

RFID-Enabled Smart Bracelet for COVID-19

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Abstract: Social Distancing is the new normal. The key is to keep 6 feet of space between yourself and others. While this might seem like a daunting task, this can be achieved through smart wearables. Wearable technology impacts the daily life of its users. Our goal is to develop a smart band which will help in achieving that with sensing the opposite tagged-band within Six-feet and giving out signals to the end-user as a vibration and blinking of a Red LED.

Keywords – RFID, DFSS-R, Bluetooth, Cloud Computing, Mobile Application.

INTRODUCTION

Radio frequency Identification (referred as RFID henceforth in this paper) has streamlined many processes in asset management and tracking, and in the last few years it has found its way to the healthcare field. It is used to track medical equipment, patients, medication, etc. The goal of this project is to design and implement a smart bracelet with the use of RFID, Bluetooth module and Sensors to help promotion of Social Distancing.

"Why should I keep 6 feet distance with my close ones as they are not affected by the virus and nothing will happen to them" - This is a very common human behavior to ignore the facts but at the end it's for the same loved ones and the humanity that social distancing must be followed. As we

all aware about the deadly virus which has affected many lives all around the world.

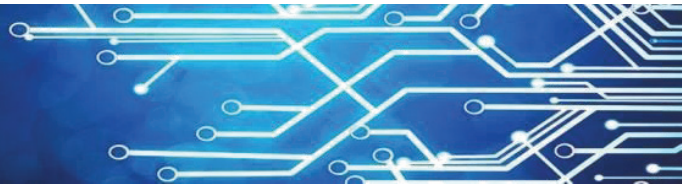
So, the objective we are focusing on is to maintain a social distance with the help of a handy wearable device.

BACKGROUND REVIEW

One of the key reasons for heavy spread of COVID-19 is due to Human Communication in a physical form whether it is direct or indirect. As you can see it is spread through a mere handshake also. And externally through sneezing, etc. The symptoms can be identified with our normal eye vision or with a tool as well but that would not be an appropriate way of identifying. So, why not use a RFID technology embedded in a bracelet? The methodology that the proposed work will be focusing is DFSS-R introduced by none other than Dr. Jones. It has three Ps in it: Plan, Predict and Perform.

PROBLEM STATEMENT

The primary problem is social distancing and other problems follow. Some of the result which could be achieve are as follows: Firstly, there will be awareness spread among the people for keeping safety measures and following the norms given by the government. Secondly, it will help in



reducing COVID-19 cases as one of the main reasons for the virus to spread is human communication in direct and indirect forms (coughing, sneezing, etc.). And lastly, these smart bracelets can change the way of in the working environment. If an employee tests positive for COVID-19, a company can immediately obtain a list of all devices that crossed the path of the sensor used by the affected employee, as well as the interaction time. With this information, the firm has a decision-making tool to place employees in security isolation. It also acts helps in carrying out selective quarantine to ensure the safety of employees, allowing the company's production not to be interrupted and monitor the health of other employees.

RESEARCH OBJECTIVES

Research required to develop an optimal solution for tracking the RFID signals synching along with the smart phone that ensures the feasibility and helps in promoting social distancing.

Developing a chip or a module that has RFID tag, Bluetooth module, proximity sensor and if needed GPS module would be one of the key criteria. Using modern web technologies like React-Native Framework for application development (IOS/Android) and feeding the real-time data into the Cloud using Amazon Web Services (referred as AWS henceforth in this paper).

An RFID system is made up of a reader or interrogator and a transponder or tag. For our purpose, the tag will be passive i.e. will

not contain a battery and will get its power from the reader.

