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"HOME AUTOMATION SYSTEM USING RF MODULE "

Roshani U. Wanjari[1], Kaveri A. Karemore[2], Aashwini V. Thakur[3], Achal P. Thakur[4], Monitai J. Uikey[5]

Department of Electrical Engineering
Prof. Manish K. Agrawal
Guru Nanak College of Engineering, Nagpur, Maharashtra, 441501, India

***Abstract*: Modern day class rooms are equipped with electronic devices that have supporting software to improve and facilitate teaching methods. However, it is often seen that significant class time is wasted on taking attendance, or the class may face interruption due to late entries of students and disturbances such as the manual control of fan and light. Therefore, to overcome those problems a feasible system is created in this thesis project that will have no physical intervention from teachers, students or floor attendance. Data from all these sensors is continually received and processed by Arduino nano board which acts as a microcontroller unit. This Paper deals with controlling the various electrical appliances present in the classroom. Thus, the system will facilitate the smooth running of the scheduled classes at our class room, and minimize time loss. . The system is developed with the help of ARDUINO NANO board which can be used to control the electric fan based on the changes in temperature of its surrounding using DHT11 Sensor. The smart classroom system controls automatic ON/OFF of fan and light system based on the presence and absence of the human inside the room through IR Sensor and based on the temperatures of the room. RFID card is used for attendance purpose, which is connected to the Node MCU board.**

***Keywords*: Arduino Nano, IR sensors, Node MCU Board, Relay, RFID, DC fan, DC lights.**

1. Introduction

It is expected that by 2020 there will be 50 million things that will be connected to the internet which was only about 15 million in 2010. In the internet of things home automation contributes to around 27 % roughly. Revenue in the home automation sector amounts to US $ 3759 m in 2016. In spring 2015 Control Networks surveyed 1,600 consumers for smart home report. The report suggests that in just 12 months there was seen a rise in the level of excitement about smart home with millennial (79%) and parents (76%) leading the pack and 50%of the overall population excited about the technology. Apart from this the intent to purchase smart home technology is quickly following suit with 50 % of people saying they plan to buy at least one smart home product in the next year. In this system we will be focusing on classroom automation. It is observed in colleges that are taking the attendance and keeping a track record of the attendance is a major issue. We still follow the traditional method of a pen and paper attendance and even if there is some automation there needs to be more than one add on modules that make the system working. Companies and corporate offices follow the card swipe methods which is very useful to some extent. But when it comes to classroom attendance the things have still not changed. In today's time there are applications available that operate things with the help of RFID's. This system is also expected to solve the problem of incorrect attendance marked in the class intentionally or unintentionally. This system will generate accurate count for each person with a tag through an algorithm without any biases. This said system model is proposed for the basic automations for a classroom that need to be automated. This system is also expected to help automate classroom electronics such as tube light, fan etc. If changes incorporated further this can also help in contributing to the institute automation and make the entire information of the place available in a single web application with the help of RFID tracking. This will also help in having a good automation impact in the near future for city and home automations. This will also add as an initiative to digitalize the world and make a smarter move towards the evolution of Internet of Things.

2. Literature Review

This paper instantly infers the power consumption in the class rooms. The knowledge about the power wastage is used to suggest the smart class room in which the operation of the electrical and electronic devices is automated. In our method we first estimated what are all the devices a classroom consist fan. Light, projector. Some existing method had already control this kind of devices using infrared remotes. Though the infrared remotes are used, power wastage due to human negligence is possible. Hence by replacing the infrared remote with wireless sensor effective automation can be achieved in the class room. The smart classroom system controls automatic ON/OFF of fan and light system based on the presence and absence of the human inside the room and based on the temperatures of the room. The system is developed with the help of ARDUINO NANO board which

can be used to control the speed of an electric fan based on the changes in
Temperature of its surrounding. [1]

The application of Internet of Things in the modern world is the center of interest of many researchers and standardization bodies since several years. Internet of things mainly consists of two parts automations and analysis. Automation is an important topic which is more and more covered by various actors in the intelligent transportation systems, home automations field via many proposed solutions. Thus, in order to achieve the dream of automation, a special attention has given to the treatment of home automations and home management problem; especially when it comes to operating things with the help of mobile applications. In this context systems based on wireless operational technologies, are proposed to address this situation. Therefore, with increasingly high-speed networks, it is increasingly important to have mechanisms that keep throughput high. Our systems will certainly contribute to the concept of home automation and classroom automation is some way. The paper will present the complete adaptation of the new methodologies of the intelligent classroom automation systems. We will also
Present a schema of the proposed model [2]

3. METHODOLOGY

The proposed SMART CLASSROOM AUTOMATION SYSTEM USING ARDUINO NANO AND IOT is
Technology used to automate the class room, which reduces the power loss, and also we perform automatic attendance, which reduce the wastage of time during the class hours of the school and college.

