

Novel Covid-19 Detection Using Smart Embedded System

Md. Abdul Muttalib Moon¹, Md. Milon Rana¹, Md. Nefaur
Rahman¹, Tajkuruna Akter Tithy¹, Md. Nurun Nabi Zehadi¹ and Lemma²

¹Department Department of Electronics and Communication Engineering¹
Hajee Mohammad Danesh Science and Technology University, Dinajpur-5200, Bangladesh
²NIT, Warangal, India

Corresponding Author: Md. Milon Rana and Md. Abdul Mutattalib Moon

ABSTRACT: Corona virus is the new virus that has not been identified in humans before which it causes the corona virus disease called COVID-19. This disease was firstly discovered in Wuhan, China, on December 2019 and spread to the world until now. The virus can easily pass from person to person which make it spreader rapidly. One of the common symptoms of COVID-19 that can be easily identified is fever. Since the virus outbreak, thermal screening using infrared thermometers are used at public places to check the body temperature to identify the indicated infected among crowd. This prevention still lacking because it spends a lot of time to check the body temperature from every person and the most importance is the close contact of the infected might lead to spreading it to the person who do the screening process or from the one in charge of screening to the checked people. This study proposes the design of system that has capability to detect the corona virus automatically from the thermal image with less human interactions using smart embedded system with Mounted Thermal Imaging System. The thermal camera technology is integrated to the smart system. In addition, the system is Equipped with the facial-recognition technology, it can also display the pedestrian's personal information which can automatically take pedestrians' temperatures. This proposed design has a high in demands from the healthcare system and can potentially help to prevent for corona virus spreading wider.

KEYWORDS: COVID-19, Corona virus, Technology, LCD, AMG8833.

Date of Submission: 01-04-2023

Date of acceptance: 12-04-2023

I. INTRODUCTION

A corona virus is a sort of virus that can make ailment in animals [1] and individuals [2,3]. 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 viruses was taken 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 [4]. The virus was recognized as part of the corona virus group, which involves SARS and the other known colds [4,5]. 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 authoritatively defined as COVID-19 that has diffused to a minimum 141 nations and regions, causing death over 5,700 individuals around the world [6].

Someone who infected by corona virus will show common symptom such as fever, dry cough, and tiredness or some cases, infected person will feel pains & aches, runny nose sore throat, nasal congestion, or diarrhea [7-9]. However, some people infected 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 [6], 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 centers. 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 [6], 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. In this project, microcontroller-based technology is employed to accurately identify diseases. However, utilizing this technology, the specific sickness will be diagnosed using thermal imaging and the diagnosis report will be shown to the Display using microcontroller-based embedded technology.

Apparatus:

- Arduino
- Thermal Camera
- LCD Display
- Buck Converter
- Potentiometer
- Battery
- Jumper Wire
- Arduino IDE Software

II. BLOCK DIAGRAM

The individual application of the project's goals is shown in the block diagram below. The major objective of this project, which is the operation of the entire devices, is described in the block diagram.

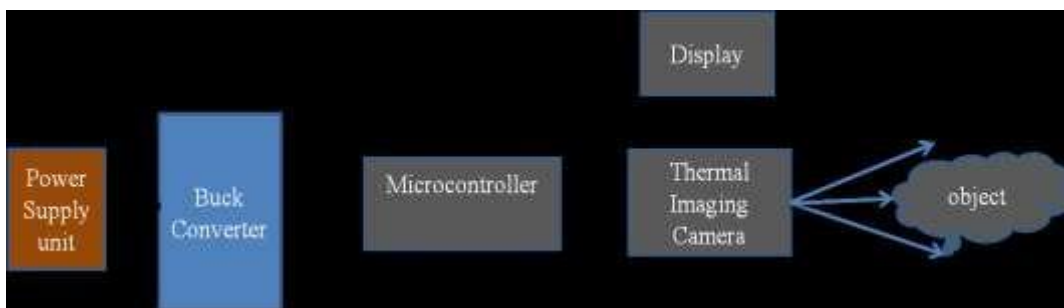


Figure 1: Block Diagram.

The block diagram in Figure 1 represents the individual application of the objectives and describes the main goal of this project, which is the working process of the whole device. This project is divided into two units. The first unit is used as input unit, and the second is the output unit. Here the input parts connected with microcontroller is Thermal Camera and the output parts is display. Power supply unit has been converted from 12 volts to 5 volts through Buck converter. Microcontroller is connected to Buck Converter to activate it. Utilizing the Thermal camera to monitor temperature is the first step. In the second step, the data from Microcontroller- will be shown on the Display.