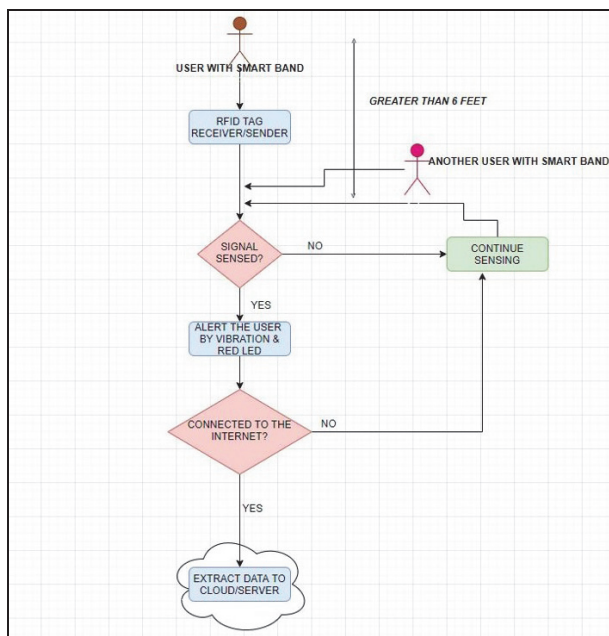
METHODOLOGY

Design for Six Sigma-Research (referred as DFSS-R henceforth in this paper) methodology is one of the key methodology used in the proposed work as the real-time feedback will be taken from the customer/workers in alliance with creating a unique design which appeals a normal human being and which is also small and handy. Concerning the cost, the idea is to invent a cost-effective wearable smart band with RFID in it. The project will be divided into phases like the seven phases proposed by Dr. Jones in his book, “Quality Management for Organizations Using Lean Six Sigma Techniques” [1].

Planned Experimentation:

1. A user wearing smart bracelet senses the RFID signals.
2. If the distance between the other person is less than six feet, the signal is sent to the receiver.
3. The signal is sensed, and the bracelet starts vibrating along with led blinking and a small beep sound.

4. If the bracelet is connected to the Internet, the real-time data would be sent to the internal storage system.
5. The database would be comprised of: NAME, DATE, TIME, Unique-ID, and LOCATION (if used GPS).
6. The generated database would be then deployed into the Cloud server services like AWS, AZURE, IBM, etc.



RESULTS

With the help of Smart Bracelet, it is expected to profit people as it will detect one or more sensors within its vicinity thus providing a safety alert buzzer/alarm along with vibration with Red LED blinks. The data collected by the device is then sent via

a Wi-Fi or Bluetooth network to an internal storage system, which can be accessed so users can analyze all events recorded by the sensors. This could be further deployed on the cloud services so that the data could be used for public monitoring systems thus helping the

government to analyze and control the spread of the COVID-19. Initially, it could be used with the community of workers and company colleagues so that the accuracy could be analyzed statistically and hence optimized it for the use of large-scale purpose.



Figure 2. Expected Smart Band



Figure 3. Data Visualizations

Log In

OR

Log in with Facebook

Forgot password?

Don't have an account? Sign up

Get the app.

Download on the App Store

GET IT ON Google Play

Figure 4. SignUp/Login

ID	NAME	AGE	DATE	TIME	LOCATION	PICTURE	RESULT
1	Sarah	43	7/8/2020	4:02:56 P.M.	Park Avenue Street	sarah.jpeg	Positive
2	Robb	38	8/8/2020	1:14:10 P.M.	M.G. Road	robb.jpeg	Negative
3	Jack	56	9/8/2020	6:45:12 P.M.	301 St Cross Road	jack.jpeg	Positive

Figure 5. Database Created

CONCLUSIONS

To sum up, the pandemic’s deadly effect can be controlled and reduced with the help of this smart band. With its convenient size and price, common people will be able to afford

and adapt it into their daily lives thus reducing the number of COVID-19 cases and ensuring social distancing according to the government’s guideline.

REFERNCES

1. Jones, Erick. Supply Chain Engineering and Logistics Handbook: Inventory and Production Control. 1st ed., CRC Press, 2019.

2. “COVID-19 United States Cases by County.” Johns Hopkins Coronavirus Resource Center, coronavirus.jhu.edu/us-map. Accessed 7 Aug. 2020.

3. Siedner, Mark. “Social Distancing to Slow the U.S. COVID-19 Epidemic: Longitudinal Pretest- Posttest Comparison Group Study.” MedRxiv, 1 January 2020, www.medrxiv.org/content/10.1101/202.0.04.03.20052373v3.

4. Aarogya Setu Mobile App.” MyGov.In, www.mygov.in/aarogya-setu-app. Accessed 7 Aug. 2020