Contactless Sanitizer Dispenser And Temperature Sensor With Sound Alert

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Abstract- *As we look around at the current world scenario, nations and organizations altogether are trying to find a cure for the novel Corona virus that took its leap in December 2019 and has been at large since then. Amidst all the research, there has been a magnanimous rise in the demand for proper safety protocols and hygiene so as to protect oneself from the spread of this virus.*

This situation demands a more efficient way of sanitization for the safety of the people. There are many instances where sanitization is not done properly and Covid-19 safety protocols are not followed through. This type of carelessness will only worsen the scenario.

This study presents the design and development of a low-cost automatic sanitizer dispenser. It is built in such a way that the overall cost can be reduced without sacrificing quality. In most cases, an automatic sanitizer is used. Generally Infrared sensors are used to detect the contents of the dispenser that is the hand is present. However, with infrared sensor, sensitivity changes depending on the temperature. That is the sensitivity depends on sunlight change. As a solution to the above-stated problem, in the project, ultrasonic sensor is used. Ultrasonic sensor gives the correct output with high accuracy. The design of this sanitizer dispenser is done in such a way that the contactless sanitizer built also senses the temperature. Using temperature sensor with correct and prompt readings. Also, a pump is used to spray the sanitizer.

Keywords- Contactless hand sanitizer, Ultrasonic sensor, Relay, Temperature Sensor, Pump, speaker, etc.

I. INTRODUCTION

The present COVID-19 situation demands the frequent cleaning of hands with an alcohol-based solutions preferably sanitizer or with soap and water for preventing COVID-19 infection. SARS-CoV-2 belong to the family of enveloped viruses, envelop of these viruses were made up of lipids and proteins and protects the virus from the external environment. Soaps and alcohol-based hand sanitizers can disrupt this envelope resulting in the inactivation of these viruses.

Washing hand frequently with soap and water at all places were uncomfortable. But using an alcohol-based hand sanitizer is more convenient. Sanitizer dispensers using conventional hand pumps and pedals are not many users friendly. Automatic sanitizer dispensers are more user-friendly since they operate in a touchless manner and are 100 percent safe to use. A low-cost automatic sanitizer dispenser is much needed in the bus stand, railway station, offices, colleges, etc., in this situation.

1.1. PROBLEM STATEMENT

This pandemic situation made us use hand sanitizers more than ever, to remove foreign particles and viruses, to reduce the risk of infection. While someone is sanitizing the hands there will be a lot of crowd standing in front of that person who is sanitizing, which will lead to high risk to the person who is sanitizing everyone. Whereas hand sanitizers that are being used in public by many people, it will create so much risk of infection.

1.2. OBJECTIVES

- Todecreasethe time duration of sanitization.
- To contactless measurement of body temperature.
- To sanitize the hands without any human involvement.
- To alert the security with sound if temperature is above limit.
- To pick out the infected people.

II. LITERATURE REVIEW

A research paper is a document of a scientific article that contains relevant expertise, including substantive observations, and also references to a specific subject of philosophy and technique.

[1] Title: "Automizer-An Automatic Sanitizer Dispenser"

Author: Anandu Ajayan, Sunitha Beevi.K

Abstract: This paper presents the design and development of a low-cost automatic sanitizer dispenser. It is designed in such a way that the overall cost can be reduced without compromising stability. Generally, an automatic sanitizer dispenser uses ultrasonic or infrared sensors for detecting the presence of the hand. The problem with an ultrasonic sensor is that it is costlier than the infrared sensor and requires a microcontroller for its smooth operation. But the problem with the infrared sensor is that its sensitivity varies with the intensity of sunlight. As a solution to the above-stated problem, the conventional design of the infrared sensor is modified such that the transmitter LED emits infrared pulses at a specific frequency and a frequency-specific infrared receiver can be used instead of a photodiode. Since here the receiver will only receive infrared pulse at a specific frequency, the problem caused by sunlight can be overcome. The design of this sanitizer dispenser is done in such a way that it has a flow controller, a level detector, 24 hours battery life, and can be recharged with a mobile charger.

