

Review on Automatic Sanitizer Dispensing Machine Using Ultrasonic Sensor

Prof. V M Sardeshmukh
Vishwajeet Jagtap
Student,

SAVITRIBAI PHULE PUNE UNIVERSITY
DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING
SINHGAD ACADEMY OF ENGINEERING KONDHWA,
PUNE-411048

Abstract:- An automatic hand sanitizer dispensing machine is automated, non contact, alcohol based hand sanitizer dispenser, which finds it's use in hospitals, work places, offices, schools and much more. Alcohol is basically a solvent, and also a very good disinfectant when compared to liquid soap or solid soap, also it does not need water to wash off since it is volatile and vaporizes instantly after application to hands. It is also proven that a concentration of >70% alcohol can kill Coronavirus in hands. Here, an ultrasonic sensor senses the hand placed near it, the Arduino uno is used as a microcontroller, which senses the distance and the result is the pump running to pump out the hand sanitizer. Lcd used to display the distance sensed by ultrasonic sensor.

Keywords:- Sanitizer, Pump, Alcohol, Soap, Coronavirus, Ultrasonic Sensor, Relay, Lcd

I. INTRODUCTION

Sanitization means cleaning or sterilizing an object or body part like hands or whole body. Sanitization can be done in many ways including UV Sanitization, Soap Sanitization, Alcohol Sanitization, Bleach Sanitization and so on. Of the above methods, alcohol was found to be more useful for human beings since it is harmless on skin surface, vaporizes easily and kills most of the viruses, bacteria, and also removes dirt in our hands. Alcohol based hand sanitizers are also provided with antiseptic disinfectants like Chlorohexidine Gluconate. Minimum concentration of alcohol in hand sanitizers must be greater than 70% for effectiveness against viruses. But, repeatedly touching the hand sanitizer containers to get a drop of sanitizer again initiates contact with persons, which may be risky. Hence there is need for non contact based hand sanitizer dispenser.

II. LITERATURE SURVEY

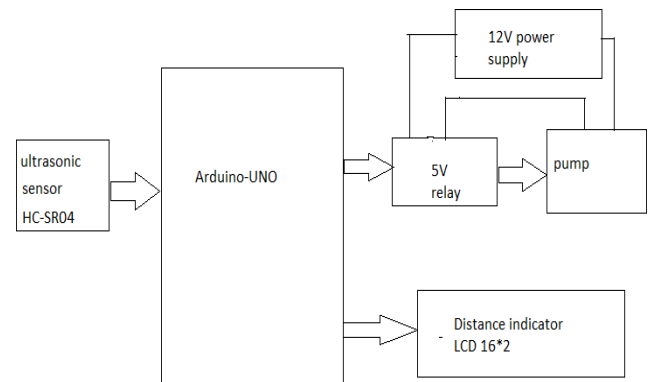
In [1], the paper mainly says about the hospital grasped infections, which is about 2 Million Patients per year and also says that it is 8th leading cause for deaths annually in USA. It also says that handwashing is important and also effective with proper hand washing steps, but washing with soap and water is time consuming for peak hours in hospitals. This paper also showed the effectiveness of the alcohol based hand sanitizers, which reduced infection rates by whopping 30%. They used hand sanitizers with 60 to 70 percent ethanol or isopropanol for reducing significant number of pathogens.

In [2], In this paper, IR sensor module is used as trigger for automated sanitizer. When switch is on the circuit and hands in front of the IR sensor module. Sanitiser fluid will flow out and continue to flow out until your hands are withdrawn from the sensor. However the disadvantage is. The IR module tends to get activated by itself when kept in open sunlight and sometimes even under tube light inside a room.

In [3], The foot operated sanitizer dispenser stand is a device which dispense a controlled amount of soap solution (or a similar liquid such as a hand sanitizer).

