IoT Based Scanner For Corona Detection

Pratnadeep Biswas¹, Kankana Ganguly², Sumanta Chatterjee³

Department of Computer Science and Engineering, JIS College of Engineering, Kalyani, West Bengal, India.

Corresponding author’s email address: sumanta.chatterjee@jiscollege.ac.in

Abstract. Human civilisation is observing a very strange and serious time fighting an invisible disastrous enemy, the NOVEL COVID-19 corona virus. Initially observed in the Wuhan province of China, its symptoms range from mild illness to pneumonia. Here we design an IoT based device which can detect the subsistence of this virus presumably based on certain framework of body components. In this context we summarized the latest research process of epidemiology, pathogenesis, clinical sensing and discussed some scientific advancement to combat the epidemic novel COVID-19. This paper proposes a design of an IoT based device which can detect the subsistence of this virus presumably based on certain framework of body components. Presence of corona virus in human body may be detected by measuring an individual’s body temperature with the help of temperature sensors. RQ or respiratory quotient will be used as another determining principle to detect corona virus. Analysis of blood samples also tells us the difference between an infected and a normal sample. From analysing the blood sample we can easily determine the total leukocyte count whereas an infected person can have an abnormal leukocyte count. We can access the data over the wifi and over the internet. Some parts of the device like the breathalyzer will be sanitized automatically and injection needles will be loaded automatically after one use and is convenient for proper detection as it analyses the three components of a. So commercially it would be economically reliable product.

Keywords: Temperature, Covid-19, IoT, CBC, RQ.

1. Introduction

A corona virus is a sort of virus that can make ailment in animals and individuals. The function of normal body is disturbed by the action of such virus which breaks into cells within their host and exploits them to replicate itself. The name of Corona virus has been adapted from Latin term ‘corona’, that means crown, since they are encompassed by what look like royal crown of a spiked shell shape. The World Health Organization (WHO) officially announced that a new virus had been identified which then is called by 2019-nCoV on January 2020. The virus was recognized as part of the corona virus group, which involves SARS and the other known colds. The first reported case was from Wuhan, China and has infected 7,711 people and 170 reported deaths in China before corona virus was declared as a global pandemic which produces a sickness which is not defined as noticeably COVID-19 that has diffused to a minimum 141 nations and regions, causing death over 5,700 individuals around the world. Someone who is infected by corona virus will be showing some very known common symptom such as fever, dry cough, and tiredness or some cases, infected person will feel pains, itching in throat and diarrhea. However, many people get in touch with the virus do not show any symptoms and do not feel uncomfortable. Around 80% of individuals infected by COVID-19 can get recovery without acquiring particular treatment, but it is so dangerous for older people or someone with develop serious illness which the probability for them to get serious
illness and develops difficulty breathing are higher. Right now, no effective vaccine for COVID-19 was produced or particular medication for treatment such virus was developed. However, potential vaccines and some particular medicine treatments are still under investigation and now being subjected to comprehensive test by leading medical research centres. Further, extraordinary efforts are coordinated by WHO to develop and produce effective vaccines and drugs to avoid and treat COVID-19. As the reported case of death and infected people keep increasing, many nations have performed lockdown to minimize the spread impact of corona virus. They also try to identify the infected among crowd by screening the temperature in public places using infrared thermometer. But the usage of the infrared thermometer gun itself is still lacking because it might not cover all of people and time-consuming. That way also can lead to the spreading virus widely because the health officer has to do it one by one through a lot of people queuing when one of them has probability to infect people around. To prevent this flaw, an alternative technology is needed. The internet of things (IoT) has been adopted in a smart city as infrastructure's key since the introducing the concept of a smart city. The big research efforts that are being performed presently are a confirmation on prosperity monitoring by remote sensing is based on IoT. The interconnection between the physical objects or things that are attached with sensors and software to gather and deliver information among them and primary servers with utmost least human mediation. IoT healthcare is modern realistic worldview that conveys the services and medical data associated with indeed farther areas. The IoT system in medical science and field is now in an advance setup that contains so many varieties of mechanism like smart sensors, medical equipment, big data, cloud computing, telemedicine, clinical information system, and many more. IoT technique is categorized into many sectors; remote monitoring of patients, remote tracking and monitoring of health, sensor based devices for hand wash monitoring, and monitoring of interactive RFID activities. It is continuously delivering best evaluation, better diagnosis, and maintains efficient treatment of patient. The main applications and uses of IoT in the field of medical health care incorporate: Therapeutic data administration, Telemedicine and portable medical care and management of health. The presence of corona virus in human body may be detected by measuring an individual’s body temperature with the help of temperature sensors. With the IoT technology that has widely implemented in the health care sector, RQ or respiratory quotient was also proven to be one of the determining principle to detect corona virus ($RQ = \frac{\text{Volume of expired C02}}{\text{Volume of O2 consumed}}$). We designed an IoT based device which can detect the subsistence of the virus based on the framework of body components. Analysis of blood samples also tells us the difference between an infected and normal sample. The obtained leukocyte count ($7.3*10^3$/microliter), whereas an infected person can have an abnormal leukocyte count up to ($14.1 *10^3$/microliter).

