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Fingerprint Based Automated Hand Wash Record System

Aditya Dorlikar[1], Tushar Bhowate[2] , Sakshi Lakhapati, Kshitija Bhivgade, Priyanka Awarkar

[1]*(Electronics & Telecommunication, Jhulelal Institute of Technology, India)*
[2]*(Electronics & Telecommunication, Jhulelal Institute of Technology, India)*

Abstract: *Arogya is a Sanskrit word that means "overall well-being" and "health of mind, body and spirit." It means living a healthy life without disease and having complete health in mind and body.*
After a difficult age, we were told that our hands should be washed after using the bathroom or before cooking meals. At present, we know that it is hygienic, correct, and important, with the necessary hand washing technique. Arogya is a system which uses fingerprint sample as a biometric unit and matches it with the existing ones in the memory then starts the process of washing hand and as soon as the process of hand wash gets complete the entry of that particular name will be stored in the XAMPP database. With the help of this system, any organization who is concerned about the hand hygiene can keep records of their hand hygiene. The technology used to build this system is Embedded C and PHP for front end and SQLite for database. The front end of the administrator in purely handcrafted by using PHP, HTML and CCS. Which will give a corporate feel to the user.

Keywords: *Automated hand wash system, biometric hand wash record system, serial communication, biometric data storage by NodeMCU on XAMPP.*

I. Introduction

The Arogya is a system, which can be, installed on places like hospitals where there are many chances of spreading of hand contagious diseases and place where hand hygiene is very necessary like food industries where there is a chance of adulteration. In this paper system we have used the technology of fingerprint scan to scan and store the fingerprint samples, which will be used to match the incoming fingerprints and then follow the entire process of hand wash. This system can also be used as the attendance system whereas conventional systems are only used for attendance purpose.

Hand Hygiene compliance by workers is extremely important in health care settings like hospitals, clinic and food industries. It is one of the most effective tools in preventing healthcare associated infections in hospitals and adulteration in food industries. Washing hands properly is the cornerstone of hand hygiene. In this paper an automated high-level design approach is introduced. We are using XAMPP local host server for the storage of data and also made a PHP web page for retrieving the data from the local host server. However, adherences with hand wash practices among health care workers are significantly low compared to the requirements, and depend upon a number of factors like demographic characteristics of the health care workers, accessibility of hygiene product supplies, workload, and individual cognitive factors.

II. Problem Statement

Apollo hospital stated a problem statement on Smart India Hackathon 2019, stating that their staff is having an improper hand hygiene and they also stated that they hired an individual to observe the staff during their hand wash and report to the administrator in case of any improper duty of hand hygiene.

III. Literature survey

According to 11-10-2010, many people do not practice this habit as often as they should even after using the toilet. Throughout the day, the accumulation of germs on their hands from a variety of sources, such as direct contact with people and contaminated surfaces [1]. If one does not wash hands frequently enough, infection of eyes, nose or mouth may occur. In addition, germs can spread to other sites by touching them or by touching surfaces that they also touch, such as doorknobs.

Furthermore, infectious diseases that are commonly spread through hand-to-hand contact include the common cold, Flu and several gastrointestinal disorders [G.I.D], such as infectious Diarrhoea. While most people will get a cold, the Flu can be much more serious. Some people with the Flu,

partially adults and people with chronic medical problems can develop pneumonia. The combination of the Flu and pneumonia, in fact, is the eighth leading cause of death among Americans [6].

Also Bartle and Biswas, as well as, Derry, reiterated that health and hygiene education in schools may increase children's knowledge about hand washing but rarely translates into children practicing hygienic behaviours since they may lack these facilities even at home [7].The standards clearly state that, hand washing basins with clean water and soap should be provided in each toilet block and be supervised by a member of staff to ensure proper hand washing by the schoolchildren (WFP/UNESCO, 1999).

Another study conducted by the Ministry of Health (MOH), a program surveying rural households in the northern parts of Ghana, found that hand washing practices were also poor. New hand washing facilities, in addition to awareness and knowledge about proper hygiene, have led to some changes in behaviour and attitude, yet the prevalence of hand washing remains low in this region.

Besides, Mayo Clinic staff (Oct. 16. 2007) observed that inadequate hand hygiene also contributes to food- related illness such as salmonella and Escherichia coli infection [8]. According to the Centre for Disease Control and Preventive (CDCP), as many as 76 million Americans get a food-borne illness each year. Of these, about 5,000 die because of their illness. Others experience the annoying signs and symptoms of nausea, vomiting and diarrhoea.

IV. Methodology

Here we have used two microcontrollers namely Arduino UNO and NodeMCU. The fingerprint scanner will only be connected to one of the microcontroller and that one is the Arduino UNO board. The fingerprint scanner will enrol all the staff of the applicants and then assign them an id. The Arduino board is programed in a manner that the respected ids will be given the name same as the name of the applicant. Here all the work of the Arduino board is done and the work of the second microcontroller i.e. NodeMCU starts from here.

4.1 BIOMETRIC VERIFICATION

Protection is available in many ways and the use of mental characteristics. They include signalling, face observation, fingers, recognition of speech and limited.

