

Covid-19 Hand Wash Timer

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Abstract- Entire world is taking all necessary steps to ensure that they are prepared well to face the challenge and threat posed by the growing pandemic of COVID - 19 the Corona Virus. Recommended measures to prevent infection include frequent hand washing and social distancing. To support the people, especially elders, this work present a simple low cost timer using 555 IC which remains them the time to wash their hand and time duration to wash their hand.

Index terms- 555 IC, Covid-19, Astable mode, Monostable mode, Hand wash

I.INTRODUCTION

Corona virus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome corona virus 2. It spread globally and resulting in the ongoing 2019–20 coronavirus pandemic. Almost entire world is now working from home to avoid infection from this disease. People of all ages can be infected by the corona virus. Older people appear to be more vulnerable to becoming severely ill with the virus.

The most important factor in preventing the spread of the Virus locally is to empower the citizens with the right information and taking precautions as per the advisories being issued by Ministry of Health & Family Welfare. The virus is mainly spread during close contact and by small droplets produced when people cough, sneeze or talk. Recommended measures to prevent infection include frequent hand washing, social distancing, covering coughs and sneezes with a tissue or inner elbow, and keeping unwashed hands away from the face.

Preventive measures to reduce the chances of infection include staying at home, avoiding crowded places and washing hands with soap and water or alcohol-based hand rub often and for at least 20 seconds.

To support the people, this work present a simple low cost timer using 555 IC which remains them the time to wash the hand and time duration to wash the hand. By proper designing of the resistor and capacitor values in this timer, it is possible to set the time interval to wash and time needed to wash. By means of buzzer sound this timer remains the people to wash their hand frequently for their safety as advised by the medical authorities.

II. DESIGN OF HAND WASH TIMER

This timer is designed with three 555 IC's which are connected in sequential manner. They are designed to operate in Astable and mono stable mode. The three 555 IC's will remains the time to handwash, cushioning time and hand wash duration time.

Time to hand wash: The buzzers at this time indicate that the time for hand wash begins.

Cushioning time: This is a small time interval within which the people has to get ready with soap and water or sanitizer.

Hand wash duration time: This time indicate the time duration up to which the hand wash has to be carried out.

A. Circuit Diagram

The circuit diagram of Covid-19 Hand Wash Timer is show in figure 1. The basic building block of this timer consist of two 555 IC's which are operating in monostable mode and connected in series with one 555 IC operating in a stable mode. The resistor and capacitor values set in the 555 IC circuit decides the time period of the pulses generated. First timer is designed to operate in astable mode while the other two are designed to operate in monostable mode.

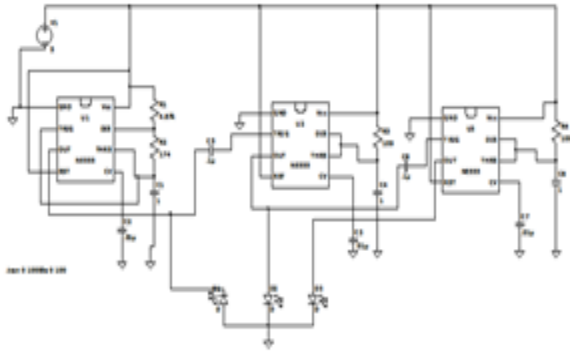


Figure 1 Circuit diagram

B. Design

Astable mode

The ON and OFF time of the astable mode is given by,

$$T_{ON} = 0.69 (R_a + R_b) C \text{ and}$$

$$T_{OFF} = 0.69 R_b C$$

Where,

R_a is the resistor connected between Vcc and Discharge terminal

R_b is the resistor connected between Discharge and Threshold terminal

This timer is designed to give buzzer sound at every one hour interval. The buzzer sound continues for 2 minutes (120 seconds). The output from 555 IC is inverted and given to the Buzzer. Instead of Buzzer, an LED is connected in our simulation circuit.

Therefore,

$$T_{\text{Total}} = 1\text{Hour} = 3600 \text{ seconds}$$

$$T_{ON} = 0.69 (R_a + R_b) C = 3480$$

$$T_{OFF} = 0.69 R_b C = 120$$

If $C = 1$ F then,

$$0.69 R_h \times 1 = 120$$

$$R_{h \times 1} = 120 / 0.69 = 174 \, \Omega$$

Now,

$$0.69 (R_a + 174) \times 1 = 3480$$

$$R_a = (3480 / 0.69) - 174 = 4.9 \text{ k}\Omega$$

Monostable mode

For monostable mode only one resistor is used and time period is given by,

$$T_{ON} = 1.1 R C$$

Cushioning timer and hand wash period timer are set for a time period of 120 seconds.

Therefore, with $C = 1F$

1.1 R C = 120 and

$$R = (120 / 1.1) = 109 \, \Omega$$

III. RESULTS AND DISCUSSION

The designed circuit is constructed and simulated to verify its performance. The circuit constructed for simulation is shown in figure 2 and it clearly indicates the operating modes of 555 IC.

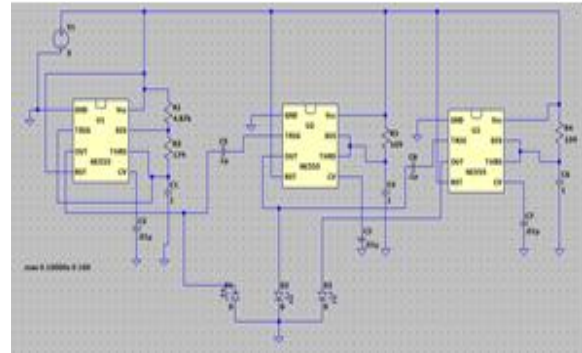


Figure 2 Covid-19 Hand Wash Timer

The outputs taken at various points like output of timers and output of capacitors are shown in figure 3.

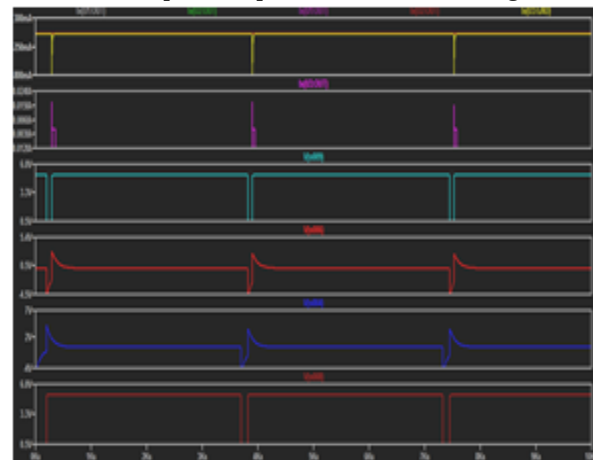


Figure 3 Covid-19 Hand Wash Timer Outputs

From the simulated output it's clearly observed that for every one hour a buzzer sound will come followed by two buzzer sounds for a period of 120 seconds to indicate the cushioning time and hand wash duration time. As already indicated, three LEDs of different colours are connected instead of three Buzzers. The capacitors connected at the output of 555IC will provide a trigger pulse to the next stage. By changing the value of resistor and capacitor, it is possible to set different time period as per the requirement.

IV. CONCLUSION

The low cost Covid-19 Hand Wash Timer is constructed using 555 IC and its simulation

performance is tested. This timer remains the people and elders regarding the time to wash the hand and time duration to wash their hands. This type of circuits will enhance the life of people to safe guard themselves from virus disease. Once the lockout period is removed, this timer can be constructed using real time components. Depending on the requirement, the time periods can be changed simply by changing the value of resistors and capacitors.

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