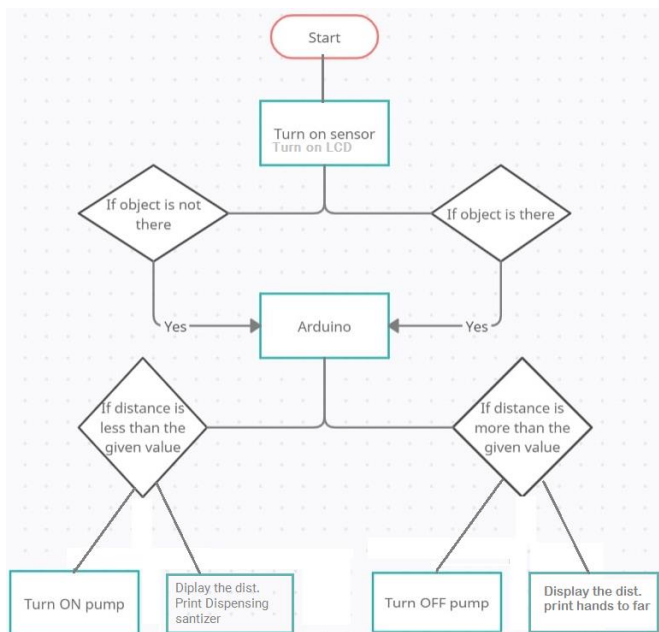
The hand sanitizer dispensing machine market can be segmented based on type, capacity, operation mode, end-use, distribution channel, and geography. Based on type, the market can be classified into gel hand sanitizer dispensing machines, liquid hand sanitizer dispensing machines, foam hand sanitizer dispensing machines, and others. In terms of capacity, the market can be categorized into less than 1.5 liters 1.5–2 liters, 2.5–3 liters, and more than 3.5 lit..

III. METHODOLOGY



Here, An Arduino Uno microcontroller is used since it is easy to program, has inbuilt ADC, DAC. The input to the Arduino is given using an ultrasonic sensor, which is used to sense the distance, it emits ultrasonic frequency from one side and the notes the time taken by sound wave to get reflected back. When the sensor senses the hand, at a distance less than 20cm from the sensor, the Arduino gives a 100ms pulse from it's digital output pin. The pump cannot be used directly, hence a relay is used as a switch. The relay accepts the pulse from Arduino and makes the pump run. The servo motor can be used with arm fitted above sanitizer, switch its position from 90 to 0 degrees which pumps out a few drops of hand sanitizer on to the hands, after pumping, the distance is sensed for every 1000ms(1s) for scanning purposes. The distance sensed by ultrasonic sensor is given as input to arduino and lcd displays the sensed distance.

