Bolt-IoT: Building Automation Solution

Dr. Pankaj Dalal

Department of Computer Engineering, Sigma Engineering College, Matar, Gujarat, India

ABSTRACT

The purpose of this paper is to present a low-cost and reliable 'Building-Automation' solution via Internet of Things (IoT) using Bolt IoT as the cloud platform, Bolt-ESP8266 as the MCU, and an Android Mobile App. Ceiling fan, tube lights, and other building devices can be controlled from a mobile device with IP connectivity via Wi-Fi. Building appliances such as fans and tube lights can be accessed via the internet from anywhere in the world. The strategic importance of this project is to reduce human effort while controlling electricity consumption. This is a low-cost system. The building's appliances are controlled via a mobile app and are linked via IP connections.

Keywords : Internet of Things (IoT), Bolt-IoT, Building Automation, Wifi, Cloud Computing

I. INTRODUCTION

The Internet of Things (IoT) connects devices/objects/things that can connect, act together, and collaborate for a common goal. IoT devices/objects/things can improve our daily lives because all devices such as refrigerators, televisions, fans, and ovens are now interconnected via the Internet and begin working as a team. The data collected by the aforementioned devices can be used for analysis and decision-making. We can also use the Internet to monitor our devices/objects/things from anywhere in the world. For example, if someone wants his room to be pre-cooled by the air conditioner before he/she arrives at the building, he can simply do so by turning the A.C 'ON' from his office using his mobile phone. If someone wants to monitor his building's CCTV camera, he can do so using IoT. Refrigerators can also read the RFID of the items stored inside them and sound an alarm when the items expire, thanks to modern technology. The burglar alarm can now be made more effective by IoT, and the house owner can be alerted about any security breach by motion detectors via IoT in his/her mobile phone. This Paper aims at one of the paradigms of IoT by automating the Ceiling Fans and Tube lights via Mobile Apps through IoT.

This paper explains how IoT can assist in turning off and on a ceiling fan and tubelight via a mobile app. This will not affect the behaviour of the switch boards, and both will be operable with an OR condition, i.e. if either of them is true, the appliance will run; if both the IOT device trigger and the individual switch are false, only the appliance will stop.
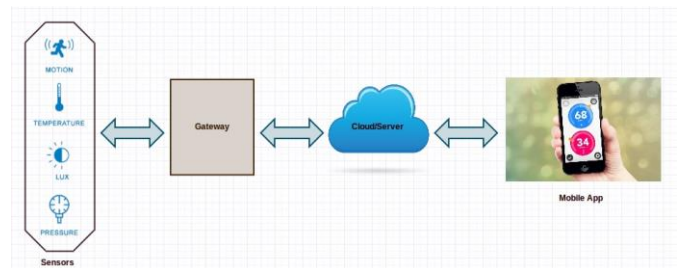
II. IoT and its working

Fig 1: Block Diagram of system

Devices/Equipment have Sensors such as motion sensors, temperature sensors, and so on. These sensors are linked to an IoT Platform/Cloud via a Gateway, and the cloud stores the data collected from these devices for analysis and decision making.
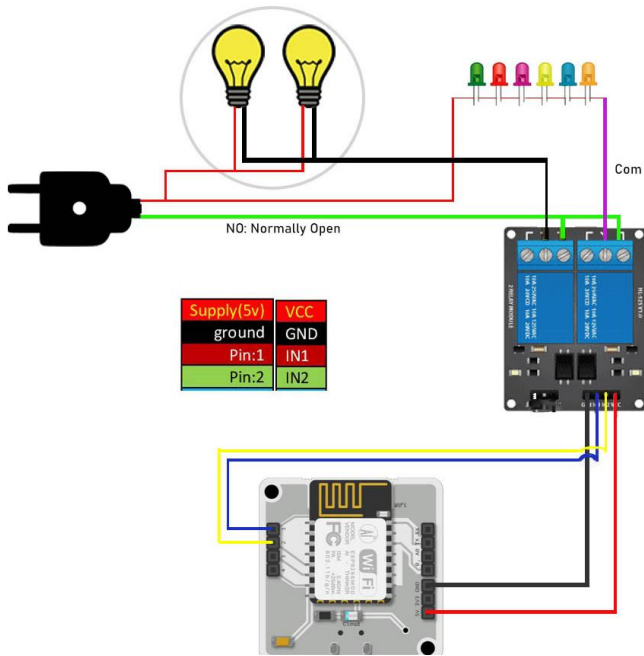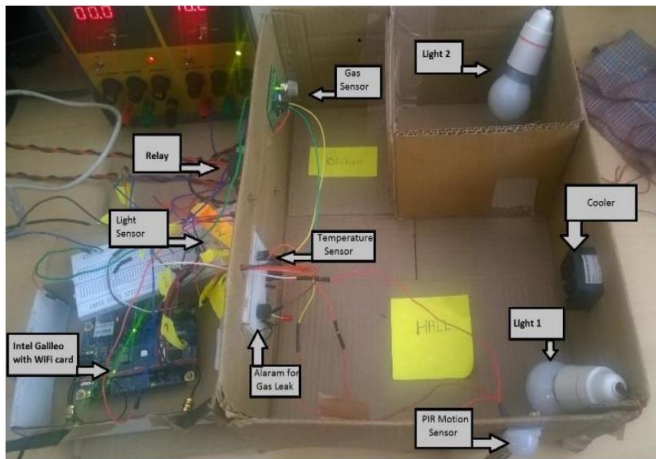

