IOT BASED HOME AUTOMATION SYSTEM

Khan Mohammed Haseen Mohammed Hafiz a, Kureshi Shadaaf Rahis b, Md.Irfan Ali Mufizur Rehman c, Tai Yameen Yakooob d, Nayna Dahatonde e

a,b,c,d Student, e Assistant Professor

a khan.haseen95.hk@gmail.com, b shadaafkureshi@gmail.com, c shaikhirfan44461@gmail.com, d yameentai@gmail.com, e nayna.badwaik@gmail.com

Abstract: Internet of Things (IOT) are conceptually applied to a number of applications ranging from home automation to industrial IoT, Where connecting physical things, from anywhere through a network and Let them take an active part in the Internet, exchanging information about themselves and their surroundings. This will give immediate access to information about the physical world and the objects in it leading to innovative services and increase in efficiency and productivity. The proposal of system is to develop an IoT based Interactive Home wireless system. The leverage obtained by preferring this system over the similar kinds of existing systems is that the alerts and the status sent by the wifi connectivity provided by the node mcu.

Key Words: IOT, wi-fi, zig-bee

1. INTRODUCTION

The Embedded systems are electronic devices that incorporate microcontroller with in their implementations[1]. The main purposes of the microcontroller are to simplify the system design and provide flexibility. Having a microcontroller in the device means that removing the bugs, making modifications, or adding new features are only matters of rewriting the software that controls the device. Or in other words embedded computer systems are electronic systems that include a microcomputer to perform specific dedicated applications. An emerging technology brought about rapid advances in modern wireless telecommunication, Internet of Things (IoT) has attracted a lot of attention and it is expected to bring benefits to numerous application areas including industrial WSN systems, and healthcare systems manufacturing. Wireless sensor networks (WSN) have been employed to collect data about physical phenomena in various applications such as habitat monitoring, and ocean monitoring, and surveillance. WSN systems are well-suited for long term industrial environmental data acquisition for IoT representation.

2. PROPOSED METHODOLOGY

The prototype can be used in two two modes:

2.1 AUTOMATION VIA INTERNET

Initially we suppose all the loads are in off state, so now to switch on a particular load we can use smart phone to give command through smart assistance provided by google assistant (google) or cortana (microsoft), alexa (amazon), the commands are predefined scripts scripted in the IFTTT[6]. IFTTT is a platform that defines a clear and concise protocol which our service’s API will implement. Each trigger and action of service will map 1-to-1 to an API endpoint on service built specifically for IFTTT. Trigger endpoints will be event streams that IFTTT will poll for new data. Conversely, action endpoints will be writable endpoints that IFTTT will send data to. The actions triggered by IFTTT are send to the MQTT (MESSAGE QUEUE TELEMTRY TRANSPORT) which consist of MQTT BROKER and MQTT CLIENT, the MQTT Broker controls the publish subscribe messaging pattern and act a central communicaton point [7][8]. The MQTT cloud service used here is ADAFRUIT IO, which is a free service for experimentors by Adafruit[5]. The MQTT client used is esp-8266 microprocessor which is a wi-fi module for wireless transmission of data. The data received is taken as input and then processed in accordance to the
configuration of the relay load control. The relay acting as an AC controlling switch passing the command to the particular load as per users wish, turning ON and OFF the load devices connected on the GPIO pins. The sensors are connected to sense the surrounding environmental physical properties such as temperature, humidity, movement, illuminance by DHT, PIR motion sensor, LDR sensor module respectively. Since ESP-8266 has a single analog pin we use a multiplexer (CD74HC4067) module which will take the sensor data in loop of 4 seconds and display in every 5th second, esp also send the data received from sensor to the MQTT broker for analysis. All the above activities are controlled and kept under surveillance on the website designed and using Adafruit.io server (cloud services). By setting threshold values for each sensor, when the value of any sensor exceeds commands are sent back to the IFTTT by the MQTT BROKER. IFTTT’S Applet are scripted so as to execute either switching ON or OFF of suitable load. For example if the temperature exceeds 30 degree celsius, then the IFTTT will send the command to turn ON the fan. Similarly operations can be carried out for the remaining sensors.

2.2 AUTOMATION VIA ZIG-BEE FOR LAN

This mode can be further subdivided in 2 blocks as follows:

TRANSMITTER:

Transmitter is used to send the control commands to the (receiver controlling unit). By using processingi3 software we created a GUI as shown in fig below. When ever the user clicks on an icon (say RED_ON) a code runs in the backend to deploy a command to send data on zig-bee module. The zigbee module connected here is configured to act as a CO-ORDINATOR to broadcast the data.
RECEIVER:
The zig-bee module at the receiver is configured as a router to receive transmitted data. The configuration of zig-bee modules are done by using XCTU software. The data is forwarded to the MICROCONTROLLER (LPC 2148) which will process the data received and control the load through relay[4]. For above used example when the zig-bee router receives data to turn ON the RED light, the microcontroller will send the command to relay to turn ON the RED light. In similar fashion we can control the remaining load devices over WLAN using Zig-Bee module.

3. ADVANTAGES
   - Low cost system with minimum requirement.
   - Availability of option for load control that is by using internet or zig-bee.
   - Timely acquisition of sensor data for analysis with adjustable threshold values for physical parameters.
   - Graphical User interface for load control via LAN.
   - Ease of access by android application.
4. CONCLUSION

In the system designed a prototype for HOME AUTOMATION based on INTERNET OF THINGS. In the first mode the automation of loads, acquisition and analysis of sensed parameters are done via internet using the developed website and Adafruit cloud service. The second mode comes in use during the unavailability of internet by providing a local area network with a maximum range of 70 metres. In the second mode commands for controlling load are given by the GUI developed and transmitted via zig-bee transmitter and receiver.

REFERENCES


[4] Riyaj Kazi, “IoT based Interactive industrial Home wireless system, Energy management system and embedded data acquisition system to display on webpage using GPRS, SMS and E-MAIL alert”


Networks 54(15), 2787-805. (2010).

[16] https://io.adafruit.com
[17] https://ifttt.com
[18] “MQTT”, wikipedia (online)
[19] https://onlinecourses.nptel.ac.in/noc18_cs08/unit?unit=15&lesson=17