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HELPING HAND FOR FRONTLINE WARRIORS OF COVID-19

Mansi Kashyap[1], Neha Yadav[1],
Shuchita Saxena[2], Pankaj Bhardwaj[2]
[1]Student, [2]Assitant Professor,
Electronics and Communication Engineering Department,
Moradabad Institute of Technology, Moradabad.

ABSTRACT

Presently the world is suffering from the Covid19 pandemic and the Frontline corona warriors who are fighting against this are facing many problems. The major problem in the present scenario is that the symptomatic patients generally breakout from the quarantine centres and hospitals. As this virus is communicable and spreads from coming in contact with the positive-tested patients of COVID-19. It has been an asserting work for our nursing staff to monitor and take care of every patient separately. So, being an engineer, a solution for these two problems faced by medical staff in the present time is given in this paper. This paper describes our project which would be in two modules. Module I would monitor the patient's health and safety issues. Module II will keep an eye on the patients if they try to ran from an isolation ward. Module I would tell us about the temperature of the patient's body. It will also detect if the patient has fallen due to dizziness and if he/she is in dark. There would be a panic button in the device which patient could press it they need some help or if they are not feeling well. Device will send an alert to the authority if patient falls, is in dark, presses the panic button or a rise in temperature is detected. Further another module have the feature that it would track the patient if they escape from the isolation wards and will locate the area of the patients to the responsible authorities, police and watchman of Hospital.

KEYWORDS *— COVID-19 pandemic, Wearable Device, Arduino, Safety, Monitoring, tracking, High Temperature, Panic button, GPS, GSM, GPRS, GSM mobile communication, SMS based, Sensors, Security, Laser, RFID,NRF.*

I. INTRODUCTION

The world is facing an unprecedented public health emergency. Our healthcare organizations are overwhelmed by the load of looking after a huge number of patients. So, this hour of need, motivated us for making this monitoring and safety device. As the number of cases is rising, the most vulnerable section will be the medical community. It would help in the increasing need for safety of our nursing staff in current times and helping our frontline warriors. As there are possibilities that patients may escape from the wards and infect people around them. The number of nursing staff and doctors becoming vulnerable to the corona virus is increasing. This would be a very big loss for our nation if these angels would get trapped by the pandemic COVID-19. The people who are at the highest risk of getting infected are the corona warriors who are serving the nation without any fear of losing their lives. So, as an engineer and responsible citizen it's our moral duty to safeguard, support and cooperate with them.

This device can play a convincing part in dealing with a populous number of patients. It focuses on providing the position or location, body movements, temperature, cases of fainting etc. of the COVID-19 sufferer using GPS, GSM and some sensors. Different safety devices based on Wi-Fi, Bluetooth and Internet as communication mode are available but all these systems have their own limitations. Wi-Fi and Bluetooth based devices have a major problem of limited range. Also, they are an unreliable means to communicate as there are connectivity issue of Internet in buildings and Congested areas. Therefore, it is intended to use SMS as the mode of communication between the

patients and the doctor or other responsible authority. Many of the monitoring devices available today are not wearable. This is a major disadvantage of them as there is a chance of getting them dropped.

II. How These Devices Works?

Data in the raw form is always emitted in the environment by the sensors used in devices which tell the user about the working state. Microcontroller acts as a common platform for sensors to dumb their data and also in a common language so that all components can establish connection. Data emitted from various sensors is collected and then sent to platform securely. Microcontroller platform collects the data from various sources and perform analytics. Valuable information from that data is extracted as per requirement. Finally, the results are shared with other components and users for further processing. It is the simple process of taking Data from environment and then performing Logics on them. After performing Logics, Output is shared with the user. Figure 1 illustrates the simple flow diagram of working of IoT.

