IOT Based Temperature Scanning Entry System

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Abstract: We propose a low-cost internet of things (IoT)-enabled COVID-19 standard operating procedure (SOP) compliance system that counts the number of people entering and leaving a vicinity, ensures physical distancing, monitors body temperature and warns attendees and managers of violations. The system comprises of multiple sensor nodes communicating with a centralized server. The data stored on the server can be used for compliance auditing, real-time monitoring, and planning purposes. The system does not record the personal information of attendees nor provide contact tracing information.

Keywords: IoT; compliance monitoring; coronavirus; pandemic; COVID-19; internet of things; IoT applications; smart sensor; crowd counting; COVID compliance; social distancing

I. INTRODUCTION

Nowadays, health monitoring is a global challenge in peoples life time. The comfort of life lies in a healthy condition which effected by environmental and surgical facts. The measurement of human body vital signs is an important to acknowledge the health status. The performance of any work or exercise in hot conditions disturbs the balanced thermal homeostasis state of human body (HB). This balance acknowledges the HB about physiological and cognitive performance of body [1-3]. The normal body temperature ranges by 36.50C to 37.50C [4]. The status of health below this limit is stated as hypothermia and the status above is referred as fever and hyperthermia conditions. The hyperthermia also referred as tumour conditional stage that ranges more than 38.5 0C [5-7]. The individual body temperature measurement is dependent of different aspects i.e. age, exertion, infection and place of body at which measurement made. There are several methods to measure the HBT i.e. oral, retail and axillary through mercurial and contactless thermometers [8, 9]. The measurement of HBT with mercurial thermometer is crucial than contactless like as broken of thermometer if bitten during oral measurement, injury of rectum during rectal measurement. Although, researcher are focusing to present digital and contactless thermometer for HBT measurement linearly. Therefore, this paper presents the contactless Infrared based HBT measurement prototype. The paper is organised as follows: in Section 2 a detailed description on the system importance is provided. In Section 3, implementation and demonstrate the hardware and software used for system design is discussed while Section 4 present the output results of experimental setup. This system is used for covid detection.

II. OBJECTIVES

The main objective of the system (temperature scanning gate) is to monitor the human body temperature when a they passed through the gate. In normal situation the gate is always open. If the gate senses any high temperature (more than 99.0 degree Fahrenheit), the gates automatically rejects the entry by closing the gate. The gate also provides warning beeps while the body temperature of a person is high.

Our world is effected by covid-19. Some health measurements are needed for preventing the covid-19 spreads. One of the early symptoms of covid-19 is high body temperature or fever. Our temperature monitoring gates able to detects high body temperature. This temperature screening gate is useful for bus stops, hospitals, restaurants, airports, grocery stores and shopping malls etc. The implementation cost of this gate is also cheap (compare with heat camera). Thermal cameras are also used to monitor the temperature.

III. PROPOSED DESIGN

The proposed design is elaborated into two categories,
(i)Hardware/software co-design
(ii) Design.

(i)   Hardware/Software Co-design The first area is based on the literature survey and the required sensors are chosen for the better performance. The Hardware/software is identified on the bases of the survey. The hardware model consists of contactless temp sensor. This sensor is connected to microcontroller ESP8266 for data processing. The software language used in the design is embedded c.

(ii)   Design . In this Proposed system the design is presented is mentioned using sensors contactless temp sensor, the sensor issued to get the information. This information is processed with the Node MCU.

IV.WORKING

The implementation of the system which includes all the wiring that is to be installed on the breadboard along with Esp32 controller and other sensors. The coding of the Esp32 controller will be in Arduino IDE language which comprises of C/C++ functions that are needed to be called in the code. In this the contactless temp sensor will detect the body temp and after that the process of gate open and close will work. The motor is used for to spray the sanitizer on the body
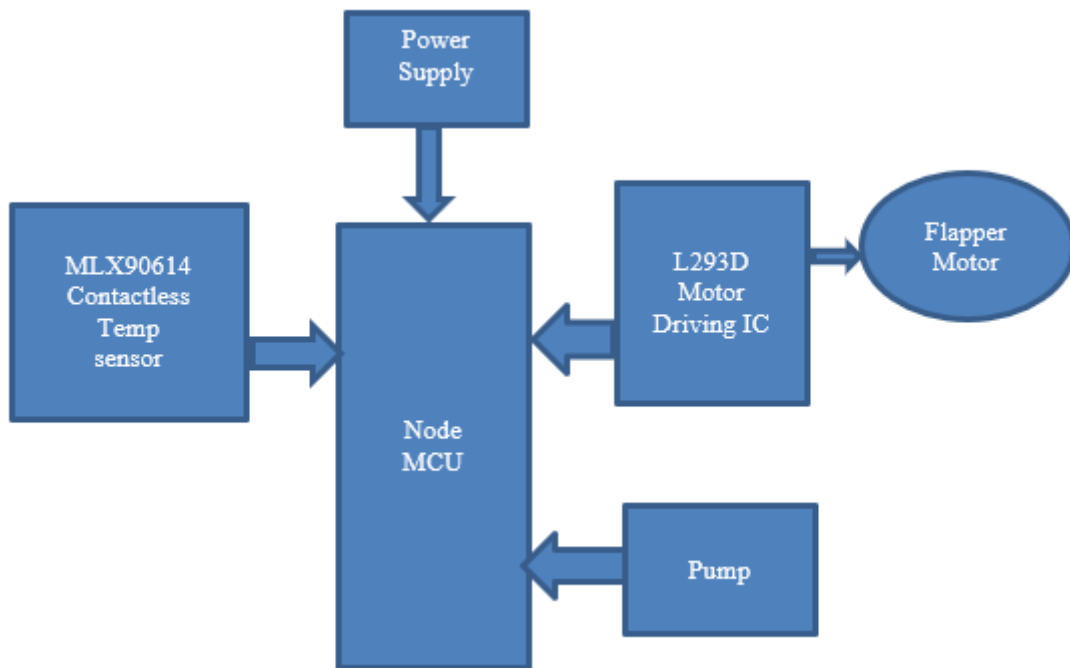
V.BLOCK DIAGRAM

