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IoT Based Smart Attendance and Temperature Monitoring and Sanitization System

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Abstract: ***With the rapid increase in covid-19 cases, the issues related to situation with respect to safety and precautions along with proper authorized persons is necessary. To avoid the spread of infectious diseases and illness, IoT based Smart authentication and temperature monitoring and sanitization system is the feasible and the trending solution. In the proposed system, the entrance of a particular firm or office will be provided with the embedded system which helps in real time monitoring and surveillance feature with proper sanitization. The data regarding the user's personal information and temperature values will be used to provide information with respect to automated authentication and safety measures. The sensors will increase the efficiency of data gathered related to avoid spread of infectious diseases. The analysis of ceaseless data gathered from the system over cloud platform will help authorities to improve plans and measures related to the current situation.***
Keywords: Cloud, ESP8266, RFID reader, IR Temperature sensor, IR sensor, google sheets, Solenoid valve, solenoid lock.

I. INTRODUCTION

Generally authentication and attendance monitoring systems are designed with biometric based recognition features such as fingerprint IDs etc. Manual attendance is a major drawback and hence demand of automated attendance and monitoring system has been increasing drastically. But due to this covid-19 pandemic its necessary to build or design a contactless mechanism for authentication and attendance using RFID. As fingerprint based attendance systems are more conventional because of its cost and technology feasibility, it is widely used. But in this critical situation biometric based attendance is of no use due to rapid spread of harmful infection on surface contact. Any system that has to be used in technological terms must attain all the parameters for practical application. This leads in designing a contactless system using chip-based modules such as RFID tags that are allotted to each employee/person with different unique IDs which are captured and recorded by RFID reader using radio waves and authenticates the person with the help of coding.

The proposed system uses contactless temperature monitoring sensor which records this reading each time and with the help of controller and saves it on allotted spreadsheets. If the temperature of a person is greater than the threshold value then the entrance will not open for that person and also an alert through buzzer will be generated to indicate the guard about the person's high temperature to avoid spread of infection. Temperature monitoring is an important part for avoiding spread of many diseases. In this project, it is proposed to use a lowcost temperature sensor based on the paradigm of passive RFID tag antenna based sensing. A simple mechanical method to permanently induce changes in RFID tag power characteristics upon exposure to temperatures greater than a threshold is presented. The controller has an inbuilt WIFI module to send and store data over cloud using IOT. The received data will be stored in Google sheets. Another important factor for health safety and avoiding spread of contagious disease is to maintain hand sanitization and hence a sanitization module has been added in this project which will ensure that all the people enter the premises with clean hands.

The entrance of the premises will be automated in such a manner that it will open only for persons who have normal body temperature in order to curb spread of viral infections and help the company/schools/colleges maintain safe and hygienic premises. The designed project will be a prototype to indicate an efficient design for bulk manufacturing.

II. LITERATURE REVIEW

Attendance monitoring systems are now very popular across the country and very useful for companies, schools, colleges, offices etc. Generally these are related to biometrics and hence use fingerprints, face detection, iris detection etc. The most popularly used form of attendance monitoring system is fingerprint based which has seen a major disadvantage in the Covid pandemic scenario due to the surface contact and multiple users which increase the chance of virus spread.

This literature review mainly focuses on the previous existing technologies which is used for designing attendance monitoring as well as healthcare systems.

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A. Attendance System based on RFID and Biometrics

Khwala A. Al Majjar ,Omar Heggy , IEEE2019 ,India

This paper depicts about the face recognition as well as fingerprint recognition where face recognition has been added to remove to avoid the problem arising due to manual attendance system. Two biometric features that is face and fingerprint recognition have been used to avoid failure chances of any system and hence RFID is also implemented for backup.

B. An improved Version of Student Attendance Management system based on RFID

Daniel Mijic et.al

IEEE 2019

In this paper the RFID system is operated using web based application to manage the attendance of students. This system is applicable to be used in schools and only maintains the record of attendance.A separately desined web based application to monitor and maintain the gathered data for future use.

C. IoT based Smart Attendance Monitoring System using RFID

Unnati Koppikar et.al

IEEE 2019

The paper basically describes a design of an RFID based attendance recording system which uniquely identifies each employee through RFID tags allotted and attached on their ID cards. This smartcard mechanism makes the system to record attendance effortlessly with quicker and protected method as compared to conventional method. This system includes both hardware and software components based on IOT configuration which can be used at different educational institutions ,corporate as well as government offices etc.