In the proposed system there are two different task are perform in the first part. We make the class room automation which performs by the Arduino nano controller. We someone enter in front of the class room door , then the door of the class room automatically open and close with the help of the IR sensor. When someone enter into the class room the second IR detect that someone is present then it automatically ON/OFF light of class room. Also when the temperature of the class room go above the threshold value which is previously store in the controller then the fan turn ON/OFF according to the temperature of the class room which are connected to the Relay board.

In the second part we take the attendance of the students by using RFID technology which is connected to entry door of the class room. When the student punch the RFID card through the RFID reader module then the buzzer perform the buzz sound and led glow for the fraction of second which means the attendance of the particular card holder is done successfully and the name of the card holder display on the LCD also, the particular card holder data send to the Google firebase database which is used for the analysis of the individual student performance. Faculty can easy get the daily count of the class room in real time also it store for the future reference which is basically used for the daily analysis. This method replace the previously pen and paper method

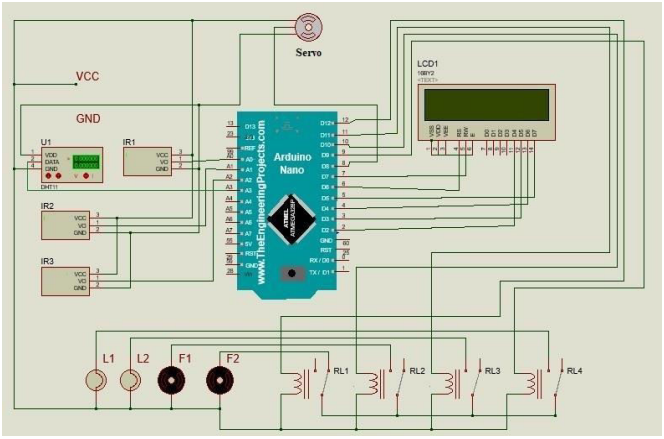

Fig.1 Connection flowchart of the system

3.1] EM 18 RFID READER MODULE

This board is based on the EM-18 RFID Module. Using the board with microcontrollers to read a card's data is very simple and requires just a serial connection. The board has a 5V voltage regulator so it can be powered by 9~15V DC adaptor. Module can also be powered through header wires (+5V & GND) from other interfacing board.
The board has power indication LED (Labeled red in color) and to indicate the detection of Card/Tag, it has a LED (Labeled green in color) and Buzzer. SEL selection jumper is used to switch between two output formats:

- Serial O/P from TTL/CMOS Pin (Microcontroller Compatible) and RS232 O/P from DB9 Female Connector. (Note: - Data is available at both TTL/CMOS and DB9 simultaneously.)

- Weigand26 O/P from ONLY DATA2 (It is DATA0 pin of EM-18) & DATA1 (It is DATA1 pin of EM-18) Pins. (Note:- This is a different mode which uses different

protocol, so if selected data can't be read using SERIAL Protocols, Like on
UART or HyperTerminal.)

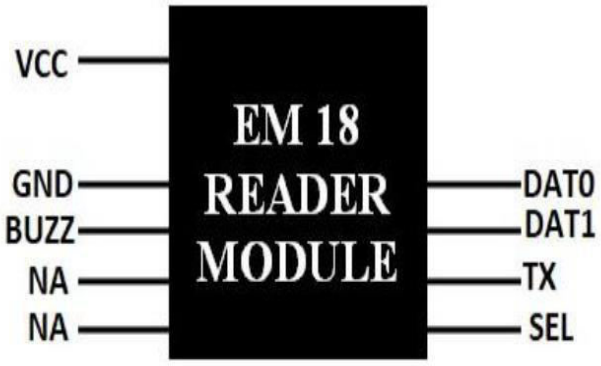

Fig.2 EM 18 RFID Reader Module

3.1.1] Features:

- Low-cost method for reading passive RFID transponder tags.
- 9600 bps serial interface.
- 125 KHz Operating Frequency.
- Reads EM4100 compatible transponders. 64bit Read Only (Manchester 64-bit, Modulus64).
- Read Distance up to: 6~10cm for cards, and 5cm for key tags.
- On board LED (Green) for Pass indication.
- On board Buzzer for Pass indication.
- Integrated RFID Coil Antenna.
- Serial UART out from pin headers (TTL/CMOS) and RS232 (DB9).

