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All in One Automatic Hand Sanitizer

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Abstract
This all in one automatic hand sanitizer, is an electromechanical system designed and constructed to help curb the spread of Covid-19 through hands. It was achieved by heuristic application of electronic sensors, mechanical pumps, LED and LCD display devices wired around an AT-MEGA microcontroller board, loaded with the required sketch codes. While the ultrasonic proximity sensors are coded to actuate between 0-64cm range, the LED and LCD devices are programmed to display when any of the sanitizing elements is empty and for sensors detection OFF and ON respectively. Although, a hundred percent success was recorded for all the hypothesis of this demonstration project. It is recommended that a pump of up to 10psi be used to replace the 1psi pump if commercial application is intended.

Keywords: *Ultrasonic Sensor; Arduino Uno; Sanitizing elements; Relays; Pumps.*

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I. Introduction

How can we curbthe spread of corona virus through hands? This project attempted to provide solution to the stated problem by creating a system whose pictorial view is as shown below;

Fig 1: Pictorial view of the system.

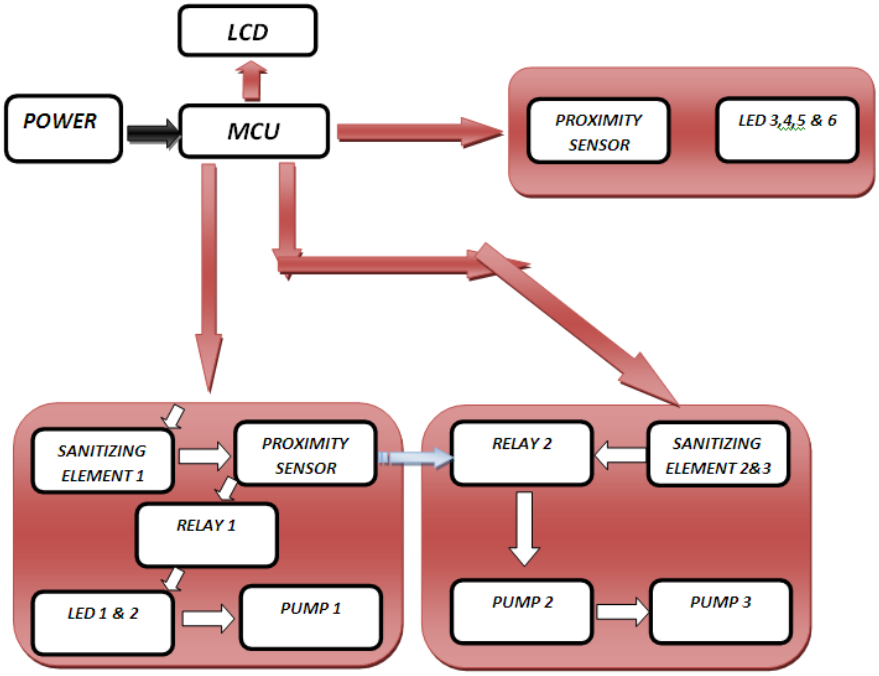
During the course of the designing and fabrication of this work we were faced with the following research questions:
How will the system detect the hand?
How will the system react when any of the sanitizing elements gets finished?
How will the system detect when the waste water container is full?

What source of power will the system utilize?
How do we make the system fully automatic?
Related works to this project includes;
(David,etal. 2009), developed a vision based system for automatic hand washing quality assessment.
(Askhay,2020), used an Arduino uno micro-controller to build an automatic hand sanitizer that can dispense sanitizer liquid only.
(Simon, etal, 2015), made a hand sanitizer dispenser and associated hospital acquired infections.
(Naomie, 2017), Developed an automatic hand washer, capable of dispensing only water,
(Jeremy, etal. 2012), created areplacement hand washing system that takes the place of current sink, soap dispenser and drying technology.
(Lukasz,etal. 2014), created a single water sink and soap dispenser and four wall mounted hand sanitizers in a clinical environment.
From the aforementioned related works it can be clearly seen that this research has added to knowledge by creating an all in one automatic hand washing machine from both local materials and some few electronic devices, capable of dispensing soap, water and liquid sanitizers simultaneously.

