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Design and Fabrication of IOT Based Temperature and Touchless Monitoring System

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ABSTRACT

After the COVID-19 outbreak, the contactless temperature measurement devices are getting very popular and most of them use the infrared temperature sensor. This device measures the temperature of the person without any physical contact. Today we will also use NodeMCU and Arduino IDE to interface MLX90614 infrared temperature sensor.

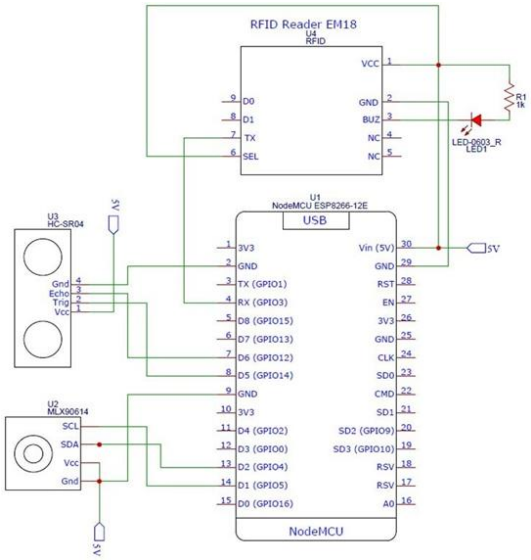
So in this tutorial, we are going to build an IoT Based Smart Employee Temperature Screening system using NodeMCU, MLX90614 Infrared Thermometer, EM18 RFID Reader, and Ultrasonic Sensor. It can measure employee's body temperature with a non- contact infrared temperature sensor and send the Name and Temperature of that employee to a webpage that can be monitored from anywhere using the internet. The webpage stores the time, Name of the person, and temperature in a table. The IR sensor is used to measure the distance between the sensor and person so that the MLX90614 sensor can measure the temperature when the distance between the sensor and person is less than 20cm for better accuracy.

I. INTRODUCTION

Nowadays, it is very important to finish the job fast, learn something new, get higher results as easy and efficiently as you can. Every sector, especially in the education process and in the business world, needs management systems that will enable them to have adequate control and management in the development of learning or work. Considering all these advantages and benefits, we thought that the process of education at the

university, in particular, needs an online system to manage student attendance. The concept “Internet of Things” (IoT) has recently attracted growing attention from both academia and industry. IoT is a scenario where devices (even animals or people) are provided with unique identifiers and the ability to automatically transmit data over a network without requiring human-to-computer interaction .RFID forms an essential block of IoT where RFID devices are wireless microchips used for tagging objects for automated identification [3]. RFID systems consist of a reading device called a reader, and one or many tags. The frequency band in which each RFID system operates can be low, high or ultra-high frequency. The lowfrequency band (LF) covers frequencies from 30 KHz to 300 KHz. Regularly LF RFID systems work at 125 KHz [4]. The high band (HF) ranges from 3 to 30MHz. Most HF RFID systems work at 13.56 MHz with reading ranges between 10 cm and 1 m. The ultra-high frequency band (UHF), recurrence band, covers the reach from 300 MHz to 3 GHz [5]. The reader is a powerful device with a lot of memory and computational resources which could be connected to Raspberry Pi. The RF SAW system provides temperature sensing capabilities Temperature sensors have been integrated with traditional passive RFID tags. The majority of the state of the art with regard to integration of sensors with RFID technology has been in relation to active RFID systems, where the sensor node and RFID tag are powered locally, typically from a battery source. Can operate in extremes of temperature compared to chip-based tagsResilience to radiation, meaning that they can survive sterilizations processes such as gamma-ray and ebeam. The main working principle of the project is that, the captured data is converted into image to detect and recognize it, along with their scanned rfid tag and their body temperature, else the system marks the database as absent. The task of the proposed system is to capture the face of each student and to store it in the database for their attendance. The face of the student needs to be captured in such a manner that all the feature of the students' face needs to be detected. There is no need for the teacher to manually take attendance and through further processing steps the face is being recognized and the attendance database is updated. The system will help a lot in improving student attendance in particular courses they need to attend and will save a lot of time. This paper consists of three sections: the first part deals with the related papers; the second part details the proposed framework; and the last part details the implementation plan accordingly.

II. DESIGN DIAGRAM



Components Used:

NodeMCU ESP8266:

NodeMCU is the main controller of the circuit. It assembles all the components and works in the desired way by programming.

EM18 RFID Module:

The RFID reader sends a pulse of radio energy to the tag and listens for the tag's response.

The tag detects this energy and sends back a response that contains the tag's serial number and possibly other information as well. In simple RFID systems, the reader's pulse of energy functioned as an on -off switch; in more sophisticated systems, the reader's RF signal can contain commands to the tag, instructions to reador write memory that the tag contains and even passwords.Historically, RFID reader were designed to read only a king of tag, but so- called multimodereaders that can read many kinds of tags are becoming increasingly popular.RFID readers are usually on, continually transmitting radio energy and awaiting any tags thatenter their field of operation. However, for some applications, this is unnecessary and could beundesirable in battery-powered devices that need to conserve energy. Thus, it is possible toconfigure an RFID reader so that it sends the radio pulse only in response to an external event. Forexample, most electronic toll collection systems have the reader constantly powered up so that every passing car will be recorded

RFID CARD :

The tag, also known as the transponder (derived from the terms transmitter and responder),holds the data that is transmitted to the reader when the tag is interrogated by the reader. The mostcommon tags today consist of an Integrated Circuit with memory, essentially a microprocessor chip.Other tags are chip less and have no onboard Integrated circuit. Chip less tags are more effective inapplications where simpler range of functions is all that is required; although they can help achievemore accuracy and better detection range, at potentially lower cost than their Integrated Circuit- based counterparts. From here on out, we will use the term tag to mean Integrated Circuit-based tag.We will refer to chip less tags explicitly, when needed.RFID tags come in two general varieties which are passive and active tag. Passive tagsrequire no internal power source, thus being pure passive devices (they are only active when areader is nearby to power them), whereas active tags require a power source, usually a small battery.

