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Containment zone Tracking and Temperature Detection System 2K20

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Abstract - *The article presents "Containment zone Tracking and Temperature Detection System 2k20", designed to reduce the spread of the "covid 19" virus. Automatic temperature measurement, hand sanitization using an automatic dispenser, and containment zone tracking are the three stages of this system. The containment zone tracking software is done in the "Visual Basic.Net" programming language. The database used is MySQL. The system design uses an Arduino Nano microcontroller, HC-SR04 ultrasonic sensor, MLX90615 temperature sensor, LCD interface, stepper motor, buzzer, printed circuit boards, limit switch. The temperature measuring system will automatically move vertically to adjust with person's height and detect the temperature at the forehead. Suppose the temperature measured is above 99.4 Fahrenheit. In that case, the alarm system will activate, which produces the beep sound and a flashing light to alert the person's temperature. Then the person gets shifted to an isolation area for the examination. If the person's temperature is below the prescribed value, a green light flashes, indicating the entrance to the next stage. The second stage consists of a sanitization machine with an automatic dispenser. In the third stage, one has to keep the identity card above the scanner to store the information about the person in a database. The information about the measured temperature and the use of sanitizer gets added to the same database. If the person is from a containment zone, the system produces an alert for further actions. This system can be used anywhere in India if there is access to common id details.*

***Key Words*: covid 19, Automatic temperature measurement, containment zone tracking, sanitization, database, common id.**

1. INTRODUCTION

Covid 19 pandemic, which taken over the world and left crores of people dead, has been a significant setback in this era. Covid spreads quickly, and intensity has in different waves. The only possible way of reducing the spreading of this infectious disease is social distancing, proper sanitization, and tracking high-risk containment zones. Development of Containment zone tracking and temperature detection system 2k20 enables the conduction of university examinations and abiding covid 19 protocols in public places.

2. Temperature detection using the mechanical link

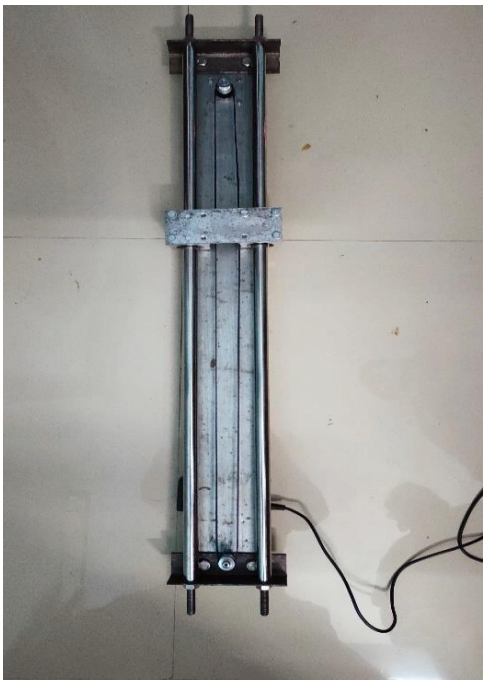

Fig 1: Temperature measurement link

Fig 2: Display indicating height and temperature

2.1 Forehead allocation.

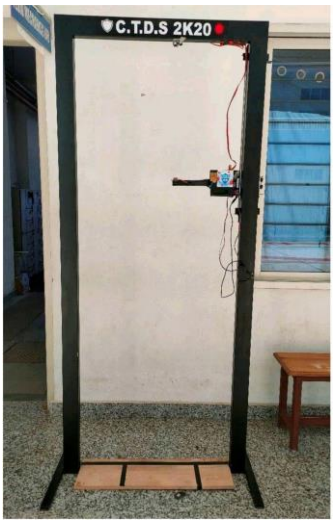

Fig 3: Temperature measurement unit

An HC-SR04 Ultrasonic Sensor fitted at the top of the frame is used to allocate the person's forehead standing in the frame. The Arduino sends a signal to the trigger pin of the sensor; thereby, the transmitter sends the ultrasonic signals, which will get deflected over the person's head and reach back to the sensor's receiver. At that time, Arduino receives a call from the echo pin. The Arduino program does the forehead allocation by simply adding an allowance of +8 mm to the measured value. The Arduino Integrated Development Environment is the main test editing program used for Arduino programming.

