Cloud-Based Remote Monitoring Applications with WSN

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Abstract--The present paper describes the Internet of Things (IoT) and applications. The applications include interfacing the sensors such as temperature and flex sensors,lamp through relay with NodeMCU (ESP8266 with Wi-Fi Module).These sensors data will displayed in the App (Blynk App) and the lamp will control either ON or OFF through relay with Android Mobile by using Blynk App.We are all surronded by the mobile network, our day to day life is significantly dependent on mobile network services. Hence the present paper is very useful for operating the electronic devices with Mobile using IoT technology.

Keywords-- *Flex Sensor; Lamp; NodeMCU(ESP8266 with Wi-Fi Module); Relay Board;Temperature Sensor.*

I. INTRODUCTION

Internet of Things(IoT) is the combination of physical elements and virtual elements.Physical elements are sensors, actuators, computing systems,etc., and virtual elements are cloud services, specific protocols such as - UDP, IPV6, IETF6LOWPAN and application user interface-UART, SPI, I2C, CAN etc., It is connecting between the people and people through electronic devices like tablets, android mobiles, laptops,etc., Sensors are essential components in many applications, not only industries for process control but also in daily life for building's safety and security monitoring, traffic flow measuring, weather condition monitoring and etc.,[1].

II. LITERATURE

Wireless Sensor Network (WSN) technology proved to be an interesting research tool nowadays as various potential applications proposed by research in various areas such as weather monitoring [3,4], precision agriculture [5,6], smart building, healthcare [7], military and others [8,9]. Extensive research on architectures, protocols, applications, and management for wireless sensor network has been done by previous researchers [10]. Arjun et al. [3] worked on enhanced architecture for integrating cloud with wireless sensor networks. The author continued by analysing weather data to alert SaaS users during weather disasters.

III. HARDWARE AND SOFTWARE OF CLOUD-BASED REMOTE MONITORING APPLICATIONS WITH WSN

The Block diagram of Cloud-Based Remote Monitoring Applications with WSN is shown in figure 1 and the schematic diagram is shown in figure 2.

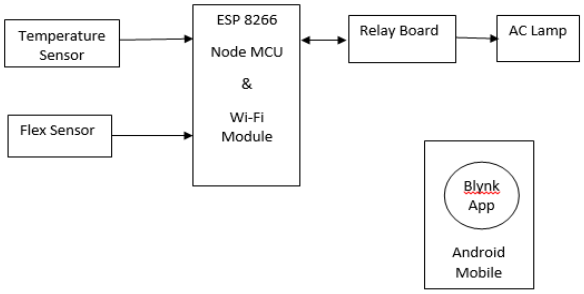

Fig 1: Block diagram of Cloud-Based Remote Monitoring Applications with WSN

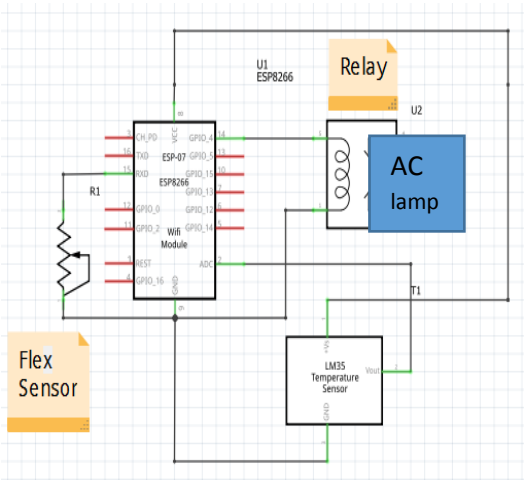

Fig 2: Schematic diagram of Cloud-Based Remote Monitoring Applications with WSN

The proposed system has following the components

- Node MCU (ESP 8266)
- Temperature Sensor
- Flex Sensor
- Relay
- Bulb

A. Node MCU (ESP8266)

It is micro controller with Wi-Fi module and its running with smooth software such as Arduino IDE (Integrated Development Environment). Arduino IDE is an open source software.