II. Design Methodology

Hardware Design Methodology

Block Diagram



Schematic Diagram

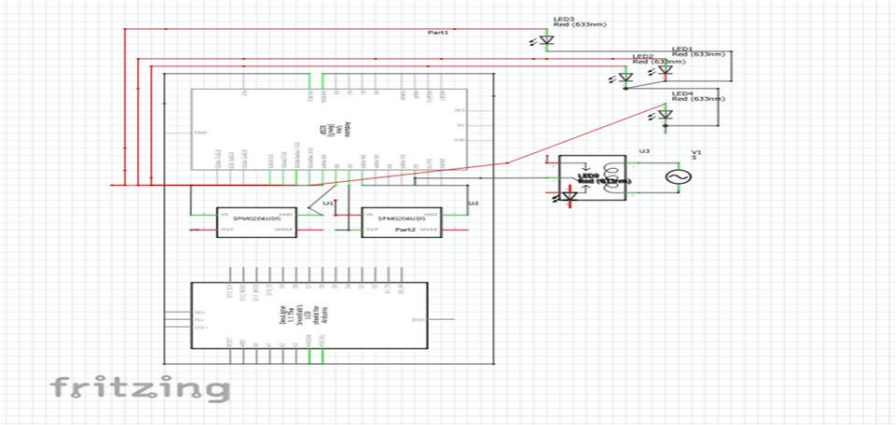