3.1.2] Technical Specification:

- Supply Voltage: 4.6 V to 5.4 V DC.
- Current: 65mAmp.
- Card/Tag Format: EM4001 or Compatible.
- Frequency: 125 KHz.
- Encoding: Manchester 64-bit, Modulus64.
- Operating Temp. : 0* to 85* Celsius.

3.2] RFID Tag

Fig.3 RFID Tag

An RFID tag is comprised of a microchip containing identifying information and an antenna that transmits this data wirelessly to a reader. At its most basic, the chip will contain a serialized identifier, or license plate number, that uniquely identifies that item, similar to the way many bar codes are used today. A key difference; however is that RFID tags have a higher data capacity that their bar code counterparts. This increases the options for the type of information that can be encoded on the tag, including the manufacturer, batch or lot number, weight, ownership, destination. And history (such as the temperature range to which an item has been exposed) in application needs. An RFID tag can be placed on individual items, cases or pallets for identification purposes, as well as on fixed assets such as trailers, containers, totes, etc.

3.2.1] Data capacity:

The amount of data storage on a tag can vary, ranging from 16 bits on the low end to as much as several thousand bits on the high end. The greater is the storage capacity, the higher the price per tag.

3.2.2] Frequencies:

Like all wireless communications, there are variety of frequencies or spectra through which RFID tags can communicate with readers. Again, there are trade-offs among cost, performance and application requirements. For instance, low-frequency tags are cheaper than ultrahigh-frequency (UHF) tags, use less power and are better able to penetrate non-metallic substances. They are ideal for scanning objects with high water content, such as fruit, at close range. UHF frequencies typically offer better rang, and can transfer data faster. But they use more power and are less likely to pass through some materials. UFIF tags are typically best suited for use with or near wood, paper, cardboard or clothing products. Compared to low-frequency tags, UHF tags might

be better for scanning boxes of goods as 2they pass through a bay door at a warehouse.

3.3] RF TRANSCEIVER

The RF transceiver is the source of the RF energy used to activate and power the passive RFID tags. The RF transceiver may be enclosed in the same cabinet as the reader or it may be a separate piece of equipment. When provided as a separate piece of equipment, the transceiver is commonly referred to as an RF module. The RF transceiver controls and modulates the radio frequencies that the antenna transmits and receives. The transceiver filters and amplifies the backscatter signal from a passive RFID tags.

3.3.1] Typical Applications for RFID

- Automatic Vehicle identification
- Inventory Management
- Work-in-Process
- Container/ Yard Management
- Document/ Jeweler tracking
- Patient Monitoring

3.3.2] Advantages of RFID Over Bar Coding

1] No "line of sight" requirements: Bar code reads can sometimes be limited or problematic due to the need to have a direct "line of sight" between a scanner and a bar code. RFID tags can he read through materials without line of sight.

2] More automated reading: RFID tags can be read automatically when a tagged product comes past or near a reader, reducing the labor required to scan product and allowing more proactive, real-time tracking.

3] Improved read rates: RFID tags ultimately offer the promise of higher read rates than bar codes, especially in high-speed operations such as carton sortation.

4] Greater data capacity: RFID tags can be easily encoded with the item details such as lot and batch, weight, etc.

3.3.3] Working:

Many types of RFID exist, but at the highest level, we can divide RFID 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 tags 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 LoJack 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. 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 integnity 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 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. 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 10W and 1mW, 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 50W.) Through various modulation techniques, near-and far-fields based signals can also transmit and receive data.

4. Conclusion & Future Scope

4.1 Conclusion

In this project, we instantly infers the power wastage in the class rooms. The knowledge derived from our estimation can enable many variable applications for social good such as effective utilization of the available power and we consider our project as a contribution for developing smart city. Thus we address the problem by establishing a smart class room. By observing the above details, we conclude that this techniques can also be implemented at collage level, Institute level. Which we will go to design a new project that is ―SMART CLASSROOM‖.

This presents a model that has been proposed to meet the basic needs of classroom automation. An important advantage of this system is that it gives the system as a complete prototype to develop more such cost efficient systems that can be used in classrooms and college automation. A study of the system shall be conducted in order to verify the expected results in the classroom automation system as proposed. In addition to this the future work can be

focused on developing applications that can help in automating an entire department or a college.

4.2 Future Scope

Future work should be along the lines of considering the validation of the attendance also by including an image detection technique which will further more authenticate the person. The same model also can be helped in making a home automation system which will be cost efficient. Different technological advances can help in making the system more reliable.

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