LINUX MINI PROJECT

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Problem Statement : In this time of crisis Doctors are the ones who need our maximum support. For clinics and nursing homes it is very hard to maintain sanitized environment since there are a lot of patients who visit doctors on a weekly basis. If one person has the **Corona Virus** (and he is unaware of that),if he goes to the clinic and sits there to see the doctor then it becomes risky for the next patient to sit at the very same place where the previous one sat and increases the risk of infection.This risk of infection also increases for the staff and doctor working there.This makes it a difficult task for a doctor to maintain a sanitized environment in their clinics.

Aim : The aim of this project is to assist the Doctors in maintaining a sanitized environment in their clinics to prevent the spread of Novel Coronavirus.
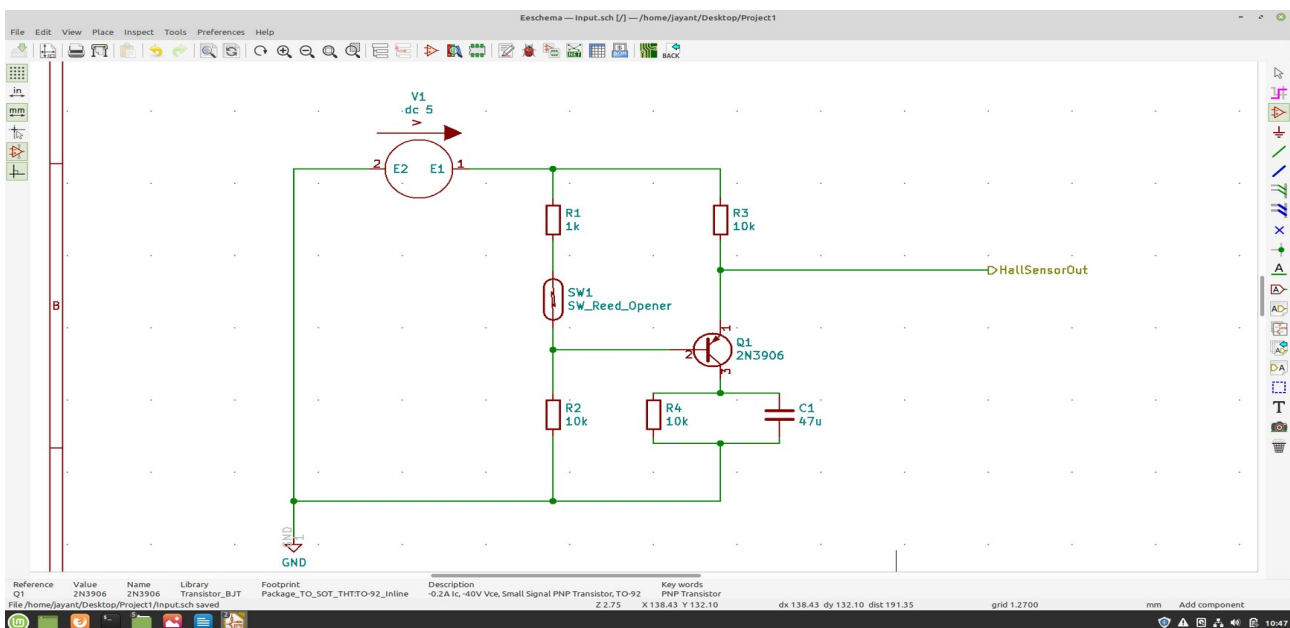
Brief Explanation :-

The whole idea is implemented as Kicad Schematic split into three Hierarchical parts.The first sheet is the input sheet where we have a Reed Switch in order to produce a voltage as an output whenever the door is open.The second sheet describes the usage of NE555 timer, IR transmitter and receiver which is used to turn on the dispenser whenever there is a signal from the transmitter.The final output (third sheet) describes supply to a motor that in turn operates the spraying of the disinfectant.

Deep Dive :-

Now looking into the working of each block in detail.

Hierarchical Block1 :-

This block is based on the working of Reed Switch. It is an electrical switch which is operated by an applied Magnetic field. Initially when the magnet is away from it the Reed switch remains open (by default),but as soon as the magnet comes near the switch the Reed switch closes which completes the circuit.

Case1 : When the door is open then the Reed Switch is open and due to this the base of the transistor Q1 goes low through the 10k resistor R2 which in turn turns on the transistor Q1 (a PNP transistor). At this moment the Capacitor C1 starts charging through Q1.

Case2 : When the door is closed the base of transistor Q1 goes high which turns off the transistor Q1 .This causes the capacitor C1 to discharge through R4 which is in parallel to C1.

