International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 04 Issue: 07 | July -2017 www.irjet.net p-ISSN: 2395-0072

Office Automation & Attendance System Using IoT

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Abstract - Nowadays, office automation is becoming an important and inspiring field that has shattered over past few years. The current advances in electronics and communications Technologies have made office area more convenient, efficient and more secure. The office automation refers to the monitoring and control of office appliances by utilizing information technologies .With the rapid rise in the use and potential of internet, it can be possible to handle, monitor and control different electrical devices in office areas. Embedded systems can be interfaced with internet to accomplish the automation. The project report presents office automation system using internet of things technology. The smart office automation system is implemented in existing office area without making any major changes in the infrastructure. In recent years the popularity of office automation has been increasing due to the low cost and the simplicity can be achieved via use of smart phone. In this context the internet of things concept has been tied with the office automation system

Key Words: IoT, Office Automation, RFID Reader, node MCU, etc.

1. INTRODUCTION

There are basically two parts of our project. One is office load control using IoT and another is to take attendance of employee by RFID and store it on the cloud using IoT.

It is quite difficult for individual office owners to operate one or more that one office and keep track of each office appliances individually. At such time we need an online solution for physical office appliances control. Here we propose use of IoT technology for office appliance automation. This allows owner to control his/her office appliances through the internet using an easy to use android app. For this system demonstration our system uses a Node MCU microcontroller for the purpose. Inbuilt Wi-Fi modem is used for receiving commands over the internet. We use 3 loads to demonstrate as office loads. The Wi-Fi module receives user commands over the internet. This information is then passed on to the microcontroller. The microcontroller now processes this data and switches the loads through relays. Thus office automation system allows user to control his office remotely using IOT technology.

Secondly the RFID system, in which we have used the RFID reader to read the RFID cards which has given to the employees. The employees have to scan RFID cards to enter in the office and also to leave from office. The tome of entry and exit of employee will be sent to the cloud using the IoT. Here we have used Atmega328 microcontroller to process all the operation. To transmit the data over internet we have used ESP8266 Wi-Fi module. We have used Thingspeak website to upload the data over cloud. Also we are displaying who has scanned RFID card with the help of LCD display

1.1 The Concept of IoT

The Internet of Things (IoT) is regarded as a technology and economic wave in the global information industry after the Internet. The IoT is an intelligent network which connects all things to the Internet for the purpose of exchanging information and communicating through the information sensing devices in accordance with agreed protocols. It achieves the goal of intelligent identifying, locating, tracking, monitoring, and managing things. It is an extension and expansion of Internet-based network, which expands the communication from human and human to human and things or things and things. In the IoT paradigm, many objects surrounding us will be connected into networks in one form or another.

2. SYSTEM ARCHITECTURE

Many types of RFID exist, but at the highest level, we can divide RFID devices into two classes: active and passive. Active tags require a power source they're either connected to a powered infrastructure or use energy stored in an integrated battery. In the latter case, a tag's lifetime is limited by the stored energy, balanced against the number of read operations the device must undergo. One example of an active tag is the transponder attached to an aircraft that identifies its national origin. Another example is a Low Jack device attached to a car, which incorporates cellular technology and a GPS to locate the car if stolen. However, batteries make the cost, size, and life-time of active tags impractical for the retail trade. Passive RFID is of interest because the tags don't require batteries or maintenance. The tags also have an indefinite operational life and are small enough to fit into a practical adhesive label. A passive tag consists of three parts: an antenna, a semiconductor chip attached to the antenna, and some form of encapsulation.

