

# IOT BASED SMART ATTENDANCE SYSTEM WITH BODY TEMPERATURE MEASUREMENT

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## ABSTRACT

The attendance management system replace the standard method of taking attendance and reduces the time to require attendance with the assistance of Radio Frequency Identification (RFID). In this project, implementing the smart attendance system with body temperature measurement with help of Arduino UNO and contactless temperature sensor. Developing a mobile and web application, to access the student's attendance details and body temperature measurement details. The attendance monitored with help of Arduino UNO and RFID module and the details are stored in the database. The parents and teachers are getting notified, once the student's vital sign indicates above normal body temperature 98.6°F. It's very helpful to the management to identify and quarantine the students those who aren't feeling well. Teachers can access/update the student's attendance details through mobile/web application. This system mainly applicable for schools and colleges.

**Keywords** — RFID, RFID Reader and Tags, Internet of Things (IOT), Arduino UNO, PIR Sensor, Temperature Sensor

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## I. INTRODUCTION

The Internet of Things (IoT) describes the network of physical objects, things that are embedded with sensors, software and other technologies for the aim of connecting and exchanging data with other devices and systems over the web. IoT has become one in all the foremost important technologies of the 21st century. We can connect everyday object kitchen appliances, cars, thermostats and baby monitors to the net via embedded devices, seamless communication is feasible between people, processes, and things. IoT helps to meets the digital world. Communication-IoT encourages the communication between devices, also famously referred to as Machine-to-Machine (M2M) communication.

**Automation and Control** - Without human intervention, the machines are ready to communicate with one another resulting in faster and timely output.

**Monitor** - this is often the foremost obvious advantage of IoT is monitoring. We will know the precise information.

**Time** - the number of your time saved due to IoT may be quite large.

**Better Quality of Life** - All the applications of this technology culminate in increased comfort, convenience, and better management, thereby improving the standard of life.

## II. RELATED WORKS

A number of related works exist in literature, application of RFID Technology to different areas and specifically to the area of academic attendance monitoring problem. RFID forms an essential block of IoT where RFID devices are wireless microchips used for tagging objects for automated identification. Design and implemented the smart attendance system with help of microcontroller and RFID module [1].

To get rid of manual attendance process, represented by paper sheet signature, researchers have proposed many technologies that include face recognition based attendance system, barcode, and fingerprint identification. The classroom attendance system is based on face recognition technology, combined with RFID technology. It realized the identity confirmation of the students in the class effectively [3].

Once the student places the card in front of the RFID card reader, it reads the data and verifies it with the data stored in the microcontroller from 8051 family. If the data matches, then it displays a message on the LCD confirming the entry of that student else displays a message denying the attendance. The status of a student's attendance can be retrieved from this system by pressing the status button interfaced to the microcontroller [6].

### III. SYSTEM REQUIREMENTS

Creation of an IOT based automatic attendance management system had lead us through the analysis and literary survey about knowing the way to tackle with necessities and requirements. To form it cost effective and user friendly, the desired components are listed as follows

- a. Arduino UNO
- b. RFID Tags
- c. EM-18 RFID Module
- d. MLX90614 Contactless temperature sensor
- e. PIR Sensor
- f. LCD Display
- g. Connecting wires
- h. HDMI Cable

- i. Breadboard

### INTERNET OF THINGS (IOT)

The internet of things (IOT) is that the inner connection or network of varied physical devices like vehicles, apartments which are embedded with sensors, software, electronics and connectivity that's helps to retrieve and exchange information. It allows the object to be sensed and controlled through the available network infrastructure leading to the mixing of physical environment and its object with the PC systems. It offers advanced connectivity among devices and systems that transcend a machine-to-machine relationship.

### ARDUINO UNO

Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. The figure 1 below is of Arduino UNO which we have used in the system.