Hierarchical Block2 :-

In this block we will look into the working of NE555 timer IC and the IR sensor -reciever.
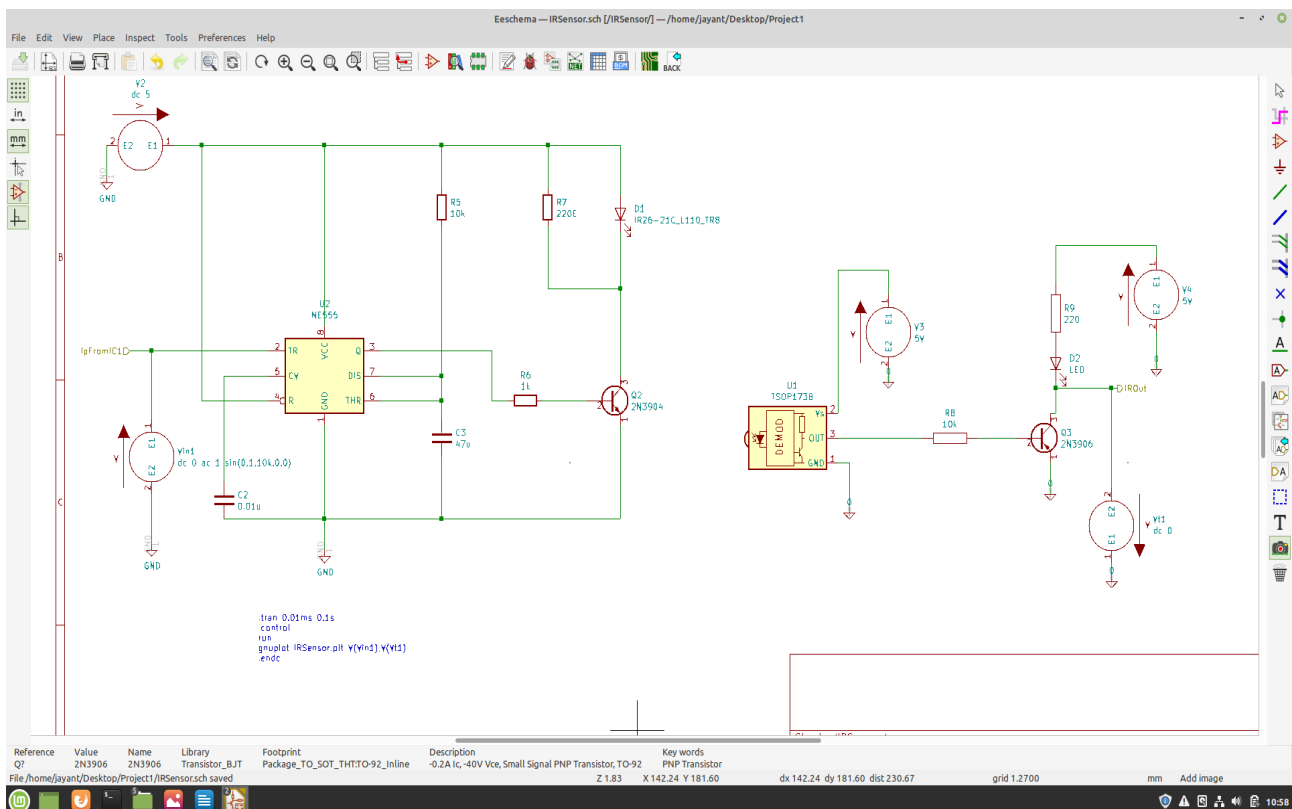
What is **NE555 Timer IC** its use?

The 555 timer IC(chip) is used in a variety of timer, pulse generation, and oscillator applications.The NE555 IC are mostly used as vibrators like, Astable Multivibrator, Monostable Multivibrator, and Bistable Multibrator.
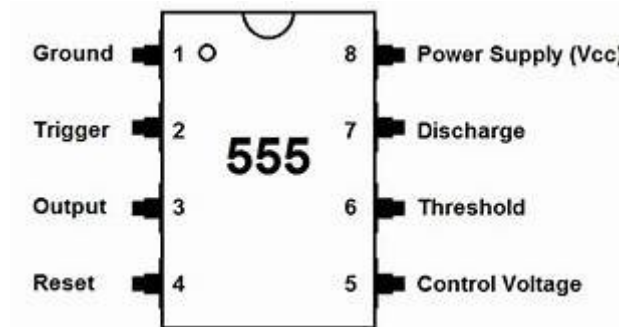

In our circuit this NE555 timer IC basically works as Monostable Vibrator which is used to provide a time- delay. Whenever signal at trigger input (Tr) goes low the Monostable output (Voltage) becomes high for a specific period of time. This output voltage is then fed to the IR Sensor .