[2] Title: "Non-invasive and wearable thermometer for continuous monitoring of core body temperature under various convective conditions"

Author: D. Matsunaga, Y. Tanaka, M. Seyama, and K. Nagashima

Abstract: We describe the design of a thermometer that can be worn during everyday activities for monitoring core body temperature (CBT) at the skin surface. This sensor estimates the CBT by measuring the heat flux from the body core based on a thermal conductive model. The heat flux is usually affected by the ambient convective conditions (e.g. air conditioner or posture), which in turn affects the model's accuracy. Thus, we analytically investigated heat conduction and designed a sensor interface that would be robust to convection changes. We performed an in vitro experiment and a preliminary in vivo experiment. The accuracy of CBT in an in vitro experiment was 0.1°C for convective values ranging from 0 to 1.2 m/s. The wearable thermometer has high potential as non-invasive CBT monitor.

[3] Title: "Body Temperature Monitor and Alarm System Used in Hospital Based on 1-wire and Wireless Communication Technology"

Author name: Chen Yu, Zhang Haijun, Wang Na

Abstract: Body temperature measurement has very important meaning in clinic diagnosis and treatment. Due to traditional artificial measurement style has mangy disadvantages such as long measurement time, and low measurement precision, etc, which is hard to automatically and accurately monitor patient body temperature in real time. Aiming to this problem, paper introduces a kind of body temperature distributed monitor system. Multi-temperature sensors DS18B20 were connected to realize body temperature signal collection, SCM AT89C52 processes measurement signal and drives field display and alarming equipment work. By nRF905 wireless transceiver chip, system completes signal wireless transmission from work slave station to work central station, and connects upper PC through USB adapter PDIUSBD12, which the distributed clinic patient body temperature concentration monitor system is carried out. Our experiments show that system wireless communication is better, and temperature measure error is less than ±0.1˚C, which matches clinic medical requirement well. Due to system adopts modularization design, which can be transplant into other fields, such as greenhouse environment intelligent monitor, etc.

[4] Title: "Self-Activating Sanitizer with Battery Imposed System for Cleansing Hands"

Author: Mr. M. M. Srihari

Abstract: –This paper gives a brief idea about the automatic hand wash sanitizer. The motor pumps the sanitizer liquid or solution to the human while detecting the IR Sensor. The IR Sensor is the photodiode used for sensing the human hand detection and it is used to control the motor pump from the liquid. The motor is connected to an RC timer delay setup and the pipe connected to a reducer are used to control the flowing liquid of the sanitizer. It has three modes of Control LED's in the system, White LED is used for the user to understand that the setup is in working mode and battery is in use. Red LED is used for the user to understand that Battery is in charging mode. Green LED is used for the user to understand that battery is in full charged mode. It has an On/ Off switch to control the whole setup from the battery supply. The consumer is convenient to use the setup and the user also saves costs and power.

III. METHODOLOGY

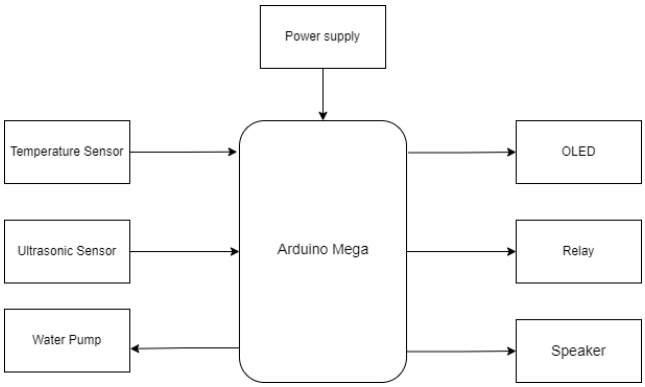
3.1 EXISTING METHODOLOGY

In the most of the methods that are existing, there are specialized devices for the temperature measurement, using infra-red gun. For sanitizing the hand we have automatic hand sanitizer. There are devices where two separate modules but they aren't integrated together.

3.2 PROPOSED METHODOLOGY

The proposed system has infra-red temperature sensor for temperature measurement of the person and automatic hand sanitizer dispenser using the ultrasonic sensors and submersible pump which has been integrated with each other with the help of Arduino Mega. The measurement of the temperature will be displayed on the OLED screen. If the measurement of temperature is above the certain limit, it will be displayed in the OLED display and in the speaker. One of the main objectives of the device is to fast the process of sanitization and temperature detection, elimination of the labour (except maintenance). Which creates an automation and further by reducing the crowd while sanitizing creates a less vulnerable place for the spread of contagious virus.