Flow Chart:

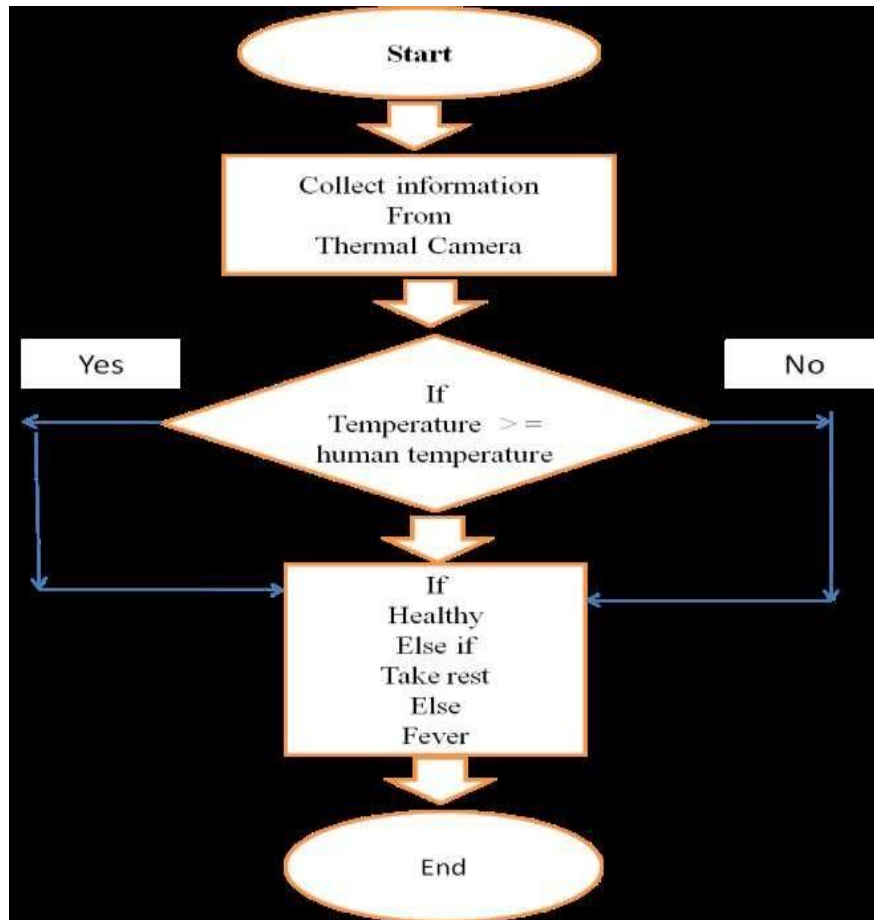


Figure 2: Flow Chart

Figure 2 shows the working procedure of the project which is presented in a flow chart for better understanding. At first start the program and chose operation. After choosing operation one needs to connect the required component. Give command using RC Transmitter and send it through wireless. Receive data using RC Receiver and recognize data commands by the Arduino. Then execute the instruction by controlling motor driver. Then the robot will analyze images using Thermal Camera. Thermal Camera is act as the input parameter. The microcontroller takes data from the camera and uploads the data in the Display. This is the overall process which is explained in a flow chart.

III. IMPLEMENTATION OF THE PROJECT

This project is divided into two units. The first unit is used as input unit, and the second is the output unit. Here the input parts connected with Arduino is AMG8833 Thermal Camera and the output part is display. 12v Battery has been converted from 12 volts to 5 volts through LM2596 Buck converter. Arduino is connected to Buck Converter to activate it. Utilizing the Thermal camera to monitor temperature is the first step. In the second step, the data from Microcontroller- will be shown on the LCD 16*2 Display.

