

CONTACTLESS BODY TEMPERATURE SCANNER AND SENSING SYSTEM

INTRODUCTION

In the past few months, covid-19 causes businesses, including school systems and government agency to update the way of how peoples need to operate in their work environment. To provide a healthy work environment for everyone, many businesses start to adapt technology that support human health monitoring and scanning. Some of these technologies are more pervasive than others and usually require few days of the individual sample's to be process before a diagnostic is made for the covid-19 virus. Other types of heath monitoring systems require limited human intervention and provide non diagnostic capability. Such systems are also capable of identifying individuals with the possibility of being infected with the novel coronavirus. As we know, one of the dominant symptoms of the coronavirus is high fever. Therefore, body temperature monitoring can be used to support quick feedback of the individual's current health status. It can be used as an initial step towards the identification of covid-19 cases in a community.

In this project, we will design and develop a system that is based on the Mbed nxpLP1768 development board. The mbed board will be integrated with a contactless infrared temperature sensor board, TMP006. The proposed design enables thermal scanning for an individual without making direct contact with the monitoring board. It has a detection range of -40°C to 125°C . Thermals sensor reading will be encrypted and a data integrity approach based on crypto hash will be incorporated into the design of the proposed system.

PROJECT'S SCOPE AND LIMITATION

In this work we are considering the design and development of a small-scale Covid-19 contactless body temperature scanner. In this effort, we are focusing on the development and the integration of the following technological innovations:

- *Body Temperature Data Logger:* A remote mobile platform (laptop or phone) will be used to provide a continuous logging of thermal data. Timestamped thermal data will be stored off board the mbed system.
- *Alert System:* The proposed system must be implemented with capability of detecting individuals that show sign of high temperature. A user programmable high temp threshold value must be integrated into the design of the above system. High-temp threshold value must be programmed prior to device deployment. When the mbed system detect an individual with a body temp that is greater than the specified high temp threshold value, the proposed system will cause the four LEDs on the mbed board to flash rapidly. Detection of individuals with high temps will be time stamped and stored into the data logger system.
- *Security:* All thermal readings will be sent wirelessly from the mbed device to the data logger system using an encrypted channel. To preserve the integrity of the data, we will be utilizing a crypto hash function. Each time the mbed need to send a thermal reading, the data is hashed first onboard the device. Then a copy of the encrypted timestamped thermal data, plus the computed hash value are transferred to the data logger system.

- *Wireless Communication.* A Bluetooth chip will be integrated into the nxpLP1768 to provide wireless communication between the mbed and the datalogger system.

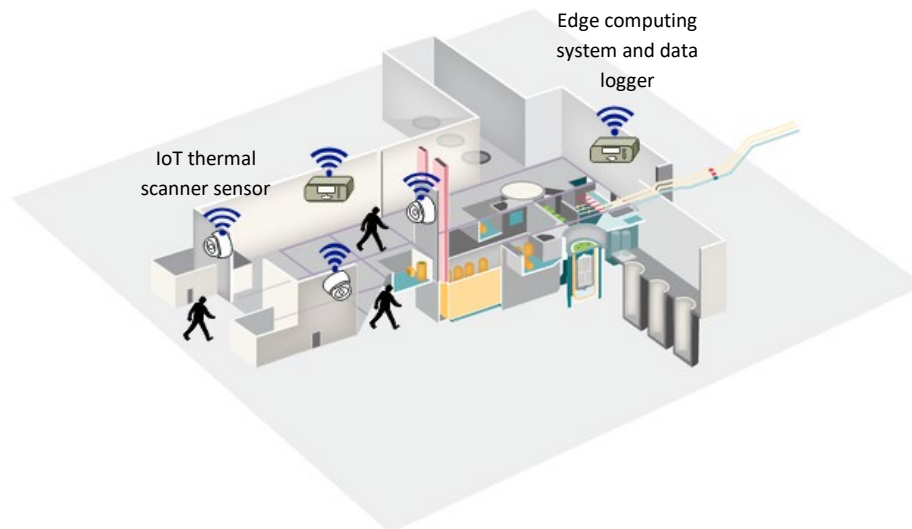
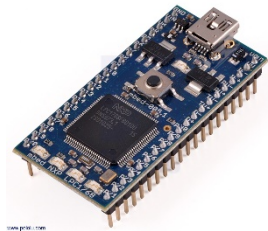


Fig 1. System overview of the contactless body temperature scanner and sensing system

HARDWARE REQUIREMENTS FOR THE PROJECT

- ❖ Two mbed systems based on the nxp LP1768 development boards will be used in this project. Each system will be loaded with a unique ID and a hypothetical data sets that maintained all covid-19 positive cases in a community.



Mbed (nxp LP1768)



TMP006 IR Temperature sensor



Bluetooth Chip

- ❖ Collected thermal data will be communicated between the IoT system and the data logger using Bluetooth based on RN-42, class 2. All data will be encrypted, and hash values of the data will be computed prior to transmission. On the data logger system, each data will be decrypted, and hash values are computed and compared to the received hash values.
- ❖ Body temperature of a passing individual will be read using the TMP006 integrated infrared temperature sensor board. The board support a detection range of -40°C to 125°C . All temperature readings will be encrypted onboard the mbed system and their hash value is computed before being communicated to the datalogger system