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A Review paper on & RFID Based Attendance and Health Monitoring System over IoT

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ABSTRACT: Real time monitoring of Health simultaneously with attendance in the premises of school, colleges, offices, societies etc. has not been done so far and the Covid-19 pandemic has made it compulsory to monitor everyone's body temperature before letting them to enter the building which is done manually by the IR temperature gun. Therefore, to solve this major problem we came up with an idea and by implementing that idea we are designing the system whose primary focus will be to take attendance as well as monitor the body temperature, oxygen level, and pulse rate, as these are the most important factors to determine symptoms of covid. Hence, after achieving our objective we will be able to monitor and record the health along with attendance and by using IoT all the data will be sent to the cloud which will make data available for remote access across the globe.

KEYWORDS: Iot, Cloud, Covid-19, IR, RFID, Node MCU, ESP 8266, Arduino Mega 2560

I. INTRODUCTION

“Health is Wealth”, a famous proverb says a lot and this goes for all human beings. Before going for work we study and for studying- everyone goes to school and colleges and once we are done with our education we step into real life where we provide our services to others and by doing so we regulate the economy of the country and world and in this way International trades happen and then world becomes a Global village where everything is related to everyone. So, if we can check the health of students or employees before they enter their required places, we will not only keep that person updated about their health but at the same time we will be keeping other students and employees safe and healthy which will boost the efficiency of the employees and will definitely improve the result of the students. The compounded outcome of these small changes in the daily curriculum will foster the growth of the nation such is the power of this system i.e., “RFID BASED ATTENDANCE AND HEALTH MONITORING SYSTEM”.

Nonetheless research has been done on the topic of health monitoring and attendance monitoring separately however, they have not been combined and were never used in the way we are using, this makes our work unique whose implementation is not only mandatory for time being but will persist longer.

This review paper is further divided into three parts and those are Prior Work (on the given topic), Summary, Future scope, Conclusion and References. Since our work combines different topics i.e., attendance and health monitoring therefore Prior Work by other authors is divided into two sub topics the former one is Attendance Based and the later one is Health Monitoring Based.

Literature Survey

1) Attendance Based



2) Health Monitoring Based

Conclusion

References

II. LITERATURE SURVEY

Students, Teachers, Researchers, and other Laureates from all across the World have worked on the relevant topic and have proposed their best work in different publications. After going through number of papers we have shortlisted few of them for the literature survey and these papers are divided into two parts and hence they have been discussed separately as follows-