The processed output from the Arduino is given to the ULN2003AN bipolar motor drive. It consists of 2 pins, the control pin and the directional pin connected to a bipolar stepper motor. It drives the motor with the required amount of rotation in the specified direction. The motor uses an open belt drive connected between a pulley of 20 teeth with a 5mm bore allocated one on the motor shaft and the other at the opposite end of the slider link, which is 630mm from the motor shaft. The temperature sensor is mounted on the support of the linear motion link, which the belt drive will drive. Two steel rods of 16mm diameter and 714 mm length guide the roller bearing. So as the motor rotates, the belt drive will transmit into linear motion causing the temperature sensor mounted on the bearing to reach the person's forehead.

2.2 Temperature Measurement

Fig 4: Measuring device

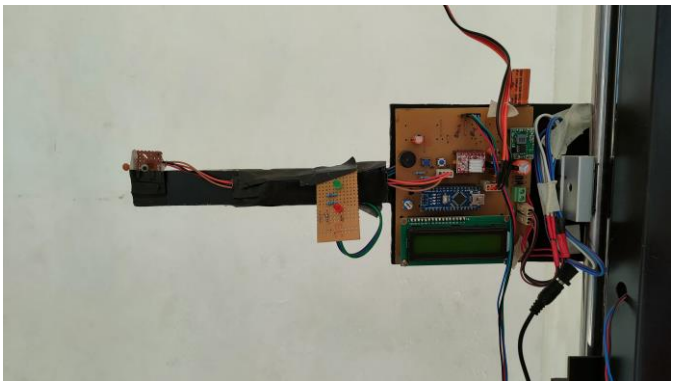

Fig 5: Circuit

A non-contact temperature sensor MLX90615 is used to measure the temperature of the body. The LCD interface displays both the measured value and the person's height. If the temperature is above the predefined temperature limit within the program (here, the temperature limit is 34 degrees Celsius), then the output signal is given to the buzzer. The buzzer gets powered by an external power of 5v, connected along with a transistor. The base of the transistor connected to Arduino will receive the signal to turn ON the buzzer. And also, the red LED in the display will glow to represent the current allocated body temperature is above the safety limit. In another case, the green LED represents the measured temperature is within the safe limit.

After the delay of 5 seconds, the motor drive will reverse the polarity, thereby rotating the motor in the opposite direction. It will return the temperature sensor to its initial position. Hence completing its path of motion. Or else, if the depth is beyond the running distance of the sensor bound bearing, then a limit switch is used to trigger the reverse motion of the motor. The ultrasonic sensor will have a delay of 5 seconds to prevent the uneven false sensing by any unwanted obstructions.

3. Hand sanitization with a mechanical door system

Fig 6: Sanitization stage

When a person enters the second stage of sanitization, as the person starts to sanitize by moving his hand towards the sanitization unit, an ultrasonic sensor senses the hand and sends a signal to the microcontroller. The microcontroller operates the motor, thereby rotating the gear, which facilitates the movement of the slider downwards until it presses the top of the sanitizer. When the smaller gear completes its full revolution, it returns and touches the limit switch. As a result, the limit switch gets triggered, and then it will send a signal to the microcontroller. Then the microcontroller operates the motor fixed to the barrier, and the motor rotates the barrier open and provides passage. When the person passes the barrier, a proximity sensor provided at the end of the unit senses the person, sending the signals to the microcontroller. As a result, polarity of the motor reverses, and the barrier is closed. Suppose someone tries to avoid the sanitization stage and tries to breach the barrier manually. In that case, the sensor attached to the barrier senses the movement and triggers the alarm and camera provided in the unit.