Fig. 1 Working of Devices

III. Basic Block Diagram

A. Module I

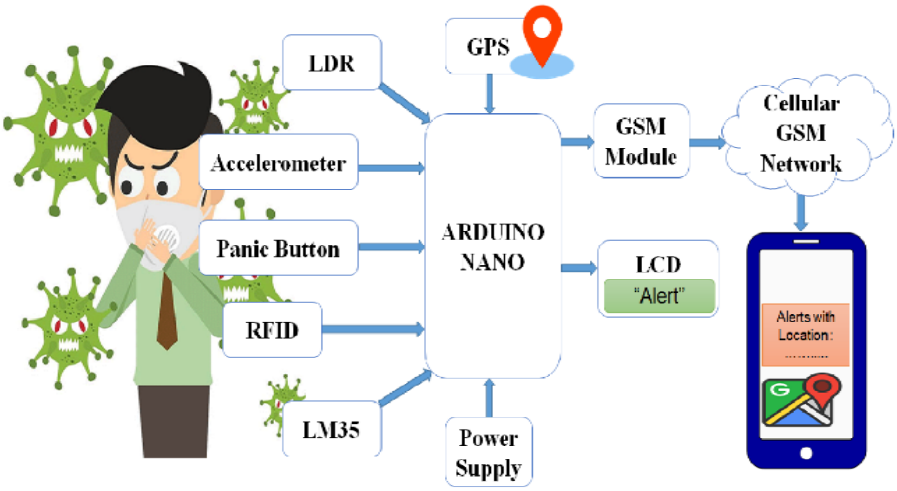

Figure 2 Basic Block Diagram of Module I

Figure 2 demonstrates the module's basic block diagram. The choosen communication mode is SMS for this system which sends on the exceeding of specific predefined threshold value. It employs a GSM module which is interfaced to Arduino Nano.Arduino is connected to required sensors.Arduino collects raw data from the sensors which is converted to useful information and location from the GPS connected to it.This gives a required output to the medical staff on their phones in form of a text message. Specific threshold values set for sensors like temperature,force resistive sensor, photoresistor and accelerometer, if the device exceeds the predefined threshold values or if the device gets exposure to abnormal condition then those values are compared by arduino. The Arduino compares the obtained values with the predefinrd threshold values, if they exceed the threshold value, it generates an alert in form of SMS through GSM. The alert messages are delivered to specified Users or wearer.

B. Module II

It comprises of a Microcontroller (Arduino UNO) that is connected to a RF Module. The RF Module Receiver detects the information signal transmitted from the wearable. When the patient tries to escape and crosses the LASER beam an alert signal is produced. Buzzer is turned on and message is sent to the authorities. Basic block diagram of module II is illustrated in Figure 3.

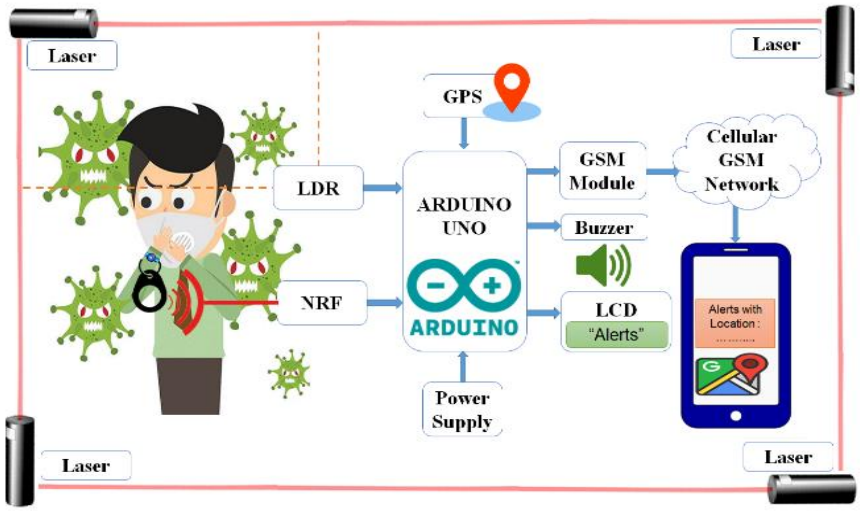

Figure 3 Block diagram of Module II

IV. HARDWARE REQUIREMENTS

A. Arduino Nano

Arduino nano is a concise and breadboard-friendly microcontroller mount based on ATmega328 (Arduino Nano 3.x). Its weight is just 7g. It is used because device needed to be small, lightweight wearable device for sufferers. Moreover, the sensors used in device are analog sensors and it consists of 8 analog input pins. There are 22 digital input output pins (6 of which are PWM). It operates at 5V with a clock speed of 5 MHz

