

ARDUINO BASED AUTO FRISKING DEVICE

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Abstract: “Arduino Based Auto Frisking” is to ensure a contactless human body temperature measurement along with detecting metals. In this project along with detection, an alert is also sent to higher authorities to take appropriate actions. This project will be introducing the automatic sanitisation system, temperature monitoring system and metal detecting system how they can be useful in covid-19 situation. It will give a brief idea of the components used along with its technical specifications. Moving forward, Temperature monitoring system is used to detect the body temperature of a person and Metal detecting system is used to avoid an illegal and unauthorized entry of metals, bombs, into the public premises. This project will show a block diagram where all the input-output components are shown. And it will be followed by a flowchart which will give a clear idea of how the system will work, hardware design and implementation of the proposed system.

Keywords:

Temperature monitoring system, Metal detecting system, Automatic sanitization system, ARDUINO, Walk through device.

1 Introduction

The temperature monitoring system monitors the human body temperature by using MAX30205 human body temperature sensor if it exceeds normal temperature then it will a buzzing sound also displays the temperature on 7 segment LCD. A metal detector is an instrument that detects the presence of metal nearby. Metal detectors are useful for finding metal inclusions hidden within objects, or metal object buried underground. They often consist of a handheld unit with a sensor probe which can be swept over the ground or other objects. If the sensor comes near a piece of metal this is indicated by a changing tone in earphones, or a needle moving on an indicator. Usually the device gives some indication of distance; the closer the metal is, the higher the tone in the earphone or the higher the needle goes. Another common type is stationary "walk through" metal detectors used at access points in prisons, courthouses, and airports to detect concealed metal weapons on a person's body.

Hand sanitization is the most useful way to prevent the spread of disease-causing microorganisms. Traditionally, to sanitize and clean our hands, we are using soaps and manual hand soap dispenser. Nowadays, due to advancement in the technology, we have optimized the health-care equipment. Currently used modern equipment is very complex and expensive. This is the idea of fully automated sensor-based controlled sanitizer dispenser. This advocates radically different approaches: we aim to fully automate the current technique using alternate components for system, thereby reducing the cost of the product. Our designed automated dispenser can be commercially used to develop a good sanitization approach toward a community. The main advantage of this design is that we could design a number of automated dispensers within a small period of time using basic components in a very fewer budget.

This temperature monitoring system, metal detecting system and the automatic sanitization system are proposed in a single walk through device to sanitize a person and to check his temperature and to check whether he is carrying any metal objects.

1.2 Objective

The main objective of this paper is to design a auto frisking device to monitor the human body temperature in this covid 19 pandemic which is very useful to detect the temperature and give a beep sound of it exceeds the normal and also to check the persons whether carrying metal objects, bombs e.t.c., and also it is used to sanitize the person to precautionate ourselves from spreading viruses like covid pandemic with minimum cost.

2 Proposed System:

Arduino is a microcontroller controls all the three systems and displays the value of the temperature on the LCD , detect the metals and sanitizes a person by using the different individual codes written in embedded system.

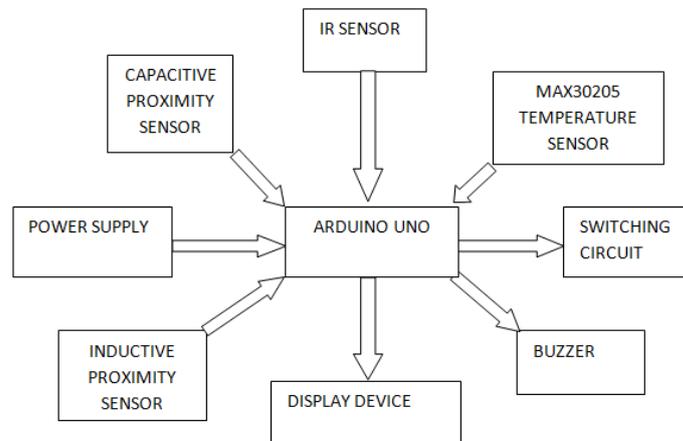


Fig.2.1: Methodology

The basic principle of working of the temperature sensors is the voltage across the diode terminals. If the voltage increases, the temperature also rises, followed by a voltage drop between the transistor terminals of base and emitter in a diode. The capacitive proximity sensor consist a high-frequency oscillator along with a sensing surface formed by two metal electrodes. When an object comes near the sensing surface, it enters the electrostatic field of the electrodes and changes the capacitance of the oscillator.