TRANSISTOR:

A bipolar junction transistor (BJT or bipolar transistor) is a type of transistor that relies onthe contact of two types of semiconductor for its operation. BJTs can be used as amplifiers, switchesor in oscillators. BJTs can be found either in their individual discrete components or in largenumbers as part of integrated circuits. In this project, the type of transistor used is the NPN bipolar junction transistor with specification 2n2222. When the microcontroller gives instructions, it sends asignal which biases the transistor.

MLX90614 INFRARED TEMPERATURE SENSOR :

Here we have interfaced with a b, named MLX90614. It is an infrared thermometer designed for non-contact temperature sensing. It comes factory calibrated with a digital SM Bus output which gives complete access to the temperature measured in the maximum temperature range with a resolution of 0.02°C and it can be used to

measure the temperature of a particular object ranging from -70° C to 382.2°C with an accuracy of about 0.5C at room temperature.

It has two devices embedded in it, one is the infrared thermopile detector (sensing unit) and the other is a signal conditioning application processor. It works based on Stefan-Boltzmann law which states that any object that isn't below absolute zero (0°K) emits light in the infrared spectrum that is directly proportional to its temperature. The sensing unit of the sensor uses the emitted light to measure the temperature of the object.

III. CIRCUIT DIAGRAM

Circuit Diagram for Infrared Thermometer using ESP8266 NodeMCU is given below:

As shown in the circuit diagram, the connections are very simple since we have used them as modules, we can directly build them on a breadboard. The LED connected to the BUZ pin of the EM18 Reader module turns high when someone scans the tag. The RFID module sends data to the controller in serial; hence the transmitter pin of the RFID module is connected to the Receiver pin of NodeMCU. The connections are further classified in the table below:

BLOCK DIAGRAM

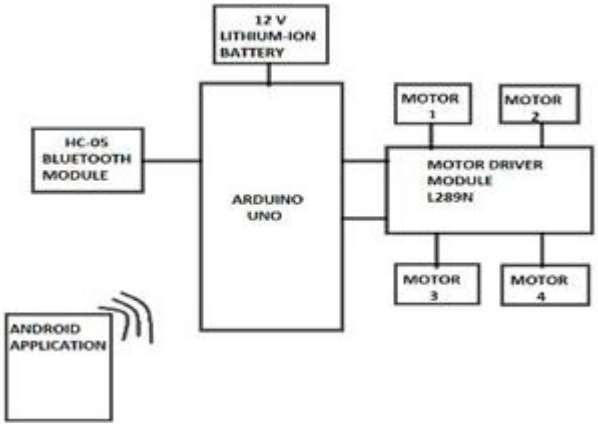


Fig 2: The IOT BASED TEMPERATURE AND TOUCHLESS MONITORING SYSTEM

IV. WORKING PRINCIPLE

The concept “Internet of Things” (IoT) has recently attracted growing attention from both academia and industry. IoT is a scenario where devices (even animals or people) are provided with unique identifiers and the ability to automatically transmit data over a network without requiring human-to-computer interaction .RFID forms an essential block of IoT where RFID devices are wireless microchips used for tagging objects for automated identification [3]. RFID systems consist of a reading device called a reader, and one or many tags. The frequency band in which each RFID system operates can be low, high or ultra-high frequency. The lowfrequency band (LF) covers frequencies from 30 KHz to 300 KHz. Regularly LF RFID systems work at 125 KHz [4]. The high band (HF) ranges from 3 to 30MHz. Most HF RFID systems work at 13.56 MHz with reading ranges between 10 cm and 1 m. The ultra-high frequency band (UHF), recurrence band, covers the reach from 300 MHz to 3 GHz [5]. The reader is a powerful device with a lot of memory and computational resources

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"Switch off" Biometric Attendance on March 5th 2020 Delhi government announced the suspension of biometric attendance in it's offices via letter written to principal secretaries, secretaries, autonomous bodies and municipal corporations for the suspension of biometric attendance to contain the spread of coronavirus. However, it was on Feb 17th 2020 when Maharishi Valmiki Hospital in the Capital City of India suspended biometric attendance announcing it as a "precautionary measure" after many of it's employees complained to the authorities that touching the biometric system is "psychological unease" on account of coronavirus scare .Need of the system is untouchable device .And also student can't cheat with the system. For that we have a solution of face recognition. Seeing the situation of covid19 along with attendance temperature scanning is very important. Without any physical contact of human etc. III. PROPOSED SOLUTION After the COVID-19 outbreak, the contactless temperature measurement devices are getting very popular and most of them use the infrared temperature sensor. But we need help of the human to use or operate such device at a very small distance and it's dangerous for them too. The solution is that our device measures the temperature of the person without any physical contact. It can measure human body temperature with a non-contact infrared temperature sensor and If necessary at and event Or school where we can get the database of the human so can configured it with our device and Face recognition and tag scanning process is send and the Name and Temperature of that human to a webpage that can be monitored from anywhere using the internet.

V. FUTURE SCOPE

To improve our project add to the camera.And the camera to detect the labour face or eye contact and to validation for the predefined labours eye or face.

VI. CONCLUTION

The project of touchless a temperature attendance system may used to the high automation security system. And the without manual and the easy to handling any one. Medium cost and the easy to repair that.

VII. REFERENCES

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