3.2.1 BLOCK DIAGRAM



The system contains Arduino Mega as the main controller. Ultrasonic sensor is given as input to the controller. Ultrasonic sensors function by sending out sound waves at frequency ranges above human hearing. The transducer of the sensor acts as a microphone to obtain and transmit the ultrasonic sound. Our ultrasonic sensors use a single transducer to transmit a pulse and to receive the echo. The sensor determines the distance to a target via means of measuring time difference between the sending and receiving of the ultrasonic pulse. Ultrasonic sensor detects the hand is present or not. Temperature sensor is a device which senses temperature variation across it. IR Temperature Sensor is a basic temperature sensor that can be used for experimental purpose. It provides the readings in centigrade (degree Celsius). It is based on the fact that as temperature increases, the voltage across diode increases at constant rate. Temperature sensor given as the input to the controller. Temperature sensor sense the temperature of the person. These readings are displayed on the OLED. If the temperature of the person is detected high sound alert turn on. Speaker will generate sound alert. A relay operates like an electromagnet. A relay is a switch; which is used to make contact between two points. There are three points namely; COM (common), NO (normally open) and NC (normally closed). The COM is connected to NC in normal state. The relay input excites an electromagnet (relay coil) so that the normal connection (i.e. between 'COM' and 'NC' terminals) gets switched and now the connection is between COM and NO.

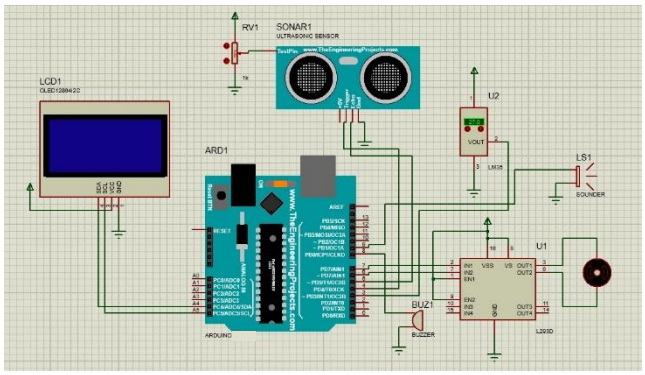
3.3 FUTURE SCOPE

- It can be used in hospitals, clinics and malls.
- Automation can be further developed to open door only when the person has body temperature in limit.
- Whether the person wearing mask or not can be detected using with the help of image processing.

It can be done using by the inclusion of camera and replacing Arduino Mega to Raspberry Pi.

IV. WORKING EXPLANATION

4.1 CIRCUIT DIAGRAM



4.2 PROCESS FLOW

The process starts out with a person approaching the proposed system. The system scans the forehead using a proximity sensor based on Infrared Radiation. Then a temperature module takes the scanned temperature as input. If the current temperature of the person exceeds 100-degree F, the speaker will go off alarming the person to take caution and if the temperature remains under 100-degree F, then the speaker will remain off with no sound alert. After temperature scan, the oximeter module of the system comes into play. The system will scan for SP02 levels in the person's body. If the level is under 90, the speaker will go off indicating that the oxygen level in the subject are lower than normal, and if the levels exceed 90, then the speaker will remain off. The proposed system with Arduino Mega works on C++ with additional functions and methods, and the whole code is

uploaded on Arduino IDE. All the readings of the temperature sensor as well as oximeter will be displayed on an OLED screen. Then the person shall proceed to place their hand near the dispenser where the Infrared Proximity sensor detects the hand's presence and dispenses a standard dosage out of the pump nozzle.

V. LIMITATIONS

The proposed contactless sanitiser dispenser system is equipped with almost all the measures to take precautions against Covid-19. But, like any other system, it does come with bit of loopholes in its working process.

1. The temperature sensor can sometimes be thrown off if it comes in contact with cold water.
2. When the sanitiser bottle is emptied, then the sound alarm does not function.
3. As any other day to day equipment would require, this system too needs proper maintenance.

VI. CONCLUSION

The methodology presented in the paper for using contactless sanitiser dispenser with temperature sensor and sound alert enables industries and organisations to curb excessive disposal of power and ensures safety levels on par with Covid-19 prevention standards. The components used in the development of this system are analysed. Sample code has also been generated through various references. Accurate description of the system through a detailed Block Diagram is developed. The complete working prototype is developed and put to experimentation.

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