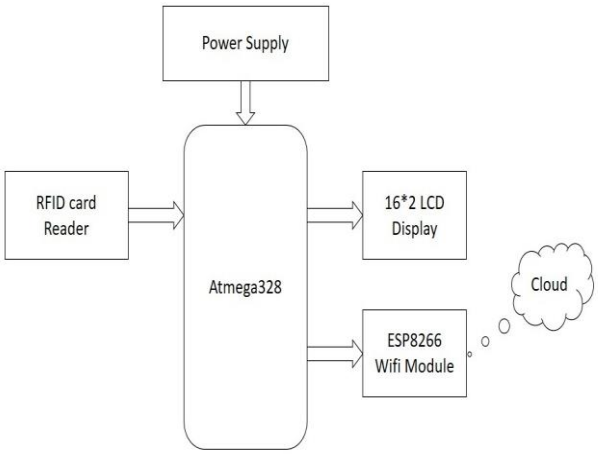

Fig 1: Block diagram of RFID Attendance

The tag reader is responsible for powering and communicating with a tag. The tag antenna captures energy and transfers the tag's ID (the tag's chip coordinates this process). The encapsulation maintains the tag's integrity and protects the antenna and chip from environmental conditions or reagents. The encapsulation could be a small glass vial or a laminar plastic substrate with adhesive on one side to enable easy attachment to goods. Two fundamentally different RFID design approaches exist for transferring power from the reader to the tag: magnetic induction and electromagnetic (EM) wave capture.

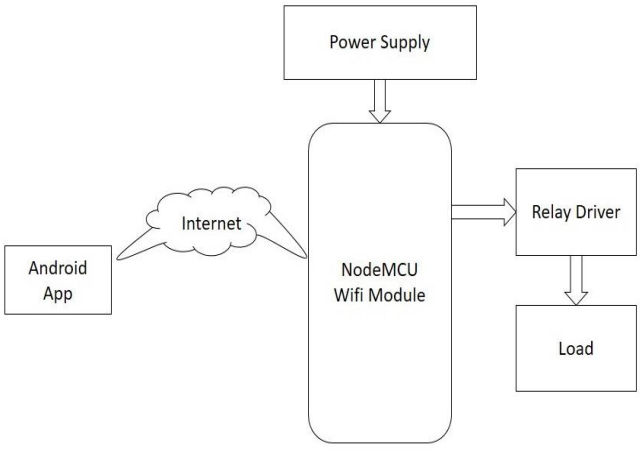

Fig 2: Block diagram of office load control

These two designs take advantage of the EM properties associated with an RF antenna—the near field and the far field. Both can transfer enough power to a remote tag to sustain its operation—typically between 10 W and 1 mW, depending on the tag type. (For comparison, the nominal power an Intel X Scale processor consumes is approximately 500 mW, and an Intel Pentium 4 consumes up to 50 W.) Through various modulation techniques, near- and far-field-based signals can also transmit and receive data.

2.1 SYSTEM COMPONENTS

1) ESP8266 Wi-Fi Module:

The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and has MCU (microcontroller unit) capability. Expressive Systems' Smart Connectivity Platform (ESCP) is a set of high performance, high integration wireless SOCs, designed for space and power constrained mobile platform designers. It provides unsurpassed ability to embed Wi-Fi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement.

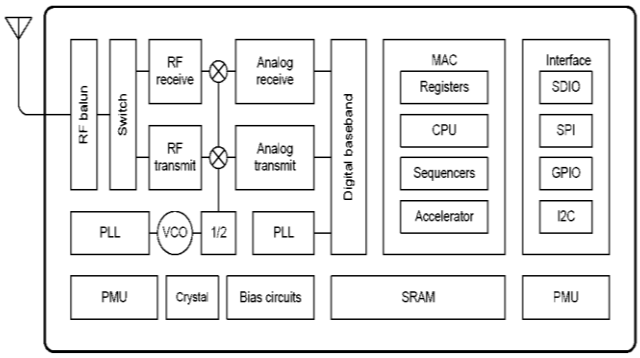

Figure 3: ESP8266 Wi-Fi Module

2) Node MCU:

The Node MCU firmware is a companion project to the popular Node MCU dev kits, ready-made open source development boards with ESP8266-12E chips. The Node MCU is an open-source firmware and development kit that helps you to Prototype your IOT product within a script lines.

3) Thingspeak:

ThingSpeak is an IoT analytics platform service that allows you to aggregate, visualize and analyze live data streams in the cloud. ThingSpeak provides instant visualizations of data posted by your devices to ThingSpeak. With the ability to execute Arduino code n ThingSpeak you can perform online analysis and processing of the data as it comes in. Some of the key capabilities of ThingSpeak include the ability to:

•Easily configure devices to send data to ThingSpeak using popular IoT protocols.
•Visualize your sensor data in real-time. Aggregate data on-demand from third-party sources.
•Run your IoT analytics automatically based on schedules or events.
•Prototype and build IoT systems without setting up servers or developing web software.