It provides

- ✓ Analog Channel – 01
- ✓ General purpose I/O lines – 16
- ✓ Supply pins 3.3V – 3 and 5V-1
- ✓ Ground Pins - 4

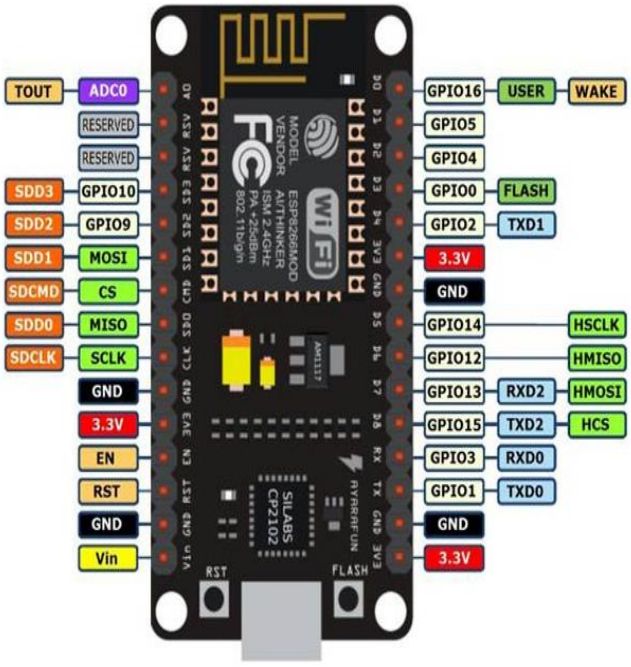

Fig 3: Node MCU (ESP8266)

B. Temperature Sensor

The Temperature (LM 35) Sensor is an analog sensor, it is used for to measure the temperature .The sensor has three pins shown in below figure.

Fig 4: Temperature Sensor (LM 35)

It has three pins such as Vcc, GND, OUT. These three pins are interfacing with the Node MCU of terminals Vcc, GND and A0. It is temperature sensing device, measuring analog voltage proportional to temperature.

Features

Operating Voltage: 5V

Operating Temperature: -55 °C to 150 °C

C. Flex Sensor

The flex sensor is a two terminal device and does not contain any polarized terminal. It can be used mainly two cases

1. Whenever we need to test the exterior of a device otherwise thing is planed or not.
2. To check a door or window is opened or not.

This sensor is used wherever we need to measure the Bent, Flex, change of an angle for any device

Fig 5: Flex Sensor

Features

- Operating Voltage (0-5) V
- Flat Resistance – 25kΩ
- Range of bend Resistance - (45-125) KΩ
- Resistance of tolerance - +/-30%
- Operating Temperature Range (-45 to 80) °C

Applications

- Servo Motor Control
- Music Interface
- Rehabilitation
- Intensity Control

D. Relay Board

Relay is switch, it operates either on or off through electromechanically. It is interfacing with one of the I/O line of NodeMCU and lamp. In this present work, whenever click on the switch button at project in the Blynk App, at that time the microcontroller send the signal to relay, then the lamp will ON through relay. Similarly click off the switch button at project in the Blynk App, then the lamp will off with Wireless communication (Wi-Fi).

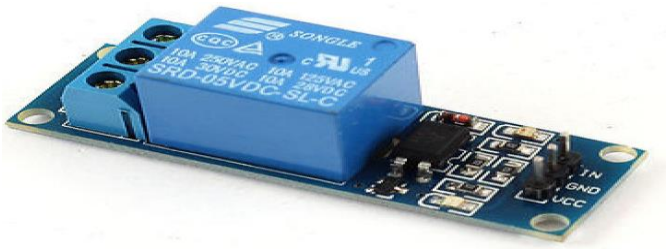

Fig 6: Relay Board

E. AC Lamp

The lamp will work either AC 230V or 110V, in this work AC 230V used for series connection of lamp with relay board. In this present work, the lamp will work depends up on the relay. Whenever the microcontroller send the signal to the relay at particular time (through the software code), Hence the relay will be ON along with lamp also ON otherwise Relay along with lamp also OFF.

Software

In this present work, Arduino Integrated Development Environment (IDE) is used for the purpose of code writing and uploading into the NodeMCU.

Arduino IDE

Arduino Integrated Development Environment (IDE) is an open source software, it is very easy to use for doing research work. It has text editor, message box and tool bar with common functions like save, compile, run and etc., In this work, it is used for to connect the device with internet through code and to write the source code of the work.