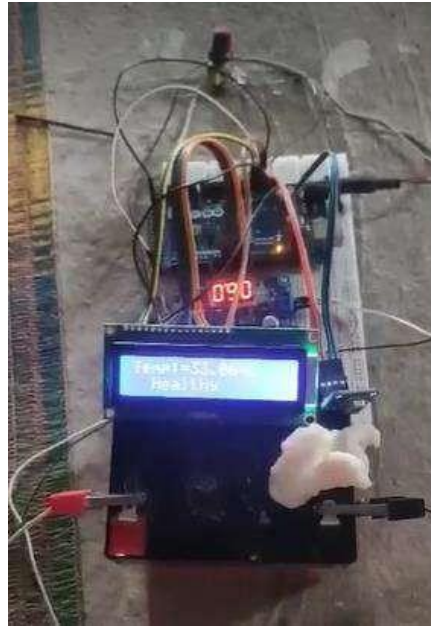


Figure 3: Project Implementation

IV. RESULTS

```
COM7
15:10:07.657 -> Thermistor Temperature = 34.88*C
15:10:07.697 -> Healthy
15:10:07.697 ->
15:10:08.655 -> Thermistor Temperature = 34.88*C
15:10:08.704 -> Healthy
15:10:08.704 ->
15:10:09.647 -> Thermistor Temperature = 34.88*C
15:10:09.692 -> Healthy
15:10:09.692 ->
15:10:10.659 -> Thermistor Temperature = 34.88*C
15:10:10.692 -> Healthy
15:10:10.726 ->
15:10:11.701 -> Thermistor Temperature = 34.88*C
15:10:11.737 -> Healthy
15:10:11.737 ->
15:10:12.706 -> Thermistor Temperature = 34.88*C
```

Figure 4: Result of the Project

V. CONCLUSION

An innovative real-time early detection of corona virus using smart system which integrated with thermal imaging system has been developed. The system can also send the measured data to be displayed. As the latest big issue nowadays that happened across the world, the spreading of corona virus give so much attention and awareness among people. Early detection of the corona virus symptoms will be one of the suitable ways to prevent the spreading of corona virus. As the high body temperature of people is one of the very common symptoms, a real time monitoring system of the screening process that automatically appearing the thermal image of temperature of people is needed. So the diagnosis of the screening process will be less time consuming and less human interactions that might cause the spreading of the corona virus faster. It can be concluded that the remote sensing procedures, which provide an assortment of ways to identify, sense, and monitoring of corona virus, give an awesome promise and potential in order to fulfill the demands from the healthcare system.

REFERENCES

- [1]. S. Singh, R. Singh, K. P. Singh, V. Singh, Y. P. Malik, B. Kamdi, R. Singh, G. Kashyap, "Immunohistochemical and molecular detection of natural cases of bovine rotavirus and corona virus infection causing enteritis in dairy calves," *Microb. Pathog.*, vol. 138, no. May 2019, p. 103814, 2020.
- [2]. C. Xie, L. Jiang, G. Huang, H. Pu, B. Gong, H. Lin, S. Ma, X. Chen, B. Long, G. Si, H. Yu, "Comparison of different samples for 2019 novel corona virus detection by nucleic acid amplification tests," *Int. J. Infect. Dis.*, 2020.
- [3]. M. Shen, Y. Zhou, J. Ye, A.A. AL-maskri, Y. Kang, S. Zeng, S. Cai, "Recent advances and perspectives of nucleic acid detection for coronavirus," *J. Pharm. Anal.*, no. xxxx, 2020.
- [4]. World Health Organization, "Laboratory testing for 2019 novel coronavirus (2019-nCoV) in suspected human cases," vol. 2019, no. January, pp. 1–7, 2020.
- [5]. Corman, I. Eckerle, T. Bleicker, A. Zaki, O. Landt, M. Eschbach-Bludau, S. van Boheemen, R. Gopal, M. Ballhause, T. Bestebroer, D. Muth, "Detection of a novel human coronavirus by real-time reverse-transcription polymerase chain reaction," *Eurosurveillance*, vol. 17, no. 39, pp. 1–6, 2.
- [6]. J. R. Hageman, "The Coronavirus Disease 2019 (COVID-19)," *Pediatr. Ann.*, vol. 49, no. 3, pp. e99–e100, 2020.
- [7]. Q. Li, X. Guan, P. Wu, X. Wang, L. Zhou, Y. Tong, R. Ren, K. S. Leung, E. H. Lau, J. Y. Wong, X. Xing, "Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia," *N. Engl. J. Med.*, pp. 20–21, 2020.
- [8]. Z. Y. Zu, M.D. Jiang, P. P. Xu, W. Chen, Q. Q. Ni, G. M. Lu, L. J. Zhang, "Coronavirus Disease 2019 (COVID-19): A Perspective from China," vol. 2019, 2019.
- [9]. T. P. Velavan and C. G. Meyer, "The COVID-19 epidemic," *Trop. Med. Int. Heal.*, vol. 25, no. 3, pp. 278–280, 2020.