Fig 3: Schematic Diagram

Circuit Diagram

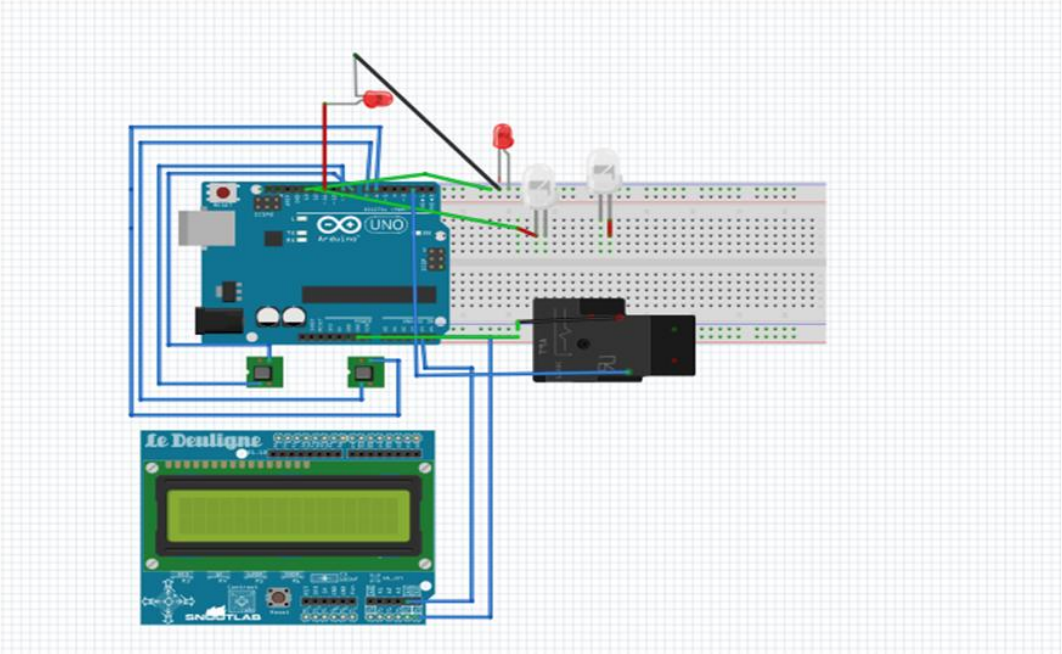
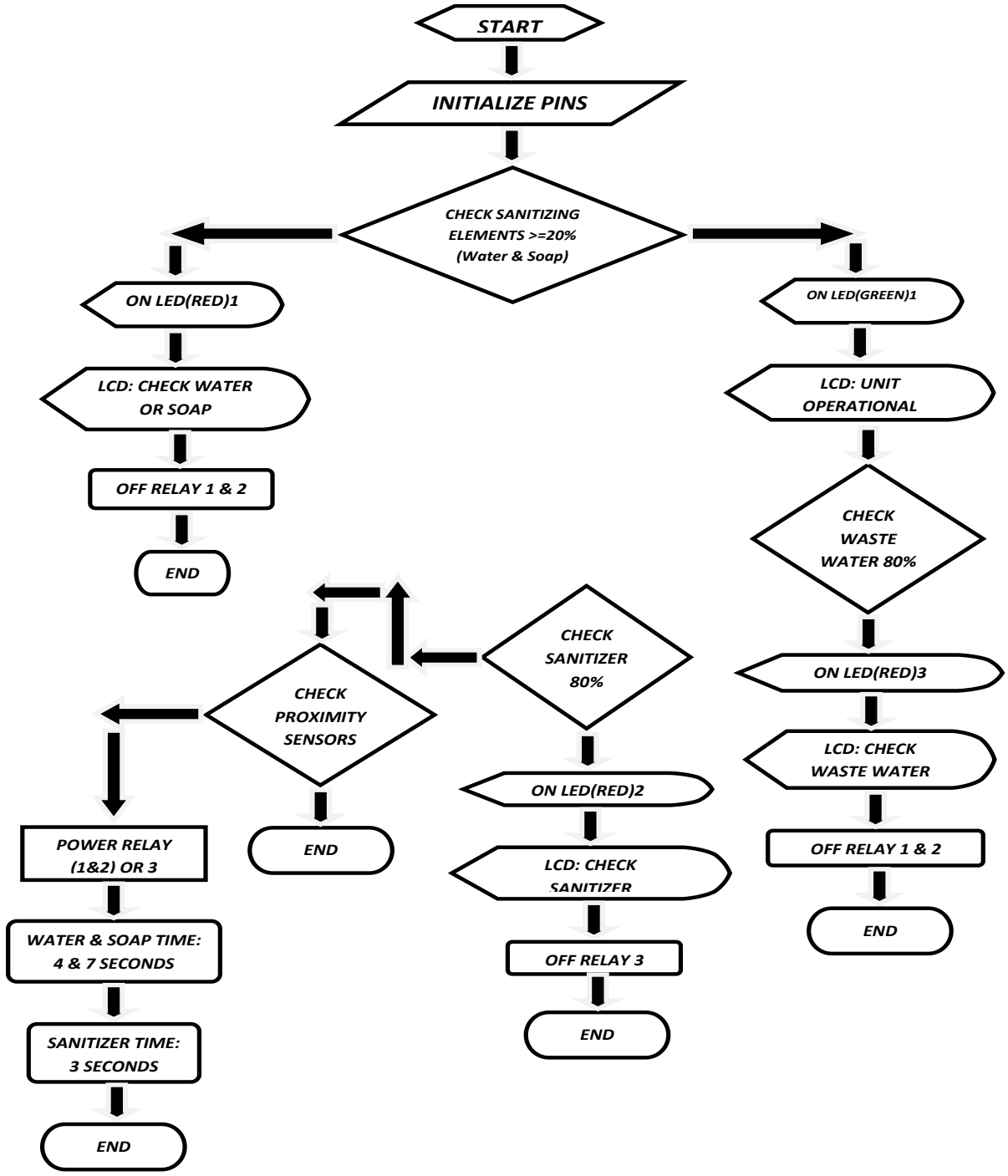