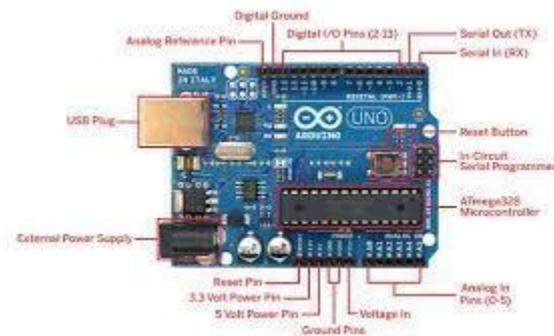


Figure 1- Arduino UNO

### RADIO FREQUENCY IDENTIFICATION (RFID)

The technology that rightfully favours our requirements is the RFID Technology. It's an automatic data identification and collection technology. Although it's not a replacement one, it has gained interest recently in computing fields. RFID involves radio frequencies and microchip

technologies to develop a system that may be accustomed identify, monitor, secure and do object inventory. It consists of a chip that contains unique details which might be used as identification when detected by a RFID Reader.

RFID consists of three components namely RFID Reader, RFID card/tag and also the computer with specific database created. RFID allows the transfer of information from the cardboard to the reader over a distance of about 10 meters betting on the type of tags/cards used. Here the data is transferred using Radio waves and lots of number of tags are often read simultaneously. RFID technology has already found usage in person identifications, passports, in grocery stores, shopping malls, finding lost pets, household material placements, etc. The figure 2 and 2.1 below is of RFID Tag and RFID Reader which we have used in the system.



Figure 2-RFID Tag and RFID Reader

### **MLX90614 CONTACTLESS AND TEMPERATURE SENSOR**

The MLX90614 is an infrared thermometer for non-contact temperature measurements. Both the IR sensitive thermopile detector chip and therefore the signal conditioning ASIC are

integrated within the same TO-39 can. Integrated into the MLX90614 are a coffee noise amplifier, 17-bit ADC and powerful DSP unit thus achieving high accuracy and determination of the thermometer. The thermometer comes factory calibrated with a digital SM Bus output giving full access to the measured temperature within the complete temperature range(s) with a resolution of 0.02°C. The user can configure the digital output to be pulse width modulation (PWM). As a customary, the 10-bit PWM is configured to continuously transmit the measured temperature in range of -20 to 120°C, with an output resolution of 0.14°C. The MLX90614 Contactless Temperature Sensor used in the project as shown given below in the figure 3 – contactless temperature.



Figure 3 - Contactless Temperature Sensor

### **PIR SENSOR**

PIR sensor could be a passive infrared sensor that measure the infrared radiation during this electronic sensor's range of access or view. The amount of infrared round the sensor depends on the temperature, nature of surface etc. This variation around is deducted by the sensor and is transferred within the style of electrical output voltage and triggers the deduction. A normal PIR sensor consists of a lens surface and may be configured for about 10 meters with 180 degree of field view. A PIR sensor has been shown in figure

4 PIR Sensor. The 3 terminals namely Vcc, ground and output also shown.

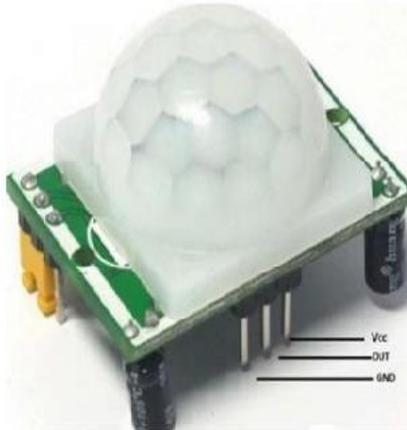


Figure 4 – PIR Sensor

## SYSTEM OPERATION

The entire working of attendance system can be divided into two phases namely,

**a) Registration Phase:** This phase consists of collecting the details of the students such as name, USN (University Serial Number), subject registered during the semester, etc. This will be feed into the computer memory and corresponding RFID card with unique identification (UID) will be issued per students.

**b) Recognition Phase:** This phase come into picture when the student wants to attend the lecture. All have to do is to tab his/her RFID card on the RFIF reader. The reader will recognize the card and there by record the attendance in the concerned faculty's database. This is done using IOT synchronized Arduino UNO and required information is made to display using LCD display.

## IV. SYSTEM IMPLEMENTATION AND METHODOLOGY

The methodology of the project is that as soon because the PIR sensor 1 reads the person entering, the RFID reader are activated and it'll accept just one card at a time till the other PIR

Sensor detects the person. That means, until PIR Sensor 2 detects the person moving inside the category, the attendance won't be updated within the database.