1) Attendance Based

[1] Author proposed a smart attendance system using RFID in IoT to solve regular lecture attendance monitoring problems in developing countries. Here, they have used passive RFID communication technology for monitoring attendance of students in school and colleges by installing an RFID reader whose input goes to the microcontroller and then to the storage for further work on data gathered. [2] proposed system aims to collect University attendance systems by using RFID, Cloud storage and IoT. RFID technology was installed in every classroom in the university to encourage that every student's presence is collected by chip instead of classroom roll call system. [3] focuses on proposing an RFID based Attendance Management System (AMS) and also information service system for an academic domain by using RFID technology in addition to the programmable Logic Circuit (such as Arduino), and web-based application. The proposed system aims to manage student's attendance recording and provides the capabilities of tracking student absentee as well, supporting information services include students grading marks, daily timetable, lectures time and classroom numbers, and other student-related instructions provided by faculty. [4] depends on smart devices which are inclined to members of schools, organizations, where each smart device has a special MAC (physical) address. Students can be connected to the application through MAC addresses and results can be saved. Finally, they generated the report on a daily/weekly/Monthly basis. The proposed system consists of two parts; the first one is a website, which can be accessed through the main screen of the system management like registration of student data, adding the admin to the system and so on. The second part is a system work environment which is a controller (Raspberry Pi) and runs the main script of the system. Finally, results were obtained automatically based on students MAC address.[5] The concept of Internet of Things (IoT) was applied to the basic attendance system in a classroom. A portable device was designed, wherein every student can feed their attendance during each lecture. The student verification was done using the R-305 Fingerprint module. Once successful recognition of the fingerprint pattern was done, the student's attendance was ready to be pushed to the web-server. The data was sent through the serial interface to the Arduino. Arduino provided a data sequence, which was a combination of the student ID, teacher ID and device ID i.e a unique no. of the hardware, so that the attendance cannot be forged. This combination was then sent to the web-server using Wi-Fi Module esp8266-01. Once the combination reaches the web-server, a PHP script does the subsequent work, to interpret the data, and the MySQL database is updated. Data from the database was retrieved and sent to the website for easy viewing by the student. The whole system was implemented on a dedicated web-server. As a result, the real-time behaviour was analysed, which helped them to understand the latency and efficiency of the entire system.[6] Focuses on Biometric student attendance system which increases the efficiency of the process of taking student attendance. The main goal of their system was to automate the cumbersome process of manually taking and storing student attendance records. It will also prevent proxy attendance, thus increasing the reliability of attendance records.[7] This paper is about taking attendance and saving time and efforts therefore he used relational database management system in real time with appropriate security measures to access, manipulate and represent the data on the basis of the unique RFID tags, which gets fast and easily scanned on the RFID reader. Their system consists of hardware and software with most trending implementation of a lightweight MQTT protocol in IoT technology; designed to take an attendance on the basis of RFID technology with Node MCU firmware.[8] focused on GSM based student attendance management system which required to assist the faculty and the lecturer for the time-consuming process. For that purpose, GSM/GPRS (Global System for Mobile communication/General Packet Radio Service) based student's attendance management system using RFID (Radio Frequency Identification) was a much more convenient method to take attendance. The whole process was controlled using the microcontroller.[9] They have used face detection techniques to solve the attendance management and monitoring issues. Online Attendance Management System is the implementation of Internet of Things through Raspberry Pi and face detection

techniques in schools and institutions. In their strategy the camera was fixed in the classroom, the faces were detected and then recognized with the database and finally the attendance was marked. [10] aims to investigate the viability of using IoT for the purpose of Students' Safety and Attendance Monitoring in Iraqi Primary Schools. A quantitative data collection using questionnaires with 113 working staff from Iraqi primary schools was conducted to identify the current challenges of student monitoring and the viability of using IoT to address those challenges. The results of the questionnaire analysis show that the use of IoT could improve the safety environment of primary schools by being able to monitor student attendance accurately in real time. [11] Their system was used to take attendance for students in school, college, and university. It also can be used to take attendance for workers in working places. Its ability to uniquely identify each person based on their RFID tag type of ID card makes the process of taking the attendance easier, faster and secure as compared to conventional methods. Students or workers only need to place their ID card on the reader and their attendance will be taken immediately. With the real time clock capability of the system, attendance taken will be more accurate since the time for the attendance taken will be recorded. Their system was connected to the computer through RS232 or Universal Serial Bus (USB) port and stored the attendance taken inside the database. [12] proposed that, RFID is used in education for student's attendance monitoring system, by using Internet of Things (IoT) and Cloud technology, it will produce a real time attendance monitoring system that can be accessed by various parties, such as lecturer, campus administration and Parent. [13] This work introduces a new paradigm of monitoring student attendance using Radio Frequency Identification (RFID) based on the Internet of Thing (IoT). Educational institutes are concerned about student irregular attendance. Truancy can affect a student's overall academic performance. RFID based attendance systems using IoT is one of the solutions to handle the problem. The proposed work comprises two most popular trends in technology research; IoT and RFID.