Blynk App

The Blynk App is one of the open source app, it is available in Play Store App, it will access with user mail id. It is provides the information either analog data or digital data in the form of analog, digital, graphs.

1. Create New Project like as shown in figure 8.

- **Project Name** Enter the project name like Temperature data
- **Choose Device** from the microcontroller devices such as Arduino Uno, Arduino Nano, Arduino Mini, Arduino Micro,ESP8266,ESP32 Dev Board, Nano Pi, Node MCU, Orange Pi, Particle Core, Particle Electron, Particle Photon, Raspberry Pi 3 B and etc., Now select the Node MCU
- **Connection Type** Select connection types such as Ethernet, Wi - Fi, USB, GSM, Bluetooth and BLE. In this project we have to select Wi-Fi.
- **Theme** Select the themes such as Dark and Light, we have to select either Dark or Light. After choose the above details, click on the Create button then the Authentication Token was sent to login mail id .Then the project window will open like below figure

2. To change the settings for different displays like value, gauge, tank etc., as shown in figure 9. It indicates

1. Project Settings

Whenever click on this button, the new window will open, in this window we have to choose the range of sensor data and sharing option is there. If we want to share the data to mail, this settings button is very useful.

2. Widget Box

Whenever click on this button, the new window will open, in this window we have to choose the options of output display like vertical slider, Value Display , gauge and etc.,

3. Run

Whenever click on this Run button, the output data will displayed appropriating with settings.