Inductive proximity sensors operate under the electrical principle of magnetism when a fluctuating current induces the voltage in a target object. The inductive proximity sensor contains a certain type of solid-state control system. It contains an oscillator circuit that generates a high-frequency magnetic field. Relays are electromechanical devices that use an electromagnet to operate a pair of movable contacts from an open position to a closed position.

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, train and confirmation of user input such as a mouse click or keystroke. LED Display (light-emitting diode display) is a screen display technology that uses a panel of LEDs as the light source. Currently, a large number of electronic devices, both small and large, use LED display as a screen and as an interaction medium between the user and the system. An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment.

2.1 Temperature Monitoring System:

In this system we uses temperature sensor MAX30205, to use to detect temperature into appropriate voltage. This voltage is given to Arduino. According to program it process the analog signal into digital and forms an particular voltage level for a particular temperature. 7 segment LCD is used to display the output i.e. surrounding temperature of MAX30205 in both degree centigrade and Fahrenheit units. At the same time it also sends the data to Relay, if the temperature becomes maximum from set point relay becomes activate. In this manner it monitors and controls the temperature. The temperature monitoring system is shown in figure 2.2

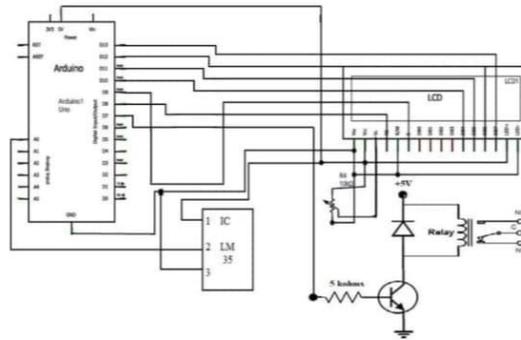


Fig.2.2: Temperature monitoring system

2.2 Metal detecting system :

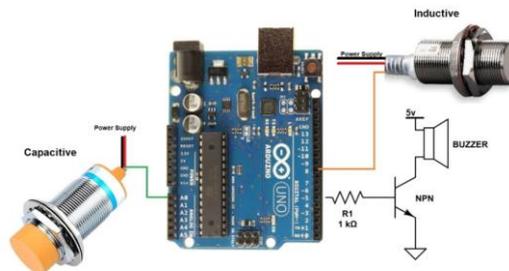


Fig.2.3: Metal Detecting System

The simplest form of a metal detector consists of an oscillator producing an alternating current that passes through a coil producing an alternating magnetic field. The metal detecting system as shown in figure 2.3. If a piece of electrically conductive metal is close to the coil, eddy currents will be induced (inductive sensor) in the metal, and this produces a magnetic field of its own. If another coil is used to measure the magnetic field (acting as a magnetometer), the change in the magnetic field due to the metallic object can be detected.

2.3 Automatic sanitization system:

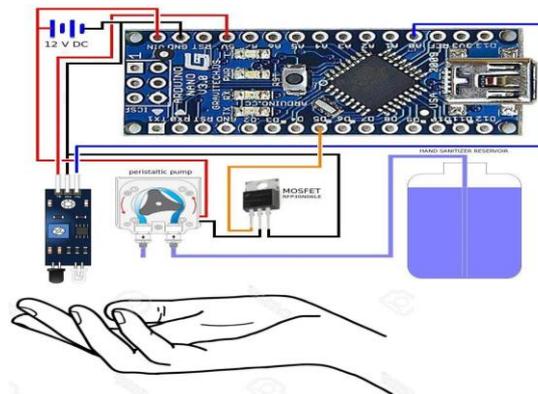


Fig.2.4: Automatic sanitization system

The infrared sensors of the automatic hand sanitizer dispenser detect the infrared energy that is emitted by one's body heat. When hands are placed in the proximity of the sensor, the infrared energy quickly fluctuates. This fluctuation triggers the pump to activate and dispense the designated amount of sanitizer.