D. IoT based Real Time Health Monitoring

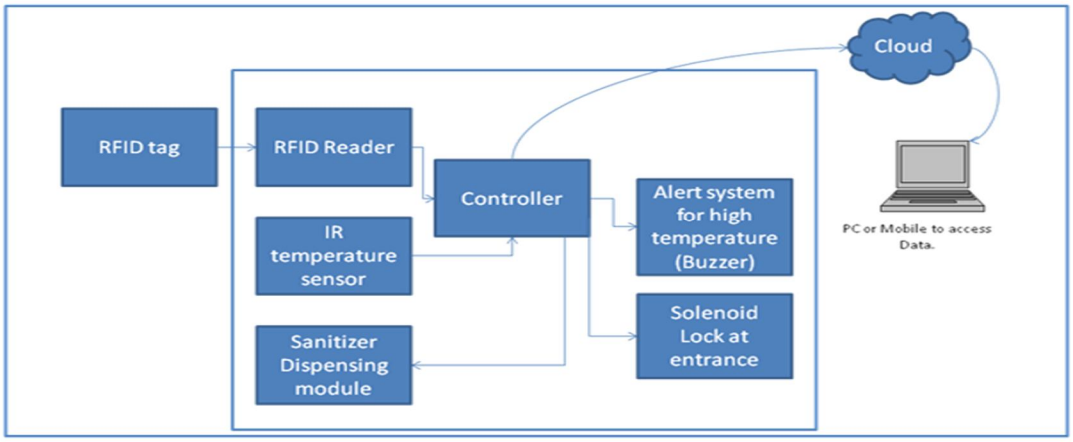
Vani Yeri et.al

IEEE 2020

This paper describes about the system that consist of web and mobile based application which is used for continuous monitoring of patients. The main objective of paper is to implement a low cost and simple system that diagnose the vital signs of patient and transmit it in emergency situations. Sensors are used for monitoring and measuring the vital signs of patient via wireless networks. The data collected is being transmitted to the cloud platform for storage using Wi-Fi module connected with controller.

III. IMPLEMENTATION METHODOLOGY

In this scenario, the RFID reader installed at the entrance will capture the RFID tag allotted to the employee/person which uniquely identifies and record the attendance and maintain this record using Wi-Fi module which is in-built in the controller. The IR sensor based automated Sanitization dispenser being placed at the entrance will disburse sanitizer and after authentication the IR Temperature sensor will sense the level of temperature. On reaching a value below or equal to threshold the command is generated and the controller sends commands to the door to be unlocked and vice versa. Once the person is Identified the information is recorded and stored in the allotted sheets , the signal is received to central authority regarding to data update



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Figure above shows the block diagram of smart door system where input is RFID module, IR Temperature sensor and output contains Sanitizer dispensing module, an alert system and solenoid lock. The controller used in this project is node mcu which is also known as ESP8266 which has inbuilt Wi-Fi module which is used for internet applications. Initially the sanitizing Dispenser module will dispense the sanitizer using relay mechanism that is when the hands are in proximity of sensor the relay will be activated ang gets normally closed and the sanitizer is disbursed. RFID stands for Radio Frequency Identification which uses radio waves to capture and store information using a tag and an RFID reader. Basic principle of RFID is when Radio waves are encountered by a passive RFID tag, the coiled antenna within the Tag forms a magnetic field and energizes the circuit. Thus the administrator can simultaneously access information of an individual through google sheets where personal data is stored and compared with data base over a cloud server. When RFID tags comes in contact with RFID reader, The reader tracks the RFID tag and gather information from it using database to check whether the database contains information about the user with the help of unique IDs provided on the tag, The controller receives the signal from TX and Rx pins of RFID reader to authenticate and save the information captured by RFID and send the signal to IR Temperature sensor to activate. The IR Temperature sensor is basically a temperature detecting device which detects the temperature of an object without contact and sends the data on cloud platform. When a Hand is detected by Temperature sensor the sensor activates and detect the temperature and dispatch it to the controller. The controller verifies whether the temperature is below or above the normal temperature For this we assigned a threshold value to monitor the temperature within two conditions.