IV. RESULTS AND DISCUSSION

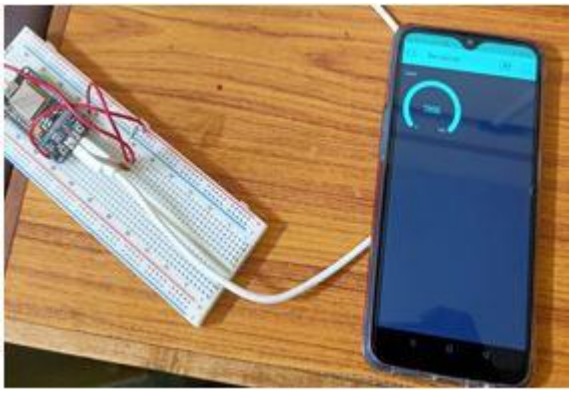

Fig 7(1): Experimental Arrangement

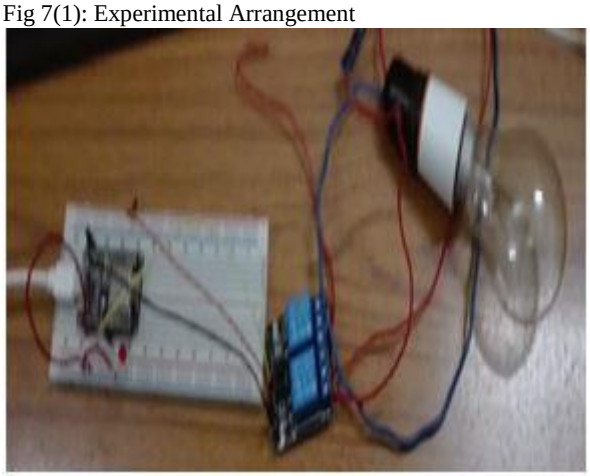

Fig 7(2): Experimental Arrangement

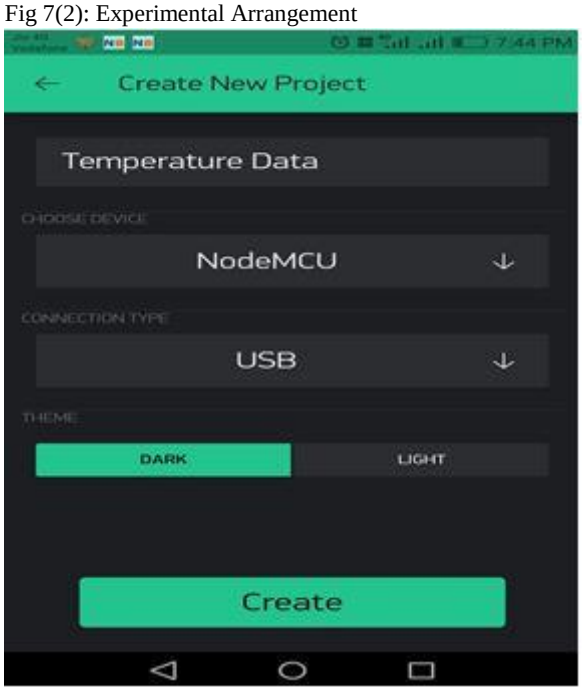

Fig 8: Screen shot for Window of Creation of New Project

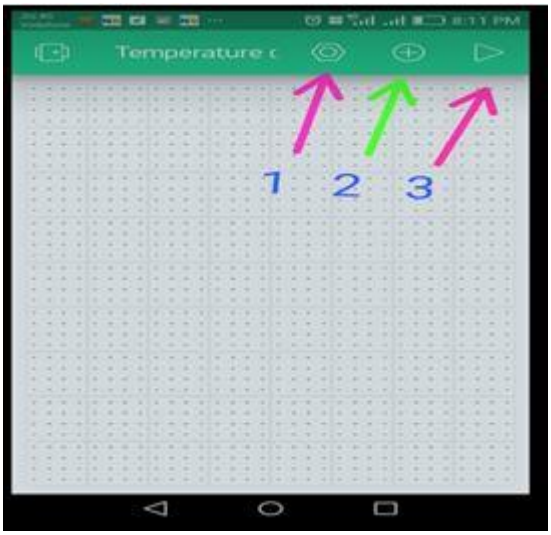

Fig 9: Screen shot for multiple options of the project window

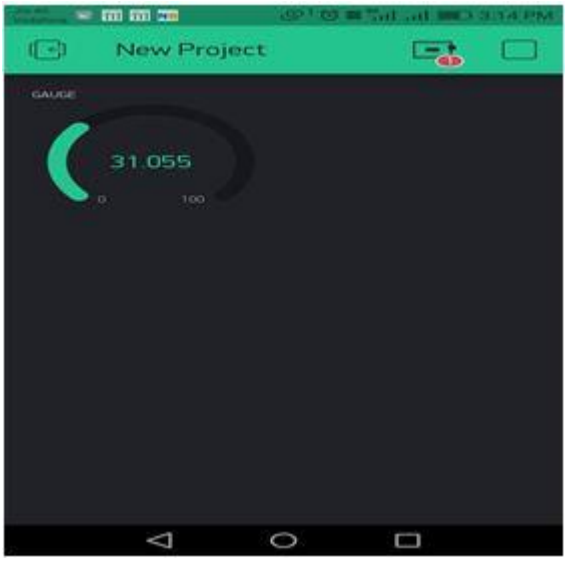

Fig 10: Screen shot of Temperature data Gauge display in Blynk App

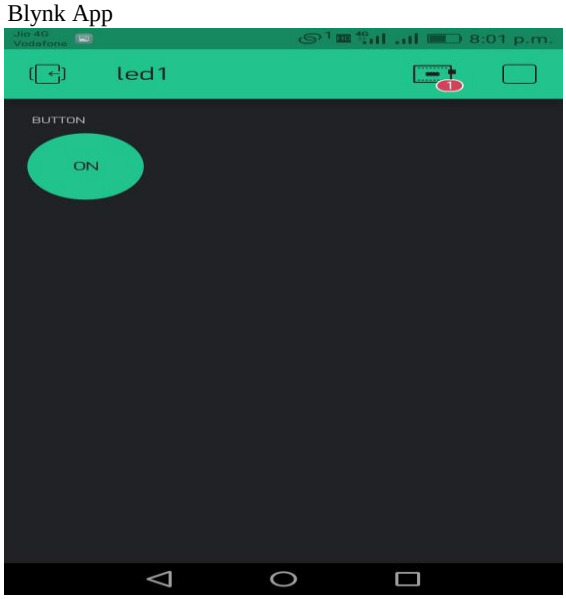

Fig 11: Screen shot of ON display in Blynk App

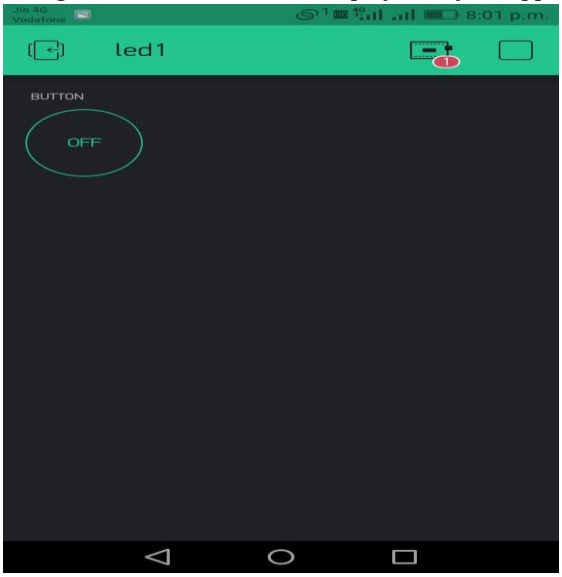

Fig 12: Screen shot of OFF display in Blynk App

V. CONCLUSIION

In this paper, the applications of IoT such as temperature sensor, flex Sensor and lamp interfaced with Node MCU (Microcontroller with Wi-Fi module). The data of the sensors are visible in the Blynk App clearly with accuracy and lamp will operate either ON or OFF through the switch button of the Blynk App. These applications are useful at anywhere in the world.

VI. REFERRENCES

[1]. Kamarul Ariffin Noordin, Chow Chee Onn and Mohamad Faizal Ismail"A Low-Cost Microcontroller-based Weather Monitoring System" Department of Electrical Engineering, Faculty of Engineering, University of Malaya, 50603 Kuala Lumpur, Malaysia

[2]. E. Kanagaraj, L.M. Kamarudin*, A.Zakaria, R. Gunasagaran, A.Y.M. Shakaff "Cloud- based Remote Environmental Monitoring System with Distributed WSN Weather Stations

[3]. 3. Centre of Excellence for Advanced Sensor Technology", University Malaysia Perlis (UniMAP), Perlis, Malaysia