Fig 1: Circuit Diagram of system

Source Code and Usage

Nodejs:

```
npm i bolt-iot-wrapper
// import module
import {Devices,Enums,PubSub} from 'bolt-iot-wrapper';
```

Browser

```
<!-- CDN script tag-->
<script src="https://unpkg.com/bolt-iot-wrapper/umd/boltIotWrapper.min.js"></script>
```

API

```
// 1) Register devices
Devices.add({deviceName},{deviceKey});

// 2) Read Device
const instance =Devices.read({deviceName},{deviceKey});

// A) Analog
instance.Analog.read()// reads analog pin data return a promise

instance.Analog.loopRead({milliseconds},{callback}) // reads analog pin continously in paritcular interval

//B) Digital
instance.Digital.read({pin |pins[]}) // read Digital signals of single of multiple pins returns a promise

instance.Digital.write({IDigitalparams | IDigitlparams[]}) // write digital singals

instance.Digital.loopRead({pin | pins[]},{milleseconds},{callback}) // read digital singals in particular interval

//C) UART
instance.UART.begin({baudRate}) //sets the baud rate

instance.UART.read({till})

instance.UART.write({data})

instance.UART.readWrite({data},{till})

//D) utils

instance.Utility.isOnline()// returns a promise with resolved valueas true/false

instance.Utility.restart()

instance.Utility.version()

//E) Api Callback

PubSub.api({cb}) // the callback will get fired with phases of api calls
```

```
  PubSub.message({cb}) // the callback will
get fired when libary would send some message
to client
 //same api follows for browser just it is
inside window object as

 boltApi.Devices.add({deviceName},{deviceKey})
```

III. Conclusion

In today's world, IoT is a hot commodity, and Building Automation is perhaps the most useful application of IoT. Building Automation makes life easier for people and reduces their workloads at work. The goal of this paper is to demonstrate how IoT can be used to automate day-to-day life processes through the use of cloud technologies. The goal is not only to provide a relaxed way of life, but also to assist disabled people in handling jobs on their own. We also used an Android app to control the household devices in this paper. Android is the world's most popular open-source mobile platform operating system. This paper discusses cordless building automation using an Android mobile device. As a result, it incapacitates many problems such as expenses, obstinacy, safety, and so on. Furthermore, it provides better benefits such as lowering our energy bills and advancing building security. In the future, the following use cases may be included: To automate the entire house using various boards as needed and with different functionalities depending on the room. reducing the time it takes to turn on/off the device To operate the system, use Speech Recognition. Face recognition is used to automatically lock and unlock doors.

IV. REFERENCES

[1]. VishwatejaMudiam Reddy, NareshVinay, TapanPokharna and Shashank Shiva Kumar Jha, Internet of Things Enabled Smart Switch, Thirteenth International Conference on Wireless and Optical Communications Networks (WOCN), Hyderabad, (2016),1-4

[2]. R. Piyare, and S.R. Lee, Smart Building-control and monitoring system using smart phone, The 1st International Conference on Convergence and its Application, 84, (2013) 83-86.

[3]. V. Ricquebourg, D. Menga, D. Durand, B. Marhic, L. Delahoche, and C. Loge. The smart Building concept : our immediate future. In 2006 1ST IEEE International Conference on E-Learning in Industrial Electronics, pages 23{28, Dec 2006.

[4]. Warsuzarina Mat Jubadi and NormaziahZulkifli, Programmable Infrared Accessory Light Switch, International Conference on Intelligent and Advanced Systems, Kuala Lumpur,(2007), 1130-1134.

[5]. VinaySagar K and Kusuma S, "Building Automation Using Internet of Things", International Research Journal of Engineering and Technology, Volume 2, Issue 3 on pp. 1965 – 1970, June 2015.

[6]. Nurzhan Nurseitov, Michael Paulson, Randall Reynolds, and Clemente Izurieta. Comparison of json and xml data interchange formats: A case study. Caine, 2009:157{162, 2009.

[7]. Sirsath N. S, Dhole P. S, Mohire N. P, Naik S. C & Ratnaparkhi N.S Department of Comp Engg , 44, Vidyanagari, Parvati, Pune-411009, India University of Pune, "Building Automation using Cloud Network and Mobile Devices".

[8]. A. Zanella, N. Bui, A. Castellani, L. Vangelista, and M. Zorzi. Internet of things for smart cities. IEEE Internet of Things Journal, 1(1):22{32, Feb 2014.

[9]. Su ZinZin Win, Zaw Min MinHtun, HlaMyoTun, "Smart Security System For Building Appliances Control Based On Internet Of Things" IJSTR, Volume-5, Issue 6, June 2016.

[10]. pranaydutta89. (n.d.). Pranaydutta89/bolt-IOT-wrapper: Simple bolt IOT API communication channel. GitHub. Retrieved October 5, 2021, from https://github.com/pranaydutta89/bolt-iot-wrapper.

[11]. pranaydutta89. (n.d.). Pranaydutta89/bolt-IOT-Mobile-App: Simple bolt IOT Mobile App. GitHub. Retrieved October 5, 2021, from https://github.com/pranaydutta89/bolt-iot-mobile-app.

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