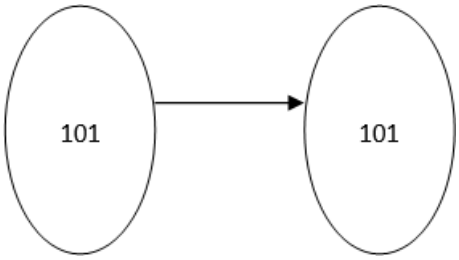

Fig.1 Verification: One to one matching

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V. Serial Communication

The transmission of data between two microcontroller by using hardware or software serial is called serial communication. Many microcontrollers have one or more than one serial ports by which they can communicate with one or more than one microcontroller serially.

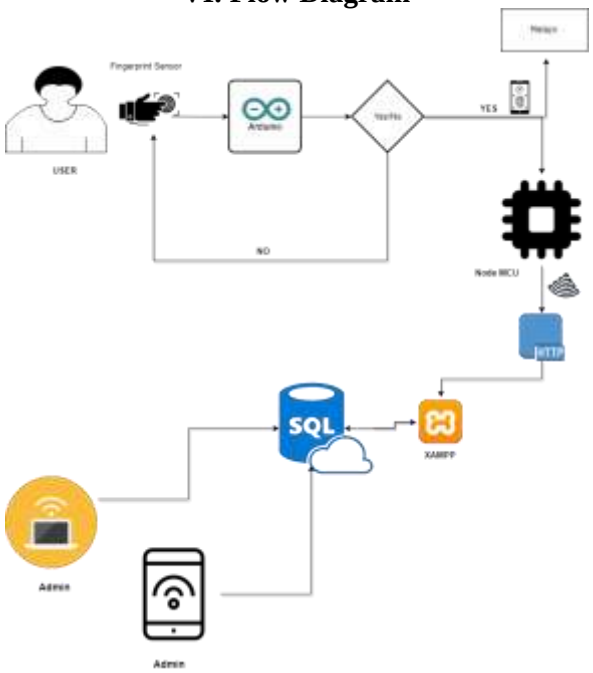
Arduino UNO and NodeMCU both have only one serial port and can only communicate with one microcontroller [2], [9]. In addition, we only need one serial communication so we chose it to make it pocket friendly.

Fig.2 Serial communication between Arduino & NodeMCU

The NodeMCU is programed in such a way that as soon as the data is available on the serial of the micro controller it will send a HTTP request to the predesigned PHP page and request for a response via its Wi-Fi module. Moreover, the HTTP request consists of the name of the fingerprint matched and the PHP code will send a request to the XAMPP server for saving the data in database [3].

For the retrieval of the data from the database, we again used PHP as a front end, which will be acting as a user interface for the administrator. The user interface will be consisting in a tabular format, with a proper format [3], [4].

VI. Flow Diagram



- From the bellow figure, it is evident that an enrolled user interacts with the fingerprint module of the main module of the system.
- The user will insert his finger on the fingerprint module, and if the fingerprint is matched, the Arduino board will pass a string of him/her name to the NodeMCU via serial communication and it will also turn on the combination of the relays for the process of hand wash [5], [2], [9].
- Here at this stage NodeMCU will be continuously reading the serial for the value. As soon as the string comes in the serial of the NodeMCU, it will pass a HTTP request [3].
- The HTTP request will be consisting of a string, which is passed by the Arduino board on matching of the credentials of the users.
- The PHP code will pass a SQLI query, which will store the Name (String) into the database.
- The above image shows the code for inserting the data of the applicant into the database.
- All the data, which is being stored into the database, get stored in a tabular format. This is also called database table [3].

- The database tables are classified into two parameters, which are rows and columns.
- To access the database you have to use a function called PHPMyAdmin, which runs on localhost of the system. The local host of the system runs on an assigned IP address. Which is basically 127.0.0.1 [3], [4].

In addition, these tabular values will be displayed on a webpage, which will be our final output. Which consist of a search bar to know the details of a particular.

VII. Conclusion

In this paper, we have overcame the problems, which were faced by many hospitals. Mainly the problem of not getting the record of the staff who are washing their hands. Amongst of all conventional hand washing system here we demonstrate the feasibility of real time biometric tools and data storage with the help of XAMPP server and HTTP request using serial communication of NodeMCU & Arduino. The proposed technique is used to record any data sent by the Arduino to the NodeMCU Serially. Our plan significantly reduces the cost of a biometric attendance system. The admin can view the logs of the system through any laptop or his smartphone which makes our system convenient than the conventional systems.

VIII. Future Enhancement

Extending this application's approach, we can also setup a digital camera module which would be able to scan and recognise the faces of an individual by using facial recognition technology and starts the process of the hand wash. Which can be installed in any firm, college, school, offices and public places? In this the whole visitors or workers of the firm have to append their face id credentials and the whole data will be logged into the database

Necessary in public places or places where security is must. It can be also upgraded to use more advance technique for improving security in our day to day life. It can also be upgraded to the extent where it can also detect the criminals by using facial recognition technology.

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