Fig 4: Circuit Diagrams (www.fritzing.com)

Software Design Methodology
Software Algorithm
Begin
Declare Variables
Declare Functions
Initialize global variables "int"
Check sanitizing element global variables value(Water & Soap); are > 20%
If(values ==false) {PowerRedLED1,LCD.print ("check water or soap"), off relay 1&2}
If(values == true){PowerGreenLED1,LCD.print "unit operational"}
Check waste water global variables value are <80%
If {values == true){powerRedLed3,LCD.print("waste water"), off relay 1&2}
If (values ==false) {check sanitizer global variable value >20%
If (values == false) {PowerRedLed2, LCD.print ("check sanitizer"), off relay}
If (values == false)
Initialize global variable
}
If (values == true)
{power relay (1&2) or 3, Delay (4000) & Delay (7000), or Delay(3000) respectively }
End

Flowchart



C

Fig 5: Software Flowchart

III. Results And Analysis

Table 1: Soap Dispensing Sensor Calibration Data

Distance (cm)	Time (s)
0	0
10	622
20	1205
30	1779
40	2225
50	3257

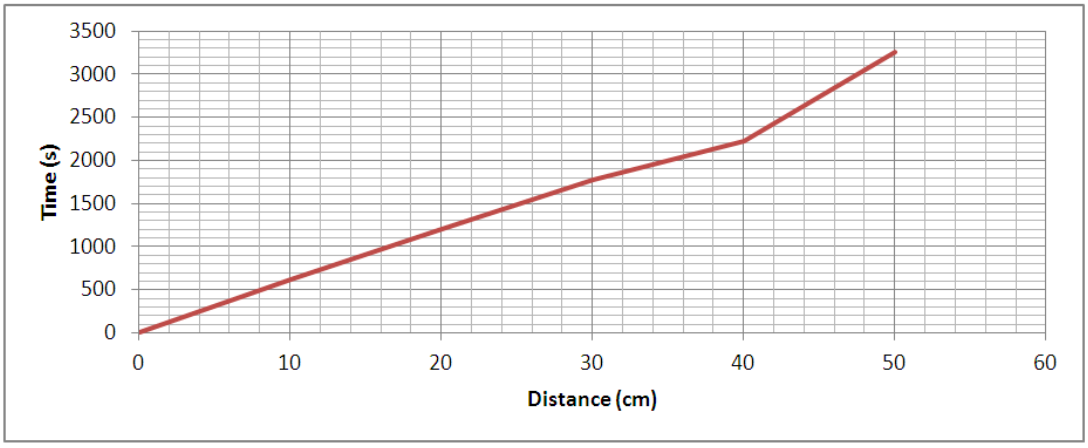


Table 2: Water Dispensing Sensor Calibration Data

Distance(cm)	Time(s)
0	0
1	50
10	521
15	742
21	1205

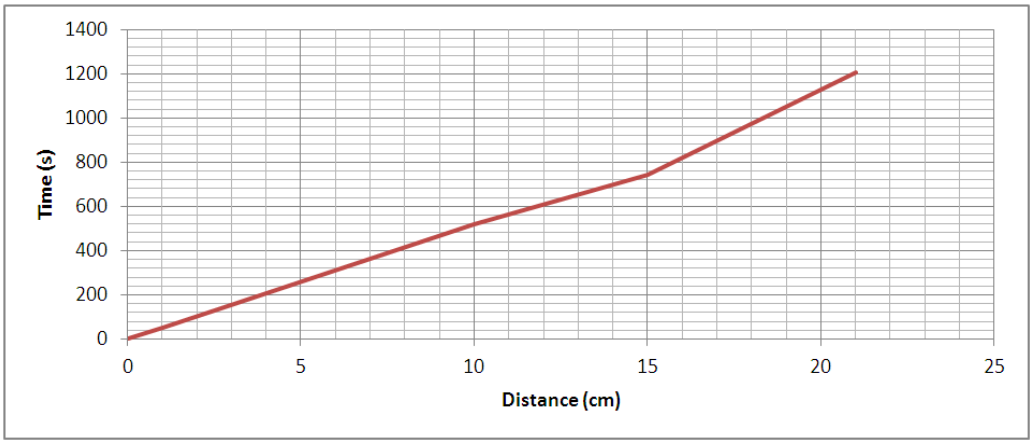


Table 3: Sanitizer Dispensing Sensor Calibration

Distance(cm)	Time(s)
0	0
10	641
20	1205
30	1770
40	2353
50	3220
60	4000

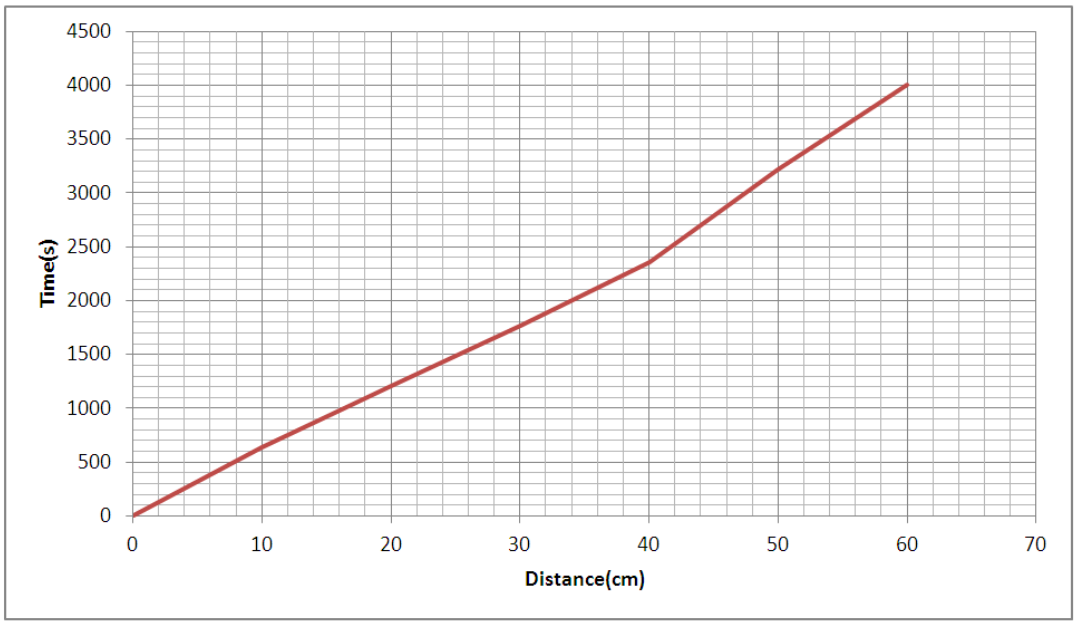
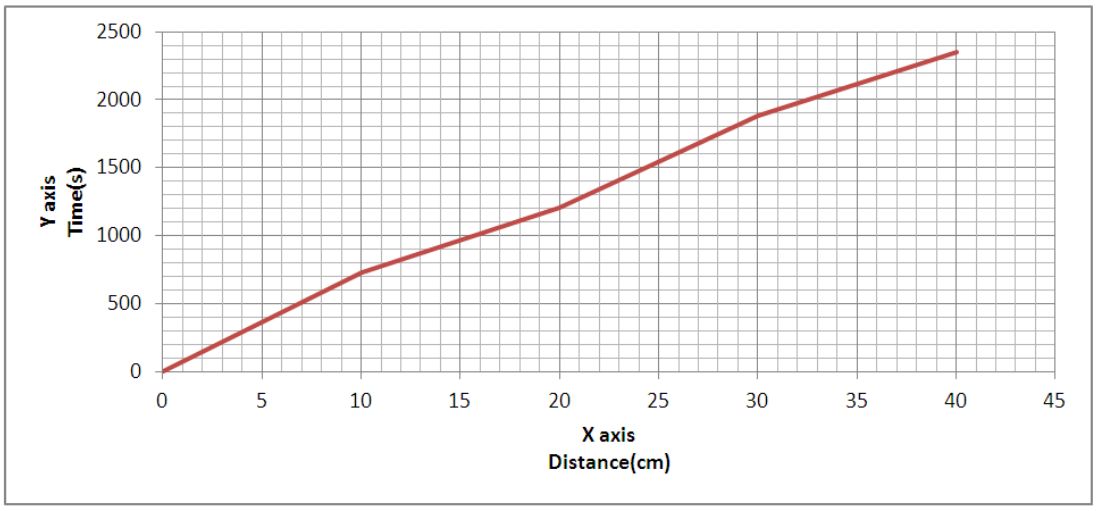


Table 3: Sanitizer Dispensing Sensor Calibration	
Distance(cm)	Time(s)
0	0
10	726
20	1205
30	1884
40	2353



IV. Conclusion

