COVID-19 Monitoring Application for better human life

Annwesha Banerjee Majumder 1, Aditya Pal 1, Abhinav Ojha 1, Sourav Majumder 2 and Debasish Sanki 1

1 Dept. of Information Technology, JIS College of Engineering, Kalyani, Nadia, West Bengal, India
2 Wipro Technologies, Kolkata, West Bengal, India

Email Id : annwesha.banerjee@jiscollege.ac.in

Abstract: COVID-19 – a panic – a threat to human has changed the total world’s normal flow of life. In this disease patient having mild cough and cold but if not identified at early stage and properly treated the patient would be died. So early state diagnosis is very crucial in this virus infection. In this paper a monitoring system model has been proposed with automated instant messaging, alarm generating and call facility. As we know COVID-19 patient has certain kind of symptoms like- high temperature, cold cough, loss of sense of smell, low oxygen saturation level along with that presence of diabetes, renal infection, pneumonia, hypertension, cardiovascular disease and obesity will influence the risk more. The application will measure oxygen saturation level, blood pressure and taking input for symptoms related questions and identifying the risk will either provide suggestions to patients and if oxygen saturation level is less then will send automated message to local COVID control units, police station and hospitals for arrangement of beds so the process for migrating the patient would be easy.

Keywords: COVID-19, instant messaging, oxygen saturation level.

1. Introduction

The world is going through a very tough journey because of the new threat to human being that is COVID-19. Now all the countries are working hard day and night to fight against this tiny threat, by providing proper treatment to infected people and also in search of proper medicine and vaccine.

1.1 COVID-19: COVID-19 is an infectious disease which causes respiratory disease. This spreads mainly through droplets of saliva and discharge from nose [1]. Most common symptoms are fever, dry cough and tiredness. [2]. It is being reported that in most of the cases patient with other diseases recovered from the infection of the virus. But it is really a big threat for the elderly persons and patient with other disease like high blood pressure, lung and heart disease. The early detection and coetaneous monitoring of patient of this disease is very vital.

As the huge of cases are reported every day, the scarcity of beds in hospital all over the world is really a big concern. At the same time all infected people need not be hospitalized, they may be at self-isolation at their home. For the patient self-isolated at home need continuous monitoring as in this disease situation at any time can be worsen and immediate care and medical supports required. In this paper we have proposed a model for continuous monitoring of COVID-19 patient when they are at self-isolation. This is an IoT based mobile application having facility of automatic message sending and calling.

It is being observed that digital medium playing a major role in different patient monitoring.[3][4][5].In case of Ebola it has been proved that Health has major impact in controlling the disease.[6]. Like Ebola the role of digital health application in tackling the Zika has been discussed by Shakrnulah Ahmadi et al. [7]
Xiaoyun Zhou et al. has described the role of tele health service in for reduction of mental health burden of COVID-19 patient. Along with the physical symptoms the monitoring mental condition of COVID-19 is equally important.[8]. In [9] authors have shown that tele health is playing a major role in COVID-19 patient from acute to post-acute and even in emergency situation also. [9]. There is a wildly popular corona virus-tracker app in South Korea that helps to control outbreak. [10]. A high-tech surveillance app to track the corona virus has been used in Singapore [11]. We are all aware about the popular Arogya Setu by Indian Government [12]. Maharashtra Government has also launched an app for COVID monitoring [13]. WHO has provided rich set of guide line for digital health applications which recommends the improvements of the applications. [14]

2. Proposed System:

This is an IoT based home isolated COVID-19 patient monitoring application. There are different alarming factors associated with COVID-19 patient, like oxygen saturation level, if it is below 95-90 that means the patient need emergency medical support.

![Fig 1: Simple Flow of Model](image)

The factors considered for our model are:

1. Oxygen saturation level (OS)
2. Body Temperature (BT)
3. Blood pressure (BP)
4. Blood sugar level (BS)

According to the impact of the criteria weight has been applied to them.

