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AUTOMATIC SANITIZER AND WATER DISPENSER WITH WATER PURIFICATION

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Abstract : Corona Virus disease (Covid19) is wreaking havoc in the world. Ever since WHO announced it as a Pandemic disease and many cities are under lockdown, people are not able to step out of their homes and already thousands have lost their lives. As the global Covid-19 crisis continues to unfold, washing and sanitization of hands have become an absolute necessity in daily affairs. Automatic mist based sanitizer dispensing systems is very useful resource in the fight against corona virus. This contact less dispensing system helps to sanitize hands without getting in contact with the sanitizing surfaces and will help to reduce spread through cross contamination. This contactless dispensing unit sprays alcohol based sanitizer when both hands are placed under it. The aerated mist based formula uses only 5- 6ml. of sanitizer ensuring optimum usage. It releases full cone spray mist for 12 seconds in single operation. Contactless technology works on plc based ir sensor and timer logic to ensure zero touch, high operational precision to completely disinfect both hands at once. It could be wall mountable. The capacity tank ensures longer duration of usage thus eliminating hassle of refilling it frequently. The sanitizer container allows displaying the quantity in it.

Also at same time the rotatory table of glass is filled with water while sanitizer dispenser is on so that before some one drink water the person hands should be sanitized.

1. Introduction:

This dispenser is contactless and will spray sanitizer for sanitization of hands while entering into the buildings like Hospitals, Office complexes, shopping Malls, auditoriums , public places, apartments, schools, colleges, places of workship, other public places etc. There are very few units manufacturing Automatic mist based sanitizer dispensing machine in India. In the present scenario, it is very much important to equip all public places with automatic sanitizer dispensing unit. Due to the spread of Covid-19, there is enough demand for this product.

We also give water dispenser with it which too is plc based. In order to keep in mind that if some one is drinking water he must first sanitize hand and then touch's the glass.

BASIS & PRESUMPTIONS:

The basis for calculation of production capacity has been taken on a single shift basis on 75% efficiency, The maximum capacity utilization on single shift basis, for 300 days in a year. During the first year and second year of operations, the capacity utilization is 60% and 80% respectively. The unit is expected to achieve full capacity utilization from the third year onwards, The salaries and wages, cost of raw materials, utilities, rent, etc. are based on the prevailing rates in and around Thrissur, Kerala. These cost factors are likely to vary with time and location, Interest on term loan and working capital has been taken @ 9% on an average. This rate may vary depending upon the policy of financial institutions/agencies

from time to time the cost of the raw material, components, machinery and equipment's refer to a particular make/model and the prices are approximate, The break-even point percentage indicated is of full capacity utilization, the project preparation cost, etc. Whenever required may be considered under the pre-operative expense, the minimum essential machinery and testing equipments required for the project have been indicated. The unit may also utilize common facilities available at MSME Technology Centers, under the Ministry of MSME, Govt of India , CFCs set up under the MSE-CDP scheme of Govt of India in different clusters, DRDO, Electronics Test & Development Centers (ETDC) and Electronic Regional Test Laboratories (ERTLs), common facilities set up by state Governments and Ministry of Information Technology to manufacture products conforming to International standards. For the prototype development, facilities available under Technology Incubation centers may be utilized. The Maker village at Kochi in Kerala is a start up eco system for the Electronic based units. Medical Devices Incubation Facility at Sree Chitira Thirunal Institute, Thiruvanathapuram and DRDO may also be approached for the possible technical assistance.

2. Objectives of project:

1. The main objective of project is to avoid covid infection on public places while drinking water.
2. This machine works on very less power consumption
3. We can restrict china projects by making made in india products.
4. Sensor range is very good and adjustable
5. No light effect on sensor
6. Plc based product so very less chances of malfunctioning.

3. Literature review :

By T.K. Hareendran on January 14, 2021 writen an article given below:

A branded automatic water dispenser is usually expensive. So, a relatively low-cost do-it-yourself solution is presented here. It is a portable general-purpose automatic water dispenser perfectly suitable for homes to wash hands or feed water to pets. The presented system also offers many possibilities for extensions.