The objectives of this paper are:
1) We are detecting the presence of virus in a body by considering some body components of a person like temperature, oxygen, carbon dioxide content.
2) By this we are detecting the abnormalities in the body (if any) and judging the possible symptoms of corona virus.
3) The abnormalities differ from body to body hence suitable mechanism is deployed in the software to detect the subsistence of the virus.

2. Methodology

2.1. Hardware Components

Our module is made using many sensors such as blood analyzer, oxygen sensor and Temperature sensor, along with Arduino-UNO, Adafruit Ultimate Gps breakout, GSM/GPRM module and Node MCU.

2.1.1. Arduino uno blood analyser

The Arduino Uno is the main component of this module. Arduino microcontroller is commonly used in every IoT device. Coming to its low cost and efficiency, it is suitable for many components that have many parameters. Physically, Arduino is very stiff and its coding method is very easy if it’s known how to be used. The capacitors in the board is arranged in such a way that is passes every data much fluently.

2.1.2. ESP8266 NodeMcu WiFi Development Board

Node MCU is used for IoT implementation, the board just like arduino which comes with built-in ESP8266 wifi module already present in it. A NODE MCU is a WiFi miniature module that also provides us to connect wifi connections within some limit of its place.
2.1.3. Adraxx LM-35 Temperature sensor

It a arduino compatible component which can detect a wide range of temperature depending upon its cost. This component is cost effective and can detect temperature of up to 40 degree Celsius. This part works efficiently with arduino and can give output at real time.

2.1.4. Bosch oxygen sensors

This is a oxygen level detection sensor which can used after conecting it with a microcontroller. This component is very rigid and provide our module a big amount of support. This sensor consumes low power and gives better result.

2.1.5. 4G GSM GPRS Module

GSM is mostly used in IoT based devices in order to use SIM facilities in any module. SIMM900A is the best in low suitable cost and works almost fine. This module consists of two or more antennas according to our requirement. GMS module require little bit soldering but it is much rigid to be fit in an entire IoT circuit. Current days GSM devices supports 4G speed services to be used.
2.2. Workflow Diagram

3. Working Principle

We will be making a huge module where initially a person’s temperature will be checked by the LM 35 sensor. After verifying it the individual’s respiratory quotient would be measured further which would be directed towards arduino blood checking module where the blood test would be performed. We have used node MCU due to which the device could be controlled through wi fi and as 4G GSM would be used, the data is stored in cloud and is accessible over a long range through the internet.
3.1. Steps:

i. The body temperature sensor like LM -35 will detect the body temperature of the subject.

ii. After the detection is made BOSCH 410 mm O2 and CO2 gas sensors will detect the amount of Oxygen and Carbon Dioxide present in the person’s breathe.

iii. These data would be sent to the microcontroller. Now the data obtained would be sent to the NODE MCU. And the data shared can be accessed by us over the wi-fi with the help of node MCU.

iv. Along with accessing the collected data can be uploaded to cloud by 4G GSM module and node MCU.

4. Results and Discussion

The data of the body parameters collected from the subject will the compared with the data of normal non-infected human being using ANN (Artificial Neuron Network) algorithm. If the collected data varies largely then we may assume that some abnormality is present in the subject. The simulation is done by the PROTEUS software which is illustrated as follows:

![Figure 8. Simulation process of IoT Scanner](image1)

![Figure 9. Output of simulation](image2)

![Figure 10. Output of simulation](image3)

5. Conclusion and Future scope

The device designed will not only reduce testing costs but also will reduce the exposure to healthcare professionals. It's quite feasible. Which can be used in public places to detect the vulnerability of the disease. The symptoms may
be assumed which will help in further diagnosis. The body parameters of a person would be considered which would help in clinical survey of the individual for treatment.

Our device provides many advantages such as the device can detect the abnormality through the body parameters and can maintain social distancing. We can control our device wirelessly. Using wi-fi through node mcu. The data stored is sent in the cloud, and can be accessed through the internet over a long distance. Our device can be kept in vehicles and also be applied at malls, institutions in entry and exit gates. The future prospects to be installed in our scanner consists of the blood checking module can be added to our device. More industrially advanced sensors can be added for more accurate results. This device can be fit to various shape and size for better usability. This IoT DEVICE can be implemented with robotics for automation. GPS module can also be implemented by which we can have the count of humans in which abnormality is detected and the location of detection.

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