The attendance will directly be updated therein page and also we've got designed a basic Android Application (App) through which the scholars can check their attendance directly from the APP in their mobile phones.

The Proposed system has been explained with the help of following steps:

Step 1: Start the RFID Reader

Step 2: Initialize the LCD Screen

Step 3: Initialize UART

Step 4: Send scanned UID of RFID card data to Arduino UNO Model

Step 5: Search and match the UID and extract the relevant student information

Step 6: Compare detected student id, date and time with class time table and if match found then mark the presence.

We have also used two passive infrared sensors so as to solve the matter of proxy of attendance. The primary PIR sensor will first detect the motion of the person by detecting his/her body heat and it'll give an output of 1. Once the PIR output is 1, the RFID Reader is such programmed that till the time the student don't cross the second PIR, the RFID reader are able to read only 1 RFID Card. so at this point the code will tap only his/her card and not the one who isn't present and then the scholar will enter the classroom, and so the second PIR Sensor will read high. Once the second PIR is high, the attendance of the scholar for that specific subject will be marked and therefore the count will increase by 1. Similarly if the second PIR reads first and so the primary PIR then the count will decrease by one and therefore the faculty will know that there's a proxy since the counts will differ.

Now the information from Arduino UNO are updated within the teacher's database directly

and therefore needn't do the labour for entering the attendance into the merit. All teachers will have their own username and password for the database login. We have used XAMPP(X: Cross platform (WINDOWS, LINUX, MAC OS) A:Apache M:My SQL P:PHP P:PEARL) for the development of on time database.

We have also developed a mobile and web application for the purpose of scholars in order that they'll see their daily attendance in their movable itself hence easing their work of constant check on the attendance percentage. This Android App has the small print about the scholar, his name, registered subjects, the amount of classes attended, the list and number of classes taken and therefore the eligibility status thus facilitating the code to stay a track of the attendance status and thus stay conscious. This can be an open platform and may be viewed by anyone just by entering the name of the scholar and the subject whose attendance he would really like to understand.

The flow of events can be depict by a flow chart as shown in figure 5 – Flow Diagram

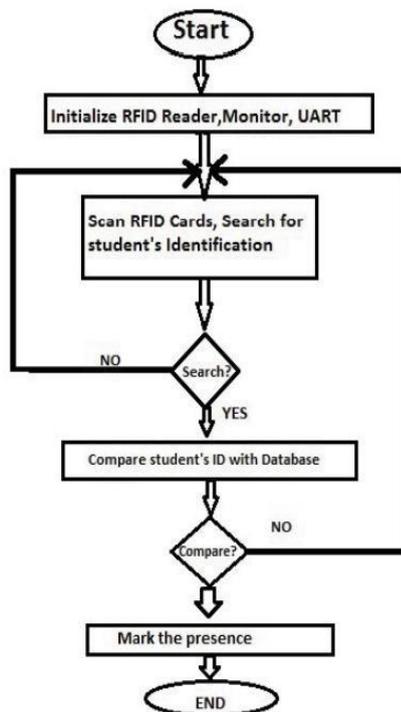


Figure 5 – Flow diagram

## V. CONCLUSION

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We have finally determine that the normal way of recording attendance may be ruled out by this integration of RFID Technology with Internet of Things using the Arduino UNO model. We stumble upon various advantages which might be listed a follows

- This system reduces paper work thereby saving time and money.
- Eliminates repetition and duplication of recorded data.
- Eliminates error in manual attendance records.
- Easy attendance recording.
- Auto generated various styles of reports of sophistication or students attendance.
- Increased security and confidentiality.
- Ethical enhancement of staff and Students.

The existing conventional attendance system of taking attendance by calling names or signing on paper is incredibly time consuming and insecure, hence inefficient. Therefore, Arduino UNO i.e. IOT based attendance management system has been proposed. The System is extended to more number of scholars and more number of classes with the database generated. It may be concluded that a reliable, secure, fast and an efficient system has been proposed by replacing a manual and unreliable system by using Arduino UNO with Radio Frequency Identification (RFID). In future the work is extended with the net camera, Finger Print module or Retina Scanner which will automatically calculate and maintain the attendance for college kids during a college or an institution using a picture processing.

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