IV. FLOWCHART

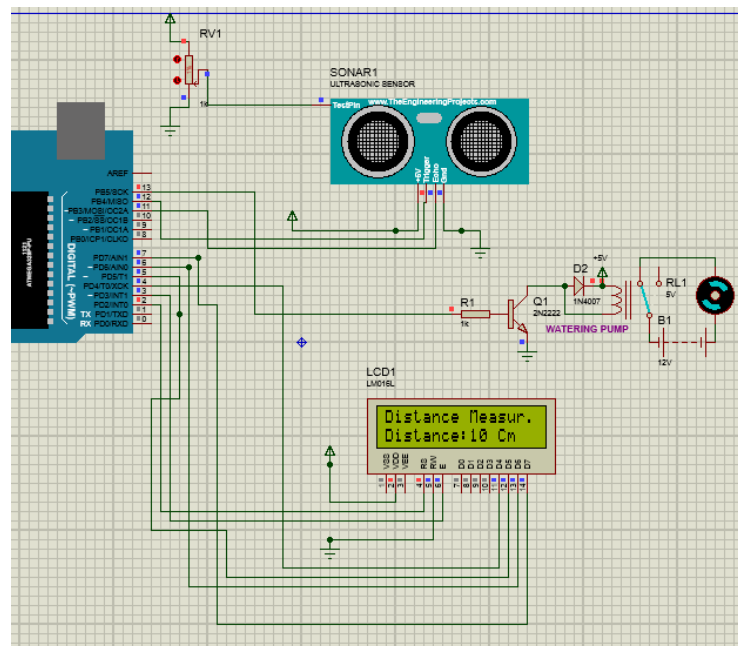


V. ALGORITHM

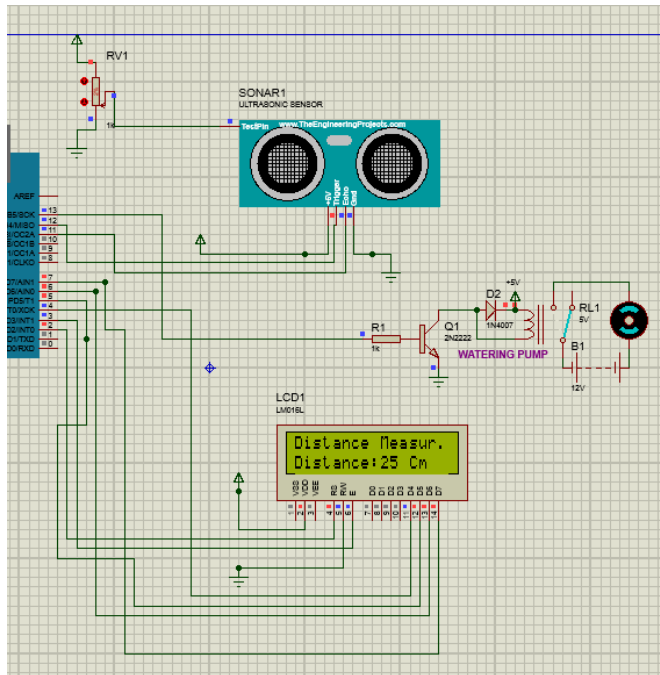
- 1.START
- 2.Intiate ultrasonic sensor and LCD
- 3.Calculate distance between hand and sanitizer
- 4.If distance greater than 20cm intiate pump dispense liquid
else Turn off pump
5. Scan object for every 1000ms.
- 6.Show distance on LCD.

VI. TEST RESULTS

Distance<20cm:



Distance>20cm:



VII. ADVANTAGES

- ▶ This build that can be try at home and works equally well in any commercial setting, but it also has obvious real-world implications for people looking to combine their passion for Maker work with more at-home sanitization during a pandemic! If adjust the height of the servo mounting appropriately, any off-the-shelf sanitizer bottle can be put into use. Either we can use relay controlled pump instead of servo motor.
- ▶ AC-DC power source is the most sustainable and cost-effective solution
- ▶ It can be uses as commercially as well as for household purpose.

1. Automatic

The first and foremost advantage of an **automatic sanitizer dispenser** is that it provides a **truly touchless experience**. There is no hassle of pressing a button or a handle (as in the case of foot-operated ones). These dispensers have ultrasonic sensors that release the sanitizer once keep your hands below the nozzle. It's fast, safe, and simply more efficient.

2. Easy to use

For every appliance, the ease of use is what determines its feasibility. While choosing a sanitizer dispenser, you will want something that will be easy to use, unlike the manual ones.

3. Eliminates a contact point

Manual hand sanitizers require pushing the pump to release sanitizer. Touching the pump can spread a of virus. With **touchless hand sanitizer dispensers**, there is no common contact point, which means less or no germs will be transferred from one person to another

VIII. RESULTS AND DISCUSSIONS

In the above paper, Arduino is used as a microcontroller for calculating the distance between the sensor and the hand placed below it. If it is less than 20cm, then pump runs for 100ms through a relay works causing pumping action pumps out few mL of liquid alcohol based hand sanitizer and also senses the distance for every 1000ms. Components like arduino pump, relay, Arduino microcontroller, Lcd, ultrasonic sensor were tested. The Hand Sanitizer used was liquid type with Isopropanol and Chlorohexidine Gluconate (0.3%). This can also be used for gel type hand sanitizer also.

IX. CONCLUSION

From the above paper, we come to know that alcohol based hand sanitizers are more effective than soaps, and also easy to use. The paper also says that non contact dispensing is again important to prevent pathogen spreading and finally, hand hygiene is most important and must be part of our daily life

X. REFERENCES

1. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. Lancet 2020;395 (10223) : 470-
2. Wu F, Zhao S, Yu B, Chen YM, Wang W, A new corona virus associated with human respiratory disease in China. Nature 2020;579(7798):265-9.
3. Lai CC, Shih TP, Ko WC, Tang HJ, Hsueh PR. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and corona virus disease-2019 (COVID-19): the epidemic and the challenges.
4. Iseri M, Malina Y, Hardman J, inventors. Dispenser for hand sanitizer. 9,060,655. United States patent US. 2015 Jun 23;
5. Arduino [Internet]. Somerville (MA): Arduino; c2020. [cited at 2020 Aug 4]. Available from: <https://www.arduino.cc/> [Google Scholar]
6. Arduino Tutorial point, pp. 24-35, 2016, Retrieved online from arduino tutorial point

LITERATURE REFERENCES:

- 1] Jessica Hillburn MT (ASCP), CIC, Brian S Hammond, Elanor J Fendler PhD, Patricia A Groziak MS, "Use of alcohol hand sanitizer . an infection control strategy in acute care facility", American Journal of infection control Volume 31, Issue 2, April 2003.
- 2] Circuit Digest Author; Rameshwer Prasad Nishad Student Year; 2020
- 3] Month & year of preparation:- June 2020 MSME Development Institute, 65/1, GST Road, Guindy, Chennai-32