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First wave of covid-19 in India using IoT for identification of virus

Nitesh Kumar Sharma a,⁎, Deepesh Kumar Gautam b, Lukesh Kumar Sahu c, M.R. Khan d

⁎ Corresponding author.

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Abstract
Internet of Things (IoT) are evolving rapidly and making it possible for many uses, such as manufacturing, military, education and health, to link different intelligent objects. Coronavirus has recently spread widely around the globe and no effective therapies are currently available. It is also very necessary to avoid infection and to control the symptoms, such as fever and shortness of breath. As Coronavirus is a disease that is circulating very rapidly and the social distancing to deter an outbreak is very significant, it is essential to provide a system that is intelligent enough to monitor the effects of individuals with little direct contact. This document contains an IoT-based and wireless sensor network architecture and simulation of the COVID-19 Monitoring Mechanism (CSMM) for the monitoring of people in their quarantine, particularly the elderly who are living under chronic diseases and immune failure, and are therefore more likely to contract severe diseases. The mechanism relies on patient health data remotely. A doctor or care practitioner may carry out the monitoring process. For starters, where there is high fire or trouble breathing, this can conveniently be used for a detected urgent or irregular situation. The process will then give a warning to the health care provider or practitioner, sending urgent SMS with time and condition to act without any delays to save the patient’s life.

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1. Introduction

A new Coronavirus Disease 2019 (COVID-19) disease emerged in China at the end of 2019 [1]. In March 2020, the World Health Organization (WHO) declared the disease a pandemic because of the vast number of instances across the world of 21,991,954 by the year August 19, 2020 [2]. The disease is spreading rapidly among humans. COVID-19 is often associated with fever, dry toux, sore throat and shortness of breath. Most people have minor symptoms, but people who are medically ill or over 60 years of age have a high chance of death [3]. WHO data suggest that COVID-19 is spreading very rapidly in contact with individuals that are afflicted with the disease. This can conveniently be used for a detected urgent or irregular situation. The process will then give a warning to the health care provider or practitioner, sending urgent SMS with time and condition to act without any delays to save the patient’s life.

Due to the high number of COVID-19 cases, people who contacted infected cases, particularly the oldest, are most often required to be monitored. On the other hand, parental inattention will lead to unknown abnormality, which would lead to health problems for the contact child. Thus, it is very important to establish an intelligent surveillance mechanism to track the symptoms of COVID-19 and some key signs of an individual in the contact, such as fibre and oxygen level, from the far distance, to safeguard one’s wellbeing, and to save the physician from the direct contact with someone infected with COVID-19 [4]. The health surveillance technology incorporates wireless and internet sensor networks (IoT). The WSN comprises several sensors which perceive various phenomena such as humidity and temperature. The parameters for people can be calculated in real-time by using IoT, on the other hand. Sensors gather fever and blood oxygen and then send data to a care supplier, acting on the values of those data [5–8]. Since the elderly are vulnerable to COVID-19, constant surveillance is required especially for contacts with other infected individuals. Standard monitoring of eldest people is a problem, for example calling them many times a day, which makes it more dif-
difficulty for the medical staff to get COVID-19 (nurses, doctors). Moreover, the number of confirmed cases and the number of notified individuals is rising exponentially, and the number of COVID-19 rises immediately. Another cause for this is the problems with their family members overseeing the oldest in emergencies [3] in particular. In case the eldest contacting a confirmed COVID-19 case to increase their quality of life and protect doctors from future infections, a surveillance mechanism is very critical. This paper examines the nature of a mechanism for tracking COVID-19 symptoms for the elderly who contacted confirmed COVID-19 cases. They will remain for 14 days under quarantine. During this time, wearable devices are used by various modes of communications to monitor the vital signs of the quarantined people.

2. Literature

IoT is used for a variety of metrics in different areas, including production, agriculture, healthcare and remote real-time monitoring. Several health surveillance trials for IoT have been completed. Recently and after the COVID-19 pandemic, the elderly who contacted COVID-19 should be monitored remotely to track the signs of vitality for the 14-day quarantine period to ensure that no COVID-19 symptoms emerge. This section discusses some of the previous medical schemes suggested in other cases rather than COVID-19, as yet no current COVID-19 infectious trials are available. IoT is used for a variety of metrics in different areas, including production, agriculture, healthcare and remote real-time monitoring. Several health surveillance trials for IoT have been completed. Recently and after the COVID-19 pandemic, the elderly who contacted COVID-19 should be monitored remotely to track the signs of vitality for the 14-day quarantine period to ensure that no COVID-19 symptoms emerge. This section discusses some of the previous medical schemes suggested in other cases rather than COVID-19, as yet no current COVID-19 infectious trials are available. In [9] creator suggested a scheme that focused on emergency services including emergency treatment for patients, ambulances and cars. In order to monitor and relay health information, the device proposed used sensors. This data is only used to track health and respond to emergencies. Moreover, there were no serious diseases in the proposed scheme. Author suggested a cardiovascular disease surveillance scheme. Data on the heart rate must be submitted by an electrocardiogram monitor to the doctor [10]. In the event of unusual circumstances, an algorithm is proposed for this method which allows the medical provider to immediately respond. In [11] researcher advised a multi-disease surveillance scheme. For the implementation of the framework, they used Cisco packet tracer tool. First, the device uses sensors to gather the data, then process it with a microcontroller. Secondly, a lot of diagnosis, medical administration and emergency response decisions can be made. Three diseases are covered by the proposal but COVID-19 is still not considered.