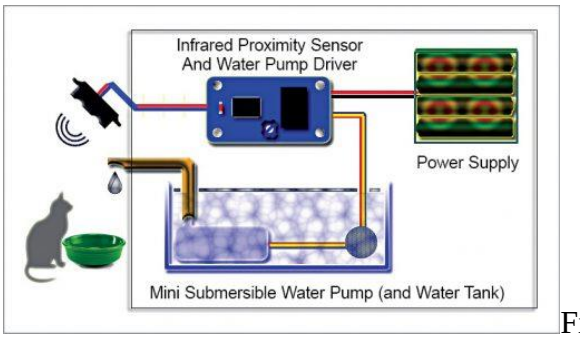

Fig. 1: Block diagram for system overview

The system consists of three key segments: infrared (IR) proximity sensor, water pump driver, and mini submersible water pump. Also, there is a power supply block that holds a couple of standard dry cells.

3.1 IR proximity sensor design

The use of an IR proximity sensor is a practical way to build an automatic water dispenser. While industrial-grade sensors are extremely efficient, most readymade pre-wired sensor modules are prone to iterated false triggering, which badly affects the intended performance. You also have to properly mount the sensors so that these are not exposed to strong sunlight/ambient light. These sensors should be covered partially to prevent erroneous operation.

To keep the complexity and cost within limits, a reliable IR proximity sensor has been developed with the help of a PLL tone decoder IC NE567.This tone and frequency decoder is a highly stable phase-locked loop (PLL) with synchronous AM lock detection and power output circuitry. Its primary function is to drive a load whenever a sustained frequency within its detection band is present at the self-biased input. The bandwidth centre frequency and output delay are independently set using just four external components. The next key component is the compact TCRT5000L reflective sensor, which includes a 950nm. IR emitter and phototransistor in a leaded package that blocks visible light.

3.2 Water pump driver

Any 3-6V water pump motor should work with this little driver built around transistor T2. (It is recommended to use a prime version water pump for a permanent fixture). Just attach a small rubber/silicone hose to the motor outlet, and submerge it in water to run it. Make sure that the water level is always higher than the motor as dry run will damage the water pump motor in a flash. Fortunately, we can prevent such a mishap by adding a mini float switch to the wiring of the water pump.

Here, S8550 pnp transistor (T2) is used as a high-side switch to drive the water pump motor (M1). Since the transistor switches the high voltage on and off (instead of ground), the setup provides a good return path when the water pump motor is turned off, and hence there's not much undesired electromagnetic interference (EMI). Further, when the output of IC1 goes high (idle state), the base resistor (R7) of T2 is floating. So, the VBE of T2 becomes 0V (5.3–5.3=0) and keeps T2 and M1 dead off. Nevertheless, the driver circuitry can be replaced with a low-current 5V relay because IC1 can merrily source current up to 100mA.

4. Components:

4.1 Laser sensor: this sensor is generally used for sensing obstruct in front of it, which operates on 12-24v dc and when it senses the object in front of it its output wire gives 12-24v dc supply which ever is supply voltage.

fig.diagram of sensor.

4.2 12v dc power supply:

12V power supplies (or 12VDC power supplies) are one of the most common power supplies in use today. In general, a 12VDC output is **obtained from a 120VAC or 240VAC input using a combination of transformers, diodes and transistors**.

fig. water dispenser

4.3 Sanitizer And Water Dispenser:

Solenoid valves are **control units** which, when electrically energized or DE-energized, either shut off or allow fluid flow. The actuator takes the form of an electromagnet. When energized, a magnetic field builds up which pulls a plunger or pivoted armature against the action of a spring.

fig.sanitizer dispenser

4.4 Sanitizer take and water tank:

This both tanks are made up of pet material. Pet material do not react with any chemical like sanitizer also it is economic to use and easily available

4.5 Motor:

The requirement of motor is to pump the water from the water tank to the water tap.

4.6 Wire:

Wires as we define here are used for transmission of electricity or electrical signals.

4.7 Relay :

The A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof.