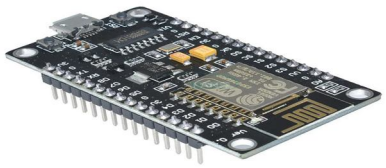
1) If the temperature detected is above normal threshold value then the system will not allow access in the premises and the controller will send signal to alert system at output side to generate alert indication for the user.
2) If the temperature is below or equal to normal temperature then the controller will sends the signal to the Solenoid door latch to be activated.

The Solenoid lock works on electromechanical signals where the door is locked and unlocked on the basis of digital input provided by the controller. When the output is low the door resets and get locked on the other hand when the output is high the door lock gets activated.Hence once authentication is completed and data is updated on google sheets the door lock is activated and system grants access entry in the office.

IV. HARDWARE DESCRIPTION

A. *Node mcu(ESP8266)]*

In this project we have used the controller Node mcu which consist for an inbuilt wifi moduole and API this controller can be used for IOT application and it cheaper open source firmware.In this project the controller will controls the RFID system temperature sensor and solenoid lock



B. *IR Temperature Sensor*

The IR temperature sensor have to be used to check whether the temperature recorded is above or below or equal to normal /threshold temoerature value. The sensor output is recorded on google sheets which will help the controller to distinguish either to unlock solenoid or generate alert.



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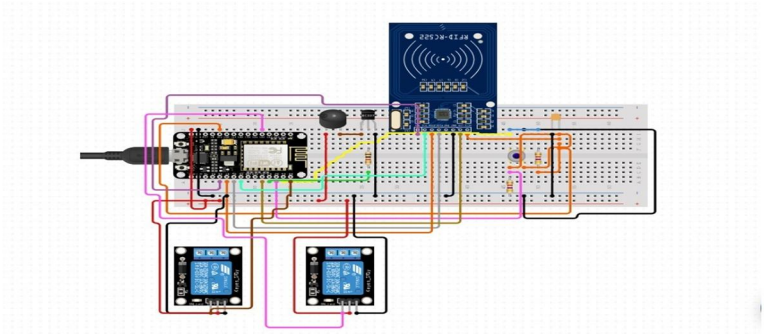
C. Solenoid Lock

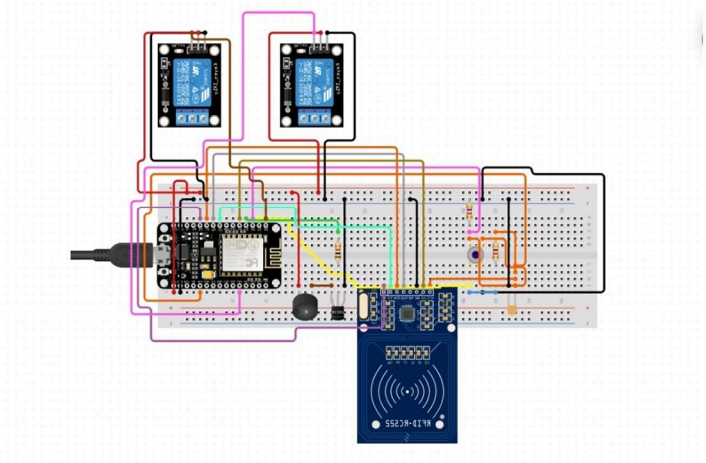
In this project we used solenoid lock for authenticated entry access based on the temperature recorded if the temperature is recorded above 99 C then solenoid remains locked on the other hand if temperature recorded is below 99 then solenoid unlocks for some period of time



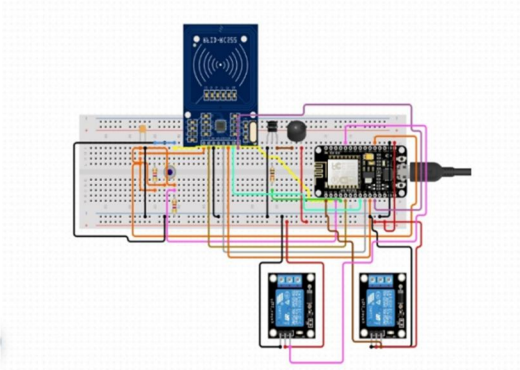
V. CONCLUSION

This paper shows how the smart authentication and automated attendance along with sanitization using IoT is implemented. This proposed system assures the collection of data for authentication purpose and elimination of covid-19 spread infection. The system will thus provide accurate reports, increasing the efficiency of the system. The real time monitoring of temperature level with the help of sensors and wireless communication will reduce the time taken by the existing method. Therefore providing better infrastructure and improved hygiene.





