Design and Development of IoT based Smart Security System in Covid19 Situation

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Abstract: In COVID19 pandemic situation social distancing and proper thermal screening is very much essential for restrict the spreading of virus. In security purpose human beings directly contacts with several known and unknown persons that is tremendously thoughtful matter. That problem will be overcome by a prototype device which can detect the temperature of the body and the collected data will be uploaded to the server as well as to the predefined consumer mobile number thorough IoT system. This system very much fruitful for office, factory, school even multi stored building security system. Instantly all related data regarding body temperature, image capturing, coming from area, area details scenario during any pandemic situation will be detect to the consumer mobile or computer. Using this it can keep a record to the number of visitors along with their temperature of the body. And in this current situation using this we can avoid human touch and the chances of getting affected will be less and a huge number of people can save their life. Solar powered IoT based smart security system will be automatically notified to the consumer when visitor come to meet in their premises. It will also give an alert if the visitor coming from containment zone or highly affected area.

Keyword: Covid19, IoT, Security, Social Distancing, Thermal Screening.
Introduction: COVID19 spreads rigorously around the world mainly close contact among people for particular periods [1-2]. Spreads happen due to infected person’s cough, sneezes, droplets in surrounding areas unprotected persons [3] and fever is the common symptom of infected person [4-6]. “physical distancing” also called social distancing that means keep safe distance from known and unknown effected person. That way we can protect our society from this virous. As now, there have no alternative medicine or vaccine for protect COVID19 pandemic. Still all research under process and testing procedure going on. Reported death case and infected case day to day increasing [3], several nations maintain lockdown to stop spreading of corona virus. But that directly effect on economy. Also try to detect infectee among the citizen using infrared thermometer but this process is very rigorous and highly chance to miss out. Recent study also disclosed that person who are affected but do not have any symptoms play big role of spreading of this virous. It is important that if possible, keep maintain at least 6 feet distance form others. But this is also some time not possible to maintain social distancing in security system. Internet of things (IoT) is the network of physical things stuck of sensors and software to deliver information among them and primary focus of less human interference. IoT technique is applicable in different prospects like patient’s health monitoring, handwash activities [7-8]. This system will provide best diagnosis, and effective treatment of patient [9]. Which is most important now a days to maintain social distancing with proper application of IoT. In traditional security system two person close each other contacts due to security checking. Visiting person effected or not that would not identify before thermal checking and also not possible infected provability checking of that visitor. In traditional security system high chance to spreading this virus due to social contacts. IoT based smart security system will help to solve that problem [10]. The Idea of IoT is a concept of remotely connected & operated with real world system through internet [11].In this system proper checking will be happen with maintain social distancing. This system also helps to identify visiting person chances of virus effected. This smart system able to maintain virus protected premises in our area which is very much essential in now days. This system will be performed following task to maintain social distancing with proper security checking protocols.

- Automatic alarming system if any visitor come and also instruct to maintain sudden distance.
- Automatic temperature checking through thermal image process and fetch data to mobile or computer through IoT.
- This system will store & check visitors upcoming area.
- Automatic alert system active if visitor come from containment zone or highly affected area.

This system also may help to Government “Aarogya Setu” health service system to collect information of unknown visitors.
Methodology:

IoT based smart security system are several aspects of the work. The system will be start with the installation of hardware and software combination for the safety, security & surveillance prospects. There have several parts of this system for data processing, image processing and decision making. Security system is one of the important parts of any domestic and commercial areas. Under Covid19 situation this part is fully exposed through strangers. IoT based communication implemented for interface between the system through Node MCU and GSM module. In this system there are two ways to identify visitor will coming from containment zone or not by speaking coming area or pre-defined ID. No which is given by the authority. Authority already put up all visitor primary address in their ID. No. Through IoT system all related information will be fetched to the authority or owner’s predefined mobile or login id. This system will be detecting if any visitor come in front of security gate and if very close (less then 5 feet) to the system, an alarm we be active which is shown in fig.1 until maintain proper distance.

![Visitor detection system](image)

This system captures thermal image through image processing module and fetch data to the cloud by Node MCU. This system given notification if it is higher predefined temperature. The system asks about last location or predefined ID number to check visitor leaving place which is under containment zone / red zone or not. If yes then an alert massage delivered to owner’s mobile or ID number. Fig. 2 shows the flowchart of the visitor identification process of IoT based smart security system.
IoT based smart security system employed for maintain social distancing in security system and identify probability of infected visitors. This system will be suitable for all security system like school, college, office, mall even domestic purpose. Fig. 3 shows the entire circuit diagram of the system. Node MCU used for transfer all related data in cloud environment and fetch to mobile or pre-define id. GSM module used for local data transfer as per requirement.
Results & its Analysis: In this system there have no human interference will be required for security checking purpose. All important information regarding coming person will be fetched instantly to the owner mobile or id no and alert system will indicate that person coming from containment zone or not. Temperature also checked through thermal image process and all information fetch instantly. In this way social distancing will be maintain with proper security system. All data will be stored in cloud environment so that will be also help to identify in future. This system can be interconnected with the government health data collection system that will help to collect huge amount of data who are not identified by government. Figure 4 shows the visitor’s information stored in cloud environment. All related important information like date, time, name, address, body temperature stored in cloud and decision will be given that mention address Covid19 highly activated area or not. If visitor coming form highly activated area then an alert will be sent instantly to owner’s predefined mobile.

![Fig. 4 Visitor’s Information stored in cloud environment](image)

![Fig. 5 Detection of visitor’s temperature by thermal image](image)
Thermal Image processing is very much helpful to find out different body temperature. Fig. 5 shows the detection of visitor's body temperature by thermal image. In this process authority will be alert if high temperature shown.

**Conclusion:** This smart security system has been developed on IoT technology. This system is perfectly applicable in Covid19 pandemic situation. Now it is very much essential to stop spreading virus and this system will help one step forward to that mission. It is fully automatic smart system that all important information gathers without human activity. It will be reduced the chances of unconsciously exposed from unknown visitors.

### APPENDIX A: SPECIFICATIONS OF DEVICES / COMPONENTS

| Sl No. | Devices / Components Name | Range | Quantity |
|--------|---------------------------|-------|----------|
| 1      | Ardino UNO                | ATmega328, 16 MHz, 5V | 2        |
| 2      | Ultrasonic Sensor (HC-SR04) | 2-400 cm | 1        |
| 3      | Buzzer                    | 5V Mini | 1        |
| 4      | Thermal Camera (TMP007 thermopile sensor) | I2C | 1        |
| 5      | LCD Display (ST7735R)     | 1.44" | 1        |
| 6      | GSM Module (SIM900A)      | 12v 1amp | 1        |
| 7      | Node MCU (ESP8266)        | 4 MB | 1        |
| 8      | Sound & Audio Detection Sensor (LM393) | 5V | 1        |

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