4.8 Switches:

A switch is an electrical component that can disconnect or connect the conducting path in an electrical circuit, interrupting the electric current or diverting it from one conductor to another

4.9 Nut and Bolts:

A nut is a type of fastener with a threaded hole. Nuts are almost always used in conjunction with a mating bolt to fasten multiple parts together. The two partners are kept together by a combination of their threads' friction, a slight

stretching of the bolt, and compression of the parts to be held together.

A bolt is a form of threaded fastener with an external male thread requiring a matching pre-formed female thread such as a nut. Bolts are very closely related to screws.

4.10 MS L Shaped Rod:

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shaped sections (LSS) are another popular type of structural steel tube that's kind of a middle-man between RHS and CHS in terms of attributes, appearance and structural behavior. LSS features a flat surface that's also economical for joining and welding, with clean lines and minimal edge preparation required

5. Construction and testing:

Wiring up the circuit is simple. You can either use a veroboard, or the designed PCB layout given here. A PCB layout for the automatic water dispenser is shown in Fig. 3 and its components layout in Fig. 4.

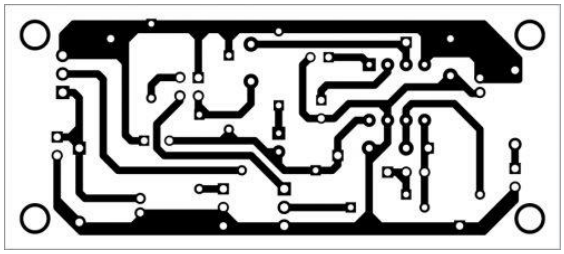

Fig. 2: PCB layout for the automatic water dispenser

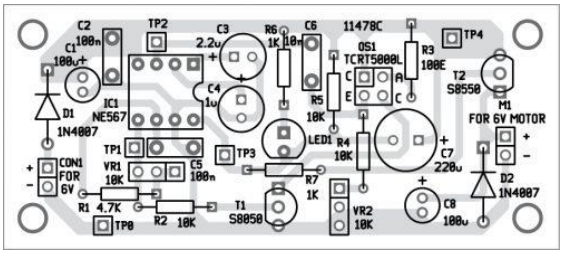

Fig. 3: Components layout of the PCB

After assembling the circuit on the PCB, enclose it in a water-resistant (transparent/translucent) prototype enclosure. A status indicator (LED1) has been added in the circuit, which glows when the proximity sensor detects an object/obstacle. Fix the TCRT5000L sensor and LED1 on the front panel of the cabinet.

A trimpot (VR1) is used to set the operating frequency of the oscillator. The power supply used here is 6V (four AA/AAA cells) DC supply. It also powers the mini submersible water pump (M1). The final proposed arrangement is shown in Fig. 5. For troubleshooting, check voltages at various test points as per the table.

Note. The system hardly needs any crucial electrical adjustments. The operating frequency of NE567 (IC1) can be tuned in 1kHz to 2kHz range using a 10-kilo-ohm potmeter (VR1). You can check frequency at test point TP1.

In case of valid proximity detection, test point TP2 gives a value greater than 150mV. The operating distance lies in 7cm to 15cm range depending upon the setting of the second 10-kilo-ohm trimpot (VR2).

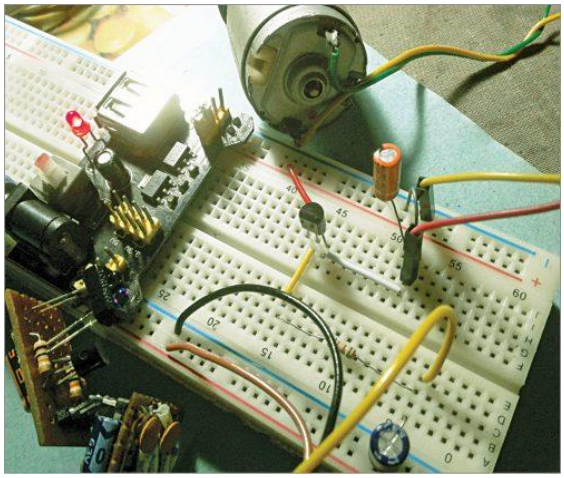

Fig. 4: Author's prototype of pump driver

The primary output pin 8 of NE567 is actually a free-floating output transistor collector. It gives a logic-low level output (TP3) with 100mA current-sinking capability on proximity detection.