Fig. 1. Block Diagram

NODEMCU

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266WiFi SoC from Express if Systems, and hardware which is based on the ESP-12 module.

Fig.2. Node MCU

The term "NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Express-if Non OS SDK for ESP8266. It uses many open source projects, such as lua-cjson, and spiffs. Node MCU provides a way to connect different sensors to their controllers wirelessly via wifi. Since, it is an improved version of the ESP8266 it has better and easier programming, with better voltage stability and more reliability.

MLX90614 Non-Contact Infrared Temperature Sensor

Fig. 3. MLX90614 Non-Contact Infrared Temperature Sensor

MLX90614 is a contactless temperature sensor used to measure temperature without touching the object using Infrared Rays. MLX90614 non-contact infrared temperature sensor can measure temperature in the range of -40°C to 380°C. MLX90614 Sensor can measure the temperature of an object which is 2-5 cm for from the sensor. The sensor has a field of view of 90 degrees and returns the average temperature value of all objects within this field of view. The module has an internal 17 bit ADC and DSP which provides high resolution and accuracy. This Infrared temperature sensor has 4 pins which are VIN, GND, SCL and SDA. VIN and GND are connected to 5V volt power supply and ground of the circuit respectively. SDA is Serial Data Pin and SCL is Serial Clock Pin which is used for serial I2C communication. MLX90614 sensor works on Stefan-Boltzmann Law, which states that all objects and living beings emit IR Energy and the intensity of this emitted IR energy will be directly proportional to the temperature of that object or living being. This sensor is used for measuring the temperature of moving objects, temperature sensing element in air conditioners, healthcare applications, windshield defogging, Industrial temperature control of moving parts, High Precision Non-Contact.

SERVO MOTOR

The TowerPro MG995 High-Speed Digital Servo Motor rotates 90° in each direction making it 180° servo motor. It is a Digital Servo Motor that receives and processes PWM signal faster and better. It equips sophisticated internal circuitry that provides good torque, holding power, and faster updates in response to external forces. These TowerPro MG995 Sem-Metal Gear Servo Motors are high-speed servo motors with a mighty torque of 10 kg/cm.

Fig. 4. Seromotor

PUMP

Fig. 5.Submersible Pump

Micro DC 3-6V Micro Submersible Pump Mini water pump For Fountain Garden Mini water circulation System DIY project. This is a low cost, small size Submersible Pump Motor which can be operated from a 3 ~ 6V power supply.

VI. SOFTWARE IMPLEMENTATION

The software required for it is the Arduino IDE.

ARDUINO IDE

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. This software can be used with any Arduino board. The Arduino development environment contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions, and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them. Software written using Arduino are called sketches. These sketches are written in the text editor. Sketches are saved with the file extension .ino. It has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by the Arduino environment including complete error messages and other information. The bottom right-hand corner of the window displays the current board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

The expected output of this project should be a text message showing the distance to full. Also,. The output should also be seen on the serial monitor of the Arduino IDE. Also, the output should also be seen on the serial monitor and also on the Blynk app.

VII. APPLICATIONS

- Railways Entry
- Airport Entry
- Offices Entry
- Museums and Amusement Parks
- Other Public Places

VIII. ADVANTAGES

- Full Automatic Detection
- Automatic Operation

IX. DISADVANTAGES

- Needs Power Supply
- Needs to be Mounted to Floor

X. CONCLUSION

An effective solution to ensure COVID-19 safety compliance is presented in this work. The system relies on open source software and widely available sensors to make a low cost and easy to configure and customize set up. It relays useful real-time information wirelessly to a dashboard which can be used to monitor and assist in COVID-19 SOP. The system is currently limited to check distance violation only in the specified area (i.e., queue). Future efforts will be focused to expand the detection for the complete floor area, contact tracing, and support for additional queues. The system can be extended easily with minimal time and is quickly adaptable to different situations.

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