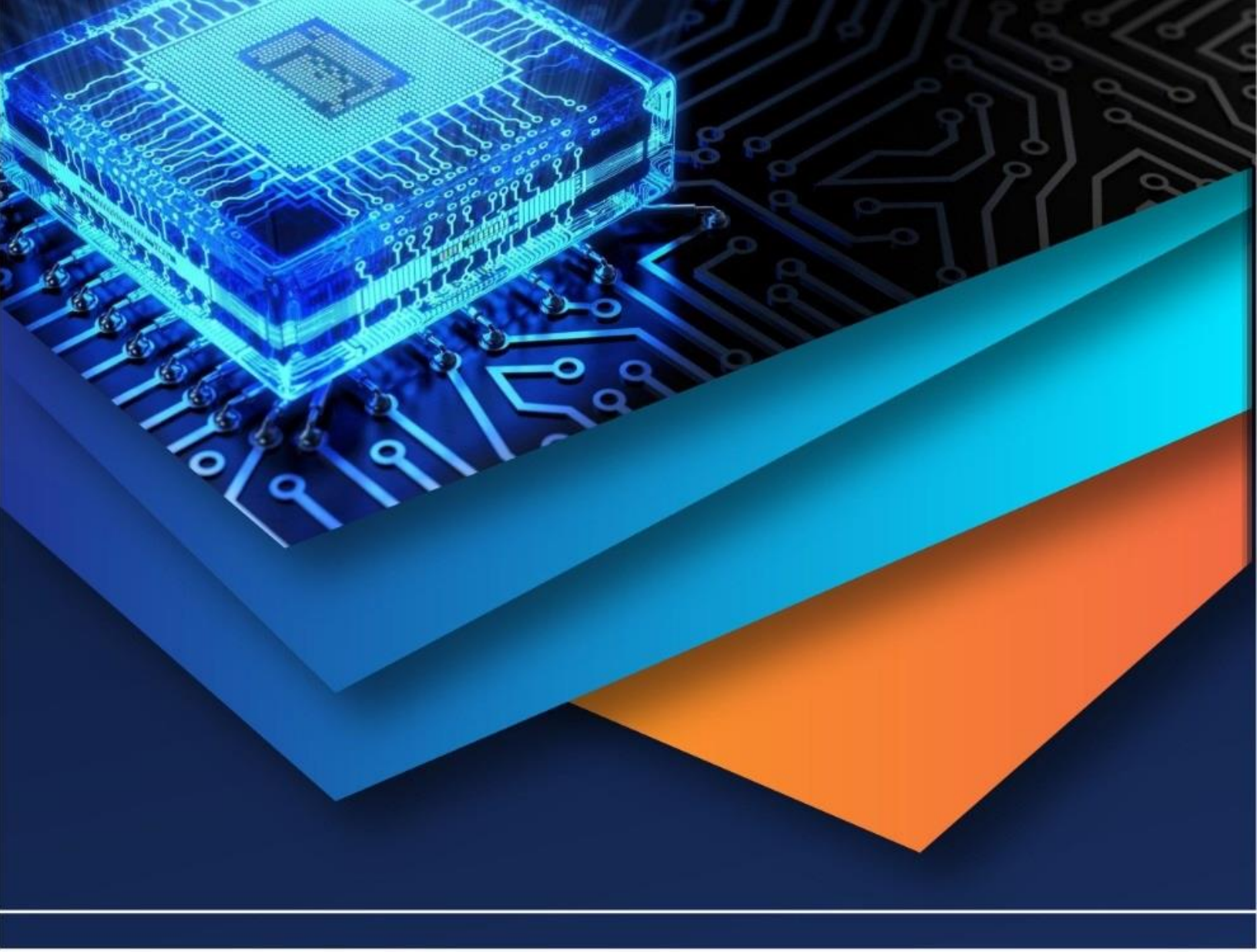
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