2) Health Monitoring Based

[14] The system uses Temperature and heartbeat sensors for tracking patient's health. Both the sensors are connected to the Arduino-uno. To track the patient's health microcontroller is in turn interfaced to a LCD display and wi-fi connection to send the data to the web-server (wireless sensing node). In case of any abrupt changes in patient heart-rate or body temperature alert is sent about the patient using IoT. Their developed system also shows patients temperature and heartbeat tracked live data with timestamps over the Internetwork. The work done by them is effective and very useful for both patient and doctor. [15] Their proposed system monitors the heart rate and other such data of the patient's body. For example, heart rate was measured through a Photoplethysmography (PPG). A transmitting module was attached which continuously transmits the encoded serial data using the Zigbee module. A receiver unit is placed in the doctor's cabin, which receives and decodes the data and continuously displays it on a User interface visible on PC/Laptop. In case the doctor is not in his chamber, the GSM modem connected to the system also sends a message to all the doctors of that unit giving the room number of the patient who needs immediate care. [16] Their work proposes the use of the Powerline network as an alternative network to the realization of IoT systems. [17] This technology uses a medical sensor creating a photoplethysmogram from which they detect the oxygen saturation level and variations in blood volume in the tissues. The analog waveform was further processed using hardware filters to obtain heart rate and SpO₂ values. These values were digitized using the A2D converters in the ATmega32 based SoC and were constantly stored and uploaded to the cloud. In case the cardiac values were found to deviate away from the set thresholds, an automated emergency alert system was triggered which uses GSM for automated SOS calls, GPS to track the patient's location and GPRS to make the system truly mobile and wireless. Also, a patient can self-trigger the same alert system by using Google voice assistant on their smart-phone. [18] Their system consists of two parts, a portable measuring device and an android application. The portable measuring device can measure the heart rate and body temperature. The device uses an Arduino board that connects to the heartbeat and temperature sensor. It shows the heartbeat and temperature readings on LCD displays and at the same time sends them to the Thing Speak IoT platform in real-time via Wi-Fi. When both readings were uncommon, the system sent the notification to the Line application. [19] The proposed method is used to measure the physical parameters like body temperature, heart beat rate, and oxygen level monitoring with the help of biosensors.[20] Their work focuses on the usage of intelligent systems in classrooms for recording student's attendance that are linked to RFID technology, face detection mechanism and also based on the location of student's registered mobile device. [21] In their research work they were monitoring the heartbeat rate and body temperature of a patient. They have used an Arduino-UNO board as a microcontroller, in which an 8-bit At mega 328 microcontroller is inbuilt. LM35 was used for sensing body temperature and DIY pulse sensor XD-58C was used for heart beat rate measurement. EP8266 Wi-Fi module was used to transmit the patient's

observed data for the Arduino uno to the server. The BLYNK application was used for IoT purposes. [22] An implementation of an affordable medical technology health sensor system is developed and demonstrated to measure blood saturation levels (SpO₂), heart rate and body temperature simultaneously. The embedded system is based on the Arduino platform due to reliability and plug and play capability. The proposed pulse oximetry sensor uses spectrophotometry to calculate the ratio of oxygenated haemoglobin to deoxygenated haemoglobin which then is used to calculate the percentage of oxygenated blood levels. The accuracy of pulse oximeters is enhanced using light emitting diodes driver circuits, sample and hold circuits thus that a variable baseline can be established for different skin tones including the finger width where the measurements are undertaken. The embedded sensor system was designed to monitor SpO₂, heart rate and body temperature and display the obtained results on an LCD. [23] This study mainly focused on the development of SpO₂ and HR measurements that will allow the monitoring and estimation in real time of the user's state and health related to the established parameters. [24]