B. Sensors

In our project uses three sensors which are LM35, LDR and Accelerometer.

a. LM35 is used to detect the high temperature of the patients. It measures temperature and has an analog output voltage. The temperature is proportional to the analog output voltage. The output voltage generated can be converted into Centigrade (Celsius).
b. LDR (Light Detecting Resistor) or photoresistor is used to detect the darkness i.e. if patient is in dark it will generate an alarm and alert the doctors or nurses. LDR is a light sensitive device whose resistivity changes when light falls on it.
c. Accelerometer (GY-61 Module) is used to detect the fall of patients. It sends an alert if the patient falls due to sickness or dizziness. It is a 3-axis accelerometer sensor module based on ADXL335.It measures static and dynamic accelerations.

C. GPS

NEO-6M global positioning system (GPS) module is a widely used, prominent, economical and a good performance yielding GPS module. It is comprised of a ceramic patch antenna, backup battery and on-boarded memory chip which is able to integrate conveniently with microcontrollers of various

extensive ranges**.** It alerts the authorities by sending SMS and providing the exact location of the patients.

D. GSM

A GSM module which is also known as GPRS module can be in a form of chip or circuit used to build a connection between a mobile device or a computing machine and a GSM or GPRS system. It runs on frequencies 900/ 1800 MHz It is an ultra-compact and steady wireless component and automatically searches these two bands.

E. RFID

RFID (radio-frequency identification) enables digital data to encode into RFID tags or smart labels that can be captured by a reader by means of radio waves. RFID tag is composed of an integrated circuit and an antenna.

F. NRF

NRF24L01 is a single chip wireless radio transceiver module which operates in the 2.4 – 2.5 GHz ISM band. NRF is used as receiver here. It is used to communicate data wirelessly which is specially designed for ultra-low power applications and it can be configured and operated through SPI(Serial Peripheral Interface) Protocol. Data can be transmitted up to a scale of 2 Mbps.

G. LASER

Laser fencing is made using the four lasers in the corners of the room mainly at the doors and windows. When the patient will try to cross this laser light beam would get reflected and will be received by LDR, which in turn sends the signal to the microcontroller. Microcontroller uses NRF to receive the signal from RFID and sends the location message.

V. SOFTWARE ASPECTS

Arduino IDE

Software programs mainly known as sketches can be created on a computer with the help of Arduino Integrated Development Environment (IDE). IDE provides us the platform for writing and editing the code and converting it into the instructions that are easily comprehended by Arduino hardware (Arduino). IDE transfers the converted instructions to the Arduino board which is known as uploading. Programming in Arduino is very simple and easy to understand. Basically, it is derived from C language which is the most globally used software language. Also, because it is easy to understand it can be right away start with a few basic programs without much going into details. Also, small projects can be made and can interface various components like motors, sensors, actuators very easily through Arduino.

VI. RESULTS

The device is tested and it works well without any major flaw. Both the modules run efficiently and are able to locate and monitor the patient's condition. Proposed device detects the high temperature of the patient properly. Device sends the proper alerts to the responsible person in form of SMS with the location of the wearer. It would be helpful in the situations of Pandemic like COVID-19.

VII. CONCLUSION

This paper presented a device which would be a warrior for our medical teams to tackle load during this situation of pandemic. It would help in monitoring patients without getting in contact with them which will prevent medical community to keep them safe from corona virus. This would be helpful for tracking the patients who ran away from the isolation wards and will also help in knowing their travel history. It will alert the staff if the system detects a sudden rise in temperature or if patient

faints. There is panic button which patient could press and call the nurse or doctor for their help if they feel sick. It is SMS based system so reliable communication is possible.

VIII. FUTURE ASPECTS

The problem with the already existing devices was limited range as they are either Wi-Fi based or Bluetooth based. Further in future it can be connected through any IOT platform which will save the data on its database. A user-friendly app can also be built. Moreover, with the use of some sensors it could be made non-removable device. Features like pulse rate detection, music playback, oxygen level check, device removal alert can be added using the sensors.

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