3. Implementation

In different implementations, the Internet of Things technology (IoT) enables the link in the Internet of mobile devices. In the Mechanism for the Symptom Monitor of COVID-19, the sensor monitoring during its isolation time is suggested in this document, which increases the efficiency of the wellbeing of the individual who is quarantined and reduces the potential for COVID-19 infection.

In this suggested mechanism the temperature is sensed using the required sensor, which is a critical essential sign and is considered a normal symptom in the case of COVID-19. During the number of inputs and outputs, clock speed, voltage and other parameters, there are various types of Arduino boards. The board is chosen because it is the most frequent category in this article. The board and its components [12] are defined in Fig. 1.

Arduino Uno can be linked with the PC via USB cable, as shown in Fig. 1. In addition, the sensor signals (e.g. the temperature sensor) are read and conducted in digital data using six analogue pins (A0-A5). In addition, the Arduino board has the most critical portion of the microcontroller chip [12].

As shown in Fig. 2, LM35 has three pins: a supply VCC, an output voltage analogue to the temperature and a ground GND. The Arduino Uno is attached to the LM35 sensor and Arduino Uno’s analogue voltage output is provided to the Arduino Uno A1 analogue pin and then translated for reading the temperature to its digital form. Fig. 3 shows the Arduino Uno board interface of LM35 [13].

Fig. 3 illustrates the link between the LM35 sensor and Arduino Uno Board. The LM35 output pin is joined to the Arduino Uno analogue A1 pin which transforms an analogue signal to a numerical value that the microprocessor reads. The 5 V pin on the Arduino is paired with the LM35 VCC, and the LM35 GND is connected to the Arduino’s GND pin. The following paragraph outlines the suggested method for the control of symptoms of COVID-19 [14]. The proposed ESP8266 WLAN module, which offers Internet access to load the sensed information to the internet and to make IoT applications as simple as possible, is also part of the proposed mechanism. In addition, Arduino IDE can be programmed. In [15] the specifics of the proposed mechanism.

4. Proposed approach

The mechanism proposed in this document covers people who were subjected to a fourteen-day quarantine, the timeframe for COVID-19. The quarantined people, especially the elderly, need to be watched during this time and the symptoms of COVID-19 considered. The temperature is a normal symptom, and the care practitioner must control it. The oldest people are at high risk of COVID-19 and they have difficulty going to the hospital and being watched by their families directly at home. Thus, during the quarantine phase a medical practitioner will track the proposed surveillance process. Analog signals are received from the sensor by Arduino Uno, which is converted to the appropriate digital form. The digital data is then processed by the microcontroller and the readings are sent into the cloud that works like a server. The readings will then be received immediately by the recipient (doctor).

The proposed framework saves, analyses and visualizes sensor data in the cloud through Thing Speak, an IoT platform that instantly visualizes the data posted by sensors. The block diagram of the mechanism proposed is shown in Fig. 4.

As seen in Fig. 4, the temperature sensor LM35 detects the quarantined person’s temperature. The Arduino Uno then analyses the signals and provides the appropriate Celsius digital temperature.
measurement. ESP8266 Wi-Fi links to Wi-Fi and transfers the data to IoT server, which in the suggested mechanism is ThingSpeak. Lastly, by logging into the ThingSpeak channel linked to the mechanism, the doctor will access the data from anywhere in the world immediately. We will create a particular channel for reading and writing data by building a ThingSpeak account and viewing it as a diagram for more decisions.

5. Conclusion

The biggest problem with this current virus is its rapid dissemination and hence the growing number of cases. The quarantine procedure is also a major problem for the vast number of people who contact the sick. The proposed mechanism allows the quarantine people, especially the oldest, to be monitored live. The mechanism suggested lets doctors handle this huge number of people on a distant basis. The IoT framework from ThingSpeak offers a graphical output of the sensed data that simplifies interpretation.

CRediT authorship contribution statement

Nitesh Kumar Sharma: Writing - original draft, Software, Validation. Deepesh Kumar Gautam: Writing - review & editing. Lukesh Kumar Sahu: Conceptualization, Methodology, Visualization. M.R. Khan: Investigation, Supervision.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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