[4]. D. S. Arjun, A. Bala, V. Dwarakanath, K. S. Sampada, B. B. Prahlada Rao, H. Pasupuleti, "Integrating cloud-WSN to analyze weather data and notify SaaS user alerts during weather disasters," 2015 IEEE International Advance Computing Conference (IACC), pp.899-904, 12-13 June 2015.

[5]. Chebbi, W., Benjemaa, M., Kamoun, L., Jabloun, M., Sahli, A., "Development of a WSN integrated weather station node for an irrigation alert program under Tunisian conditions," 2011 8th International Multi-Conference on Systems, Signals and Devices (SSD), pp.1-6, 22-25 March 2011.

[6]. A. Baggio, "Wireless Sensor Networks in precision agriculture", Proceedings of REALWSN'05 Stockholm Jun 20-21, 2005.

[7]. S. M. Saad, L. M. Kamarudin, K. Kamarudin, W. M. Nooriman, S. M. Mamduh, A. Zakaria, A. Y. Md Shakaff, M. N. Jaafar, "A real-time greenhouse monitoring system for mango with Wireless Sensor Network (WSN)," 2014 2nd International Conference on Electronic Design (ICED), pp.521-526, 19-21 Aug. 2014.

[8]. G. Bakul, D. Singh and Daeyeoul Kim, "Optimized WSN for ECG monitoring in ubiquitous healthcare system," 2011 4th International Conference on Interaction Sciences (ICIS), pp.23-26, 16-18 Aug. 2011.

[9]. L. Capezzuto, L. Abbamonte, S. De Vito, E. Massera, F. Formisano, G. Fattoruso, G. Di Francia, A. Buonanno, "A maker friendly mobile and social sensing approach to urban air quality monitoring," 2014 IEEE Sensors, pp.12-16, 2-5 Nov. 2014.

[10]. G. Vellidis, V. Garrick, S. Pocknee, C. Perry, C. Kvien, M. Tucker, "How Wireless Will Change Agriculture", Proceedings of the Sixth European Conference on Precision Agriculture (6ECPA), Greece, pp.57-67, 2007.

[11]. Yazeed Al-Obaisat and Robin Braun, "On Wireless Sensor Networks: Architectures, Protocols, Applications, and Management", Auswireless Conference, 2006.