The system monitors all the measured values from connected sensors and if the values crossing the threshold value then immediately send automated message to local municipality, police station and local COVID hospital for immediate support.

The application is divided in three different segments as:

1. Front End - For the mobile application and web view we are using Flutter SDK which is a framework developed by Google for creating cross platform application.
2. Back End – For backend of our application we are using Firebase SDK as it provides real-time database which will be updated instantly in all devices. Every person will have his own account all the records of previous checkups will be stored into it.
3. To connect with IOT Devices we will be using Local Wi-Fi and send information through it.
Figure (2): Application Development.

Figure (3): Application Development.
3. Conclusion:

This is a model for monitoring home isolated COVID patient. It has been observed that during home isolation some patient’s conditions decorated and even end of life. So this application may help to take immediate action to protect life.

References

[1] https://www.who.int/health-topics/coronavirus#tab=tab_1

[2] https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/q-a-coronaviruses

[3] Wood CS, Thomas MR, Budd J, Mashamba-Thompson TP, HerbstK, PillayD, et al. Taking connected mobile-health diagnostics of infectious diseases to the field. Nature 2019; 566 :467-74

[4] World Health Organization. Digital technology for COVID-19 response. Geneva: WHO;2020

[5] Reeves JJ, Hollan ndsworth HM, Torriani FJ, TaplitzR, Abeles S, Tai-Seale M, et al. Rapid response to COVID-19: Health informatics support for outbreak management in an academic healthsystem. J Am MedInform Assoc 2020. pii:ocaa037

[6] DanquahLO, HashamN, MacFarlane M, ContehFE, Momoh F, Tedesco AA, et al. Use of a mobile application for Ebola contact tracing andmonitoring in Northern Sierra Leone: A proof-of-concept study. BMC InfectDis 2019; 19.doi:10.1186/s12879-019-4354-z.

[7] Ahmadi S, BempongNE, De SantiaO, Sheath D, FlahaultA. The role of digital technologies in tackling the Zika outbreak: A scoping review. J Public Health Emerg 2018; 2 :1-20

[8] Zhou X, SnoswellCL, Harding LE, BamblingM, EdrippuligeS, Bai X, et al. The role of telehealth in reducing the mental health burden from COVID-19. Telemede Health 2020; 26 :377-9.

[9] Smith AC, Thomas E, SnoswellCL, Haydon H, MehrutraA, Clemensen J, et al. Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). J TelemedTelecare 2020. pii: 1357633X20916567

[10] DujmovicJ. Wildly popular coronavirus-tracker app helps South Koreans steer clear of outbreak areas. MarketWatch; 2020. Available from: https://www.marketwatch.com/story/wildly-popular-coronavirus-tracker-app-helps-south-koreans-steer-clear-of-outbreak-areas-2020-03-18, accessed on April 11, 2020.

[11] Holmes A. Singapore is using a high-tech surveillance app to track the coronavirus, keeping schools and businesses open. Here’s how it works. Business Insider India; 2020. Available from: https://www.businessinsider.in/tech/news/singapore-is-using-a-high-tech-surveillance-app-to-track-the-coronavirus-keeping-schools-and-businesses-open-heres-how-it-works/articleshow/74797714.cms, accessed on April 11, 2020

[12] AnanthV. Beyond contact-tracing, AarogyaSetu may find use in policy inputs. The Economic Times; 2020. Available from:https://economictimes.indiatimes.com/news/economy/policy/beyond-contact-tracing-aarogya-setu-may-find-use-in-policy-inputs/articleshow/75078678.cms, accessed on April 11, 2020.

[13] Maharashtragovtlaunchesonlineself-assessmenttooltobetteridentify, assistCovid-19patients. IndiaToday; 2020. Available from: https://www.indiatoday.in/india/story/maharashtra-govt-launches-online-self-assessment-tool-to-better-identify-assist-covid-19-patients-1662766-2020-04-03, accessed on April 11, 2020

[14] World Health Organization. WHO guideline: Recommendations on digital interventions for health system strengthening. Geneva: WHO; 2019.