HadyBassil, Habib Moubarak, Abdallah Kassem, Mustapha Hamad, Chady El- Moucary, "A Smart real time portable multichannel data logger system" 2017 29th International Conference on Microelectronics (ICM).

[5] Hung Nguyen, Radoslav Ivanov, Linh T.X. Phan, Ole Sokolsky, James Weimer, and Insup Lee, "LogSafe: Secure and Scalable Data Logger for IoT Devices" Dept. of Computer and Information Science, University of Pennsylvania, PA, U.S.A

[6] Vivek Kumar, Rohit Sharma and VikasHastirYogeshwar Singh Dadwhal, Mitesh Bansal, RohitPuri, ShreyAbhiPathania and Abhay Thakur, "Smart Wireless Temperature Data Logger" Proceedings of the 2008 International Conference on Embedded Systems & Applications, USA 2008, July 14-17, 2008, Las Vegas, Nevada, USA

[7] VikramKamadal, Manjula N Harihar, "Wi-Fi Based Wireless Data Logger", International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064

[8] tps://cdn-learn.adafruit.com/downloads/pdf/pir-passive-infrared-proximity-motion-sensor.pdf

[9] https://cdn-shop.adafruit.com/product-files/2471/0A-ESP8266__Datasheet__EN_v4.3.pdf

[10] https://www.onsetcomp.com/files/data-logger- basics.pdf