4. Containment zone tracking using common ID

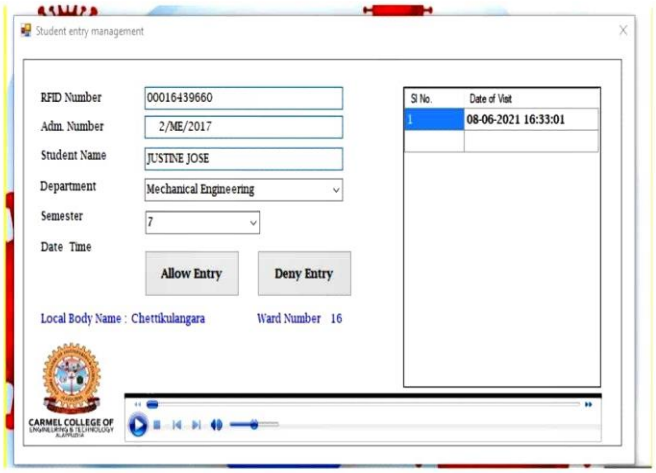

Fig 7: Verifying entry details

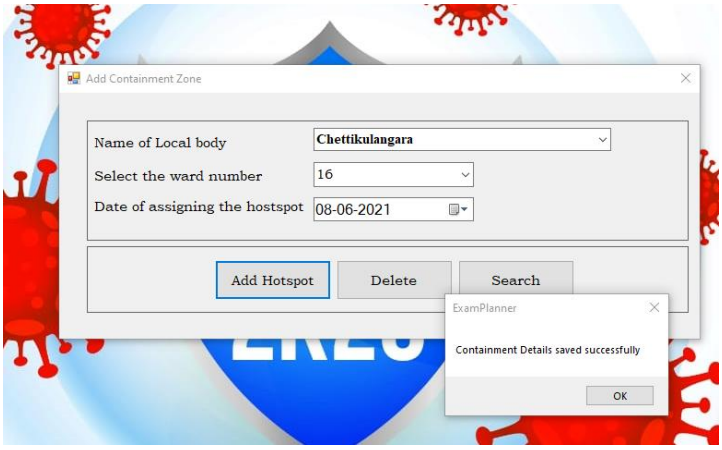

Fig 8: Containment zone details

Fig 9: Containment zone tracking

C.T.D.S. software is intended to restrict and record the entry into a building based on the database regarding the containment zone. It maintains the details of all the students along with their RF-ID details. A user with admin privilege controls the administration of this software. The program

ensures the authenticated entry with a login window prompting the user to input the username and password. The details of students can be uploaded either individually or bulk from a Microsoft Excel file.

The details of the containment zone are managed separately. When the student enters the campus, the college I.D. will be scanned and the R.F. Identification number checked against the entries in the database. Common id details are used in public places for containment zone tracking. If it finds that the student comes from a containment zone, the entry will be denied. All the previous entry details get saved in the database, including biometric attendance utilized for further references.

4.1 Hardware Specifications

- Processor - Intel Dual Core or above
- RAM - 256 MB or more
- Hard disk - 80 GB or more
- Operating System: Windows 7/8/10
- Programming Language Used: Visual Basic.Net

5. RESULT

The value of height and temperature of an individual was measured accurately. Also, the values were displayed on the LCD interface. If the temperature measured is above a referred value, red light with a buzzer indicates the person is sick, and the person gets shifted to an isolation area. It was noted that the sanitization stage using the mechanical barrier ensured the proper usage of sanitizer. Containment zone tracking software verified whether the person was from the containment zone and provided appropriate instructions through speakers connected. It was observed that the system was arguably time-efficient, totally the system maintained social distance, and accurate measurements were found.

6. CONCLUSION

This system helps to reduce the chance of the spread of the Covid19 virus in public places. It helps to ensure that all people abide by covid protocols such as temperature measurement, hand sanitization, maintaining social distancing, and tracking containment zone. This System "C.T.D.S" helps to control the chance of spread of the covid virus in public gathering places such as airports, railway stations, etc. And it helps to conduct the university exams by adhering to the covid protocols.

The advantage of using a mechanical link is to measure the temperature of individuals according to their heights. Sanitization using the mechanical barrier will help to ensure that the person uses the sanitizer. And containment zone tracking helps to identify and verify whether the person is from the containment zone. The plus point of this system is that the processes in all three stages are completed in a limited time.

REFERENCES

[1] Mr. Ajith Asok and Prof. Dominic Mathew, “A Novel Method of Using Direct Torque Control in Bipolar Stepper Motor”, International Journal of Scientific & Engineering Research, Volume 5, Issue 12, December-2014.

[2] Jessica Hillburn MT(ASCP), CIC, Brian S Hammond, Elanor J Fendler PhD, Patricia A Groziak MS, "Use of alcohol hand sanitizer as an infection control strategy in acute care facility", American Journal of infection control, Volume 31, Issue 2, April 2003.

[3] Santosh Panchal et al, "Automatic Opening and Closing of Door", International Journal of Applied and Pure Science and Agriculture (JAPSA), Volume 02, Issue 05, May-2016 .

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