6. Circuit and working of automatic water dispenser:

The circuit diagram of the automatic water dispenser is shown in Fig. 2. It is built around tone decoder NE567 (IC1), optical reflective sensor TCRT5000L (OS1), two 1N4007 rectifier diodes (D1 and D2), two transistors S8050 and S8550 (T1 and T2), and a few other components.

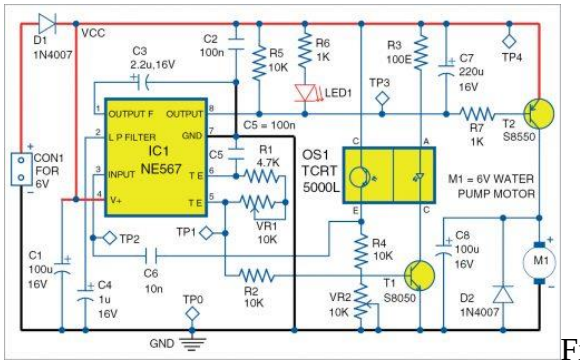

Fig. 5: Circuit diagram of the automatic water dispenser

The working of the circuit is simple. Initially, when there is no object such as a hand or pet in front of TCRT5000, LED1 remains off and no water flows out as the water pump also remains off. But when there is an object/obstacle in front of TCRT5000, LED1 glows and, at the same time, the water pump is switched on and water flows out from the tap.

Costing:

Sr no	Name of part	Material cost(raw)	Material cost(bought)	Machine &assly. cost	total
1	Foundation frame	10kg	1580	2000	3580
2	gear system	740	-	-	740
3	Motor	940	-	-	990
4	Switches	310	-	-	310
5	Wire	375	-	-	375
6	Relay	1230	0	-	1230
7	Solar module	1780	-	-	1780
8	wheel	220 x 4	-	-	880
9	Nut bolt	-	-	-	220

10	Screw nut adjustment	780	-	-	780
11	Water tank	500	0	-	500
12	Duster	2550	-	0	2550
13	Paint	0	50	25	75
14	miscellaneous	0	1000	0	1000
				TOTAL	15010

7. CONCLUSION :

Implementing of Contactless Automatic Hand Wash Dispenser for Sanitation is efficient and the cost price is minimized. It works like the normal contactless automatic machine. The human gets the limited sanitizer liquid for sanitation in hand, to wash the hands and to protect themselves from the corona disease. This system can be utilized in malls, high populated areas. The economic cost of the seminar, it will be better quality when considering the life of the system and the seminar. The most goal of this seminar was to use current advanced technologies to develop an Automatic hand sanitizing machine to improve hygiene and prevent the infectious viruses entering our body. Automatic hand sanitizers are priced less when compared to any other hand sanitizing tools or dispensers. At the same time it is environment friendly as because the disposable wastage is very minimal, since it can be refilled easily without any technical assistance. These automatic hand sanitizer machines are developed keeping in mind about its affordability by underprivileged sections of the society as it can be purchased by lower income groups in
pursuit of their well being and also they are easily available and can be used by everyone without any hassle.

8. Scope:

The goals of our project is to make india covid free. By restricting cross contamination of infection.

In demo we are performing this on one nozzle. But at product wise this will be multipoint sanitizer dispenser. And multipoint water dispenser with auto filling glass based on plc timer technic.

There is lot of dispensors in market but this one is comb pack of sanitizer and water. While the whole setup is based on made in india concept. While the other dispenser is single pointed it cannot be used in public places due to lot of crowd. One should wait for other will finish and then we will get the nazzel. So we introduce this idea of multipoint so this will be very much useful for public places like hospitals, bus stand, railways stations etc.

9. Reference :

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