This paper describes the development of heart rate and oxygen saturation monitoring systems using the Internet of Things platform. Measurement of heart rate and SpO₂ is done by pulse oximeter method using sensor module and Raspberry Pi. The Arduino based sensor module collects, calculates and sends heart rate and SpO₂ data to Raspberry Pi for further analysis based on normal value reference tables to detect abnormalities. Further heart rate, SpO₂ and its abnormality status were delivered to the Things board using MQTT protocol. The results show that the system functioned as expected while Photoplethysmogram signal (PPG) was presented as graphic on Things board dashboard. [25] Beer's Law was used to implement the Heart Beat Rate, and SpO₂ detector used to measure SpO₂, heart rate and temperature range. Two different light wavelengths (Red Led and Infrared Led) were used to measure the actual difference in the absorption spectra between HbO₂ and Hb. The SpO₂ probe is placed on the person's finger and the other end with a microcontroller to calculate the number of pulses and the amount of the SpO₂ present on their body. The measurement range of the SpO₂, Heart Beat Rate and Temperature were viewed via OP APP (Outpatient Android Application) and the same was viewed by the doctor on the other end through the cloud. [26] The system was based on wireless body area networks. WBAN also known as Body Sensor Network (BSN). That is basically a network of wearable computing devices. Usage of the GSM module has become very popular nowadays. It is used to establish connection between a GPRS system and a computer. GPRS is used for data transmission and reception applications. It could be done with a transceiver which is used for data sending and receiving. But in their system, they used a GSM module which is GPRS enabled because of its area coverage. [27] Their research was carried out to provide and develop a specialized framework for an IoT-based smart health system by focusing particularly on interoperability problems. Based on different technology standards and communication protocols, the specific requirements of the IoT system were analysed and served as a basis for the design of the framework. The approach ensures that the specific expectations of the proposed model can be fulfilled with confidence. The experiments showed interoperability between different IoT devices, read in various variables and were displayed on LCD locally. [29] IOT based monitoring system was proposed where the patient's condition was regularly monitored and communicated through a cloud-based platform. To execute this, Arduino Uno, ESP8266, SEN1174, LM 35 and the think speak platform were utilized. One of the objectives of their research work was to design and develop low cost and low complexity prototypes that can ensure high quality monitoring, high level of security through wifi modules and secured communication through cloud databases called thing speak. [30] This system monitors patients pulse rate, vital sign and saline liquid level (if any). In case threshold is reached, their sensible device informs doctors or caretakers and kindle corrective actions to save lots of patient's lives. The attention blink device Heartbeat device and temperature device, Vibration device were used to monitor the health of a patient.

standards, and protocols in a smart health system could be achieved using a specialized gateway device and that different web technologies could be used simultaneously in constrained and Internet environments. [28] The ECG shield and LM35 were generating analog output, so they were interfaced to the analog pins of Arduino Mega. Using the Pulse oximeter, they got the Pulse rate and BP. All the above readings (ECG graph, Blood pressure, Heartbeat, temperature) were read through respective pins and were stored in various variables and were displayed on LCD locally. [29] IOT based monitoring system was proposed where the patient's condition was regularly monitored and communicated through a cloud-based platform. To execute this, Arduino Uno, ESP8266, SEN1174, LM 35 and the think speak platform were utilized. One of the objectives of their research work was to design and develop low cost and low complexity prototypes that can ensure high quality monitoring, high level of security through wifi modules and secured communication through cloud databases called thing speak. [30] This system monitors patients pulse rate, vital sign and saline liquid level (if any). In case threshold is reached, their sensible device informs doctors or caretakers and kindle



corrective actions to save lots of patient's lives. The attention blink device Heartbeat device and temperature device, Vibration device were used to monitor the health of a patient.

PROPOSED SYSTEM

Since, none of the surveyed paper and their authors worked on the combination of both the topic i.e. Attendance and Health Monitoring system therefore it was a great opportunity for us to make a unique system which is "RFID based attendance and Health monitoring system" which will help numerous organisations.

III. CONCLUSION

RFID Based Attendance and Health Monitoring System is a unique way to monitor the attendance and Health in real time and according to the literature survey the hardware and technology which will be used to accomplish this project are Arduino Mega2560, IR temperature sensor, Pulse Oximeter MX30100 sensor, and Node mcu ESP8266 module, for uploading data to cloud IoT and Wi-Fi will be used. Arduino programming will be done on the Arduino IDE platform and the programs will be in C language. This will conclude the overall work which needs to be done to accomplish the result.

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