Actually this project achieved 100 percent of all the research question or hypothesis available to it. The ultrasonic sensors used were perfect for hand detection and other sensing requirement of the project. With the microcontroller providing control for the various LED indicators, sensors and therefore achieving a fully automatic system.

V. Recommendation

Although Arduino UNO, 1psi Arduino pump and 10amps relays are used for this demonstration project, it is recommended that Arduino Mega providing more plug in pins, 10psi pump and 100amps relays that are more durable be utilized for a commercially viable system.

References

[1]. Sharma A.S (2020) "Automatic hand sanitizer ". @www.researchgate.net,internet.

[2]. David f.L;Ignacio p; Miguel A.S and Gerrard l.(2009); "Automatic hand quality assessment". Retrieved from http//:www.Researchgate.net, internet.

[3]. Jeremy brassard, David markham, Amber Truhanovitch (2012); "Replacement hand washing system". Retrieved web.wpi.edu.internet

[4]. Lukasz .S.B (2014): '' Hand sanitizer dispensing door handless ''. Retrieved from www.ajicjourney.org. Internet.

[5]. Noemie A.B.(2017) ''Automatic hand washer''. Retrieved from www.researchgate.com. Internet.

[6]. Simon D.E, Michael L. and William R. (2015) ''Hand sanitizer dispenser and associated hospital acquired infections''. Retrieved from http//:www.researchgate.net, internet.

[7]. (2020): "Arduino integrated development environment''. www.arduino.cc, internet

[8]. (2020): "Fritzing Arduino project schematic software" . www.Fritzing.org, internet,

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