3 Principle of operation:

The MAX30205 accurately measures temperature and provides overtemperature alarm, interrupt, and shutdown output. The MAX30205 converts temperature measurements to digital form using a high-resolution, sigma-delta, analog-to-digital converter (ADC). One-Shot and Shutdown Modes helps to reduce power usage. Communication is through an I2C-compatible, 2-wire serial interface. Capacitive proximity sensors rely on the ability of objects to hold an electrical charge even when the object is non-conductive. Capacitance is a measure of the amount of charge that can be stored under the application of an applied voltage. The sensor operates by noting the change in capacitance that occurs when an object (usually called the “target”) approaches the sensor.

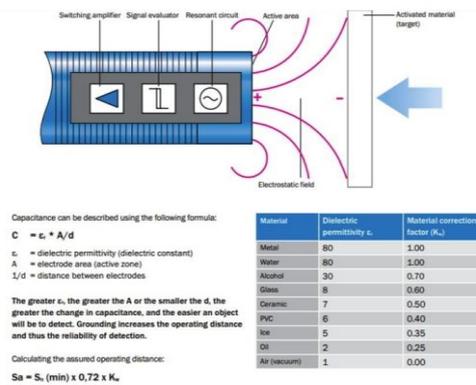


Fig.3.1: Automatic sanitization system

Inductive sensor uses one coil to produce a changing magnetic field, and a second coil (or other device) to sense the changes in the magnetic field produced by an object, for example, due to eddy currents induced in a metal object.

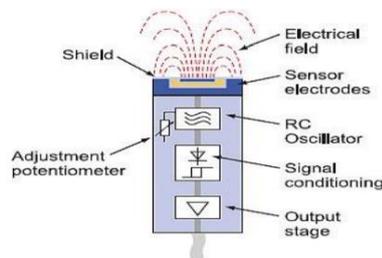


Fig.3.2: Working Principle of Inductive Proximity Sensor

4. Hardware Developed:



The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. Liquid Crystal Display (LCD) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. Inductive Proximity Sensor is an electronic proximity sensor, which detects metallic objects without touching them. These Sensors consist of an induction loop. Electric current generates a magnetic field, which collapses generating a current that falls asymptotically toward zero from its initial level when the input electricity ceases. Capacitive proximity sensor that detects nearby objects by their effect on the electrical field created by the sensor. Simple capacitive sensors have been commercially available for many years, and have found a niche in nonmetallic object detection, but are limited to short ranges, typically less than 1 cm.

Fig. 4.1 Hardware working Model

5 Results & Discussions:

The output of temperature monitoring system is showed in figure 5.1. The temperature monitoring system monitors the room temperature and the human body temperature.



Fig.5.1: Temperature monitoring system output

The sanitization system sanitizes the person where IR sensor senses the hand as shown in figure 5.2

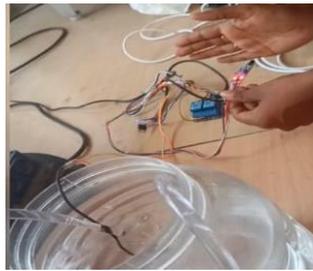


Fig.5.2: Automatic sanitizing system output

In the metal detecting system, the capacitive and inductive sensors senses the metals and give beep sound as shown in figure 5.3



Fig.5.3: Metal detecting system output

5.1 Advantages:

1. The three systems like temperature monitoring, metal detecting and automatic sanitization in a single walkthrough device decreases the cost of entire device
2. It leads to decrease in spreading of viruses among the people by sanitizing and monitoring the temperature of every person
3. It can be used before the college premises, shopping malls, schools, industries and other places where needed.

5.2 Disadvantages:

1. It has limitation under metal detecting system sensor which senses the metals which are very closer to it. This can be avoided by using highly recommended sensors but those are cost effective.

6 Conclusion:

Hence, the temperature of a person is calculated by using a temperature monitoring system where MAX30205 temperature sensor is used to sense the temperature and displays the value of the temperature. Hence, the temperature of a person is calculated by using a temperature monitoring system where MAX30205 temperature sensor is used to sense the temperature and displays the value of the temperature on the LED display.

Metals are detected by using metal detection system where inductive proximity sensors and capacitive proximity sensors are used to sense the metals entering through the walkthrough device or a frisking device and buzzer will indicate the metals with its sound. Automatically sanitizes the person who is entering the walkthrough device by sensing the hand through the infrared sensor.

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