2.2 PERFORMANANCE ANALYSIS

Here is a flow chart for operation of RFID card operated attendance system,

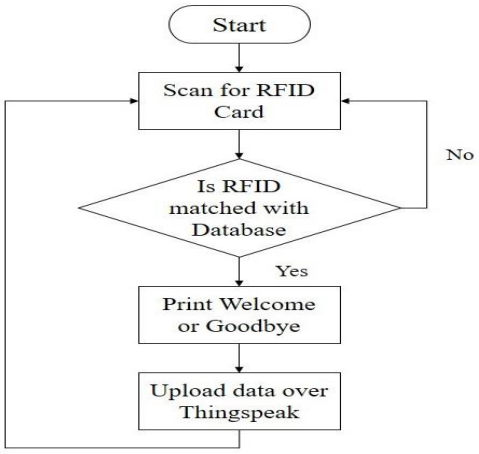

Figure 4: Flowchart of RFID Card operation

And another flow chart for Controlling load over internet.

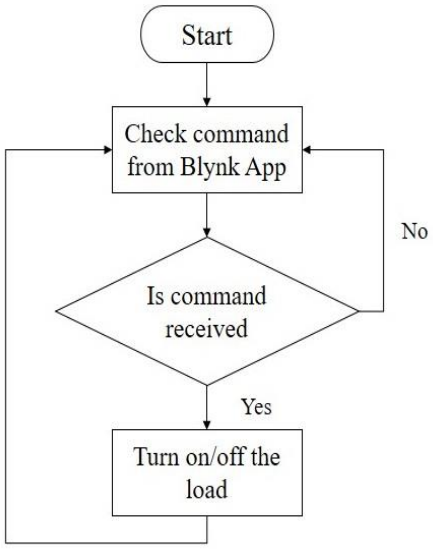

Figure 5: Flowchart of Controlling load over Internet

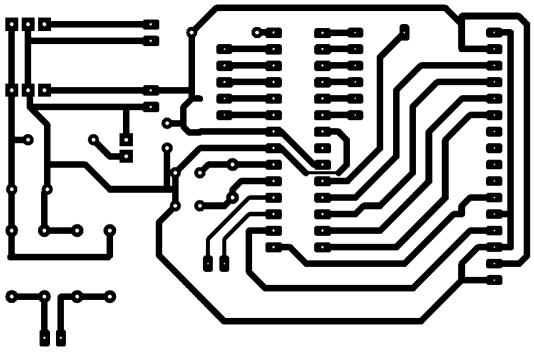

Figure 6: PCB layout of Atmega328

2.3 ADVANTAGES

1. Data analysis is easy over Thingspeak website.
2. RFID based attendance system is more secure and fast responded.
3. Office automation is easy over the internet.
4. Reduce Involvement in clerical work.
5. Fast and Accurate Storage.
6. Less work force for large volume of data.

3. CONCLUSION

In this paper described the various components and technologies used in a prototype system to office automation using IoT. This project is intended to bring us a step closer toward a smart office where all appliances and devices are efficiently controlled and monitored remotely. It integrates a number of technologies to build the complete hardware and software system. There are a number of possible extensions to this work such as: support multimedia devices and services through MMS (Multimedia Message Service); extend wireless coverage within the office through a mix of Bluetooth and WiFi technologies. Many of the issues are being incorporated in the prototype system.
RFID based attendance system is more secure and fast responded as compared to the other system like biometric. The advantage of the RFID system is contact-less and works without-line-of-sight. By using Arduino it is easy to access and works very quickly while burning the code it is like plug and play device. Users can change the function accordingly by using arduino. It is easier to use and accurate also. Data analysis over the cloud is also simple using the Thingspeak website.

ACKNOWLEDGEMENT

I am sincerely thankful to all my teachers for their guidance for my project. Without their help it was tough job for me to accomplish this task. I am especially very thankful to my guide Mr.Lakshman C.Sir (NEILIT, Scientist 'C') for his consistent guidance, encouragement and motivation throughout the period of this work. I also thankful to our M.Tech course co-coordinator Mrs. Warsha Kandlikar mam, for providing me all necessary facilities.

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