What is **IR Sensor-Reciever** and how it works **?**

The IR signal is produced by the IR diode D1 named IR26. This device is an IR Emitter with wavelength of 940nm. The signal produced from the IR emitter in the circuit in the left part of the circuit is received by the IR receiver named TSOP1738. The sensor can be used for Proximity detection application along with a IR led in robotics and security systems.

It receives IR signal at 38khz frequency. The output is a current of 5mA.The output pin is connected to a BJT labelled as Q3 (2N3906) which is a small signal PNP transistor. It is connected through a 10k ohm resistor.
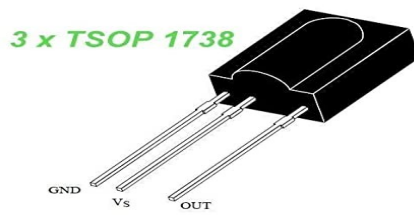
The collector is connected to the output and we also have an LED connected to the output of collector in order to confirm that there is current passing. This LED also server the purpose to prove that the IR receiver is working properly.

Hierarchical Block 3 :-
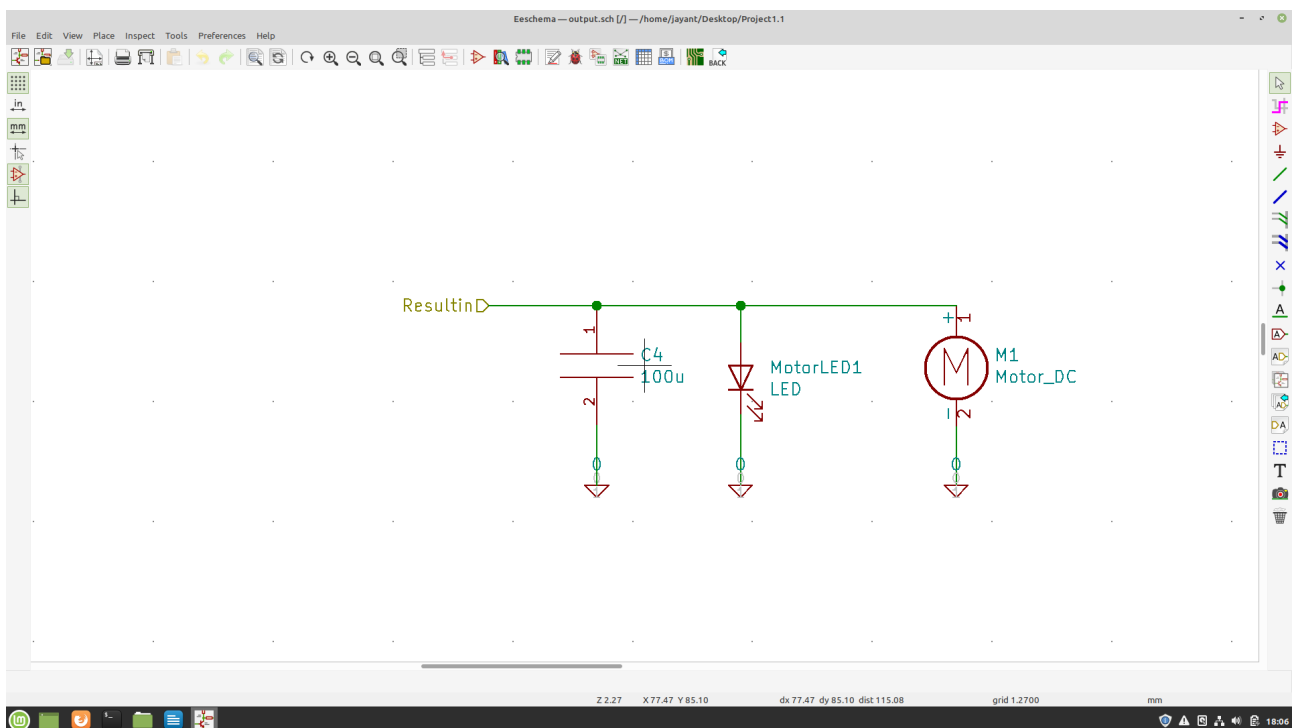
Now coming on to the third and last hierarchical sheet of this project,the output sheet.

The output sheet takes its input from the IR receiver circuit. We observe that there is a capacitance (C4) connected.This capacitor reduces the motor's inductive noises.

MotorLED1 is an LED that indicates the IR reception and activation of the liquid pump.

M1 is a DC motor that is used to operate on the dispenser to spray the disinfectant on the place close to where it has been set up.

Results and Analysis :-

The first step to check if the schematic has been properly concieved is to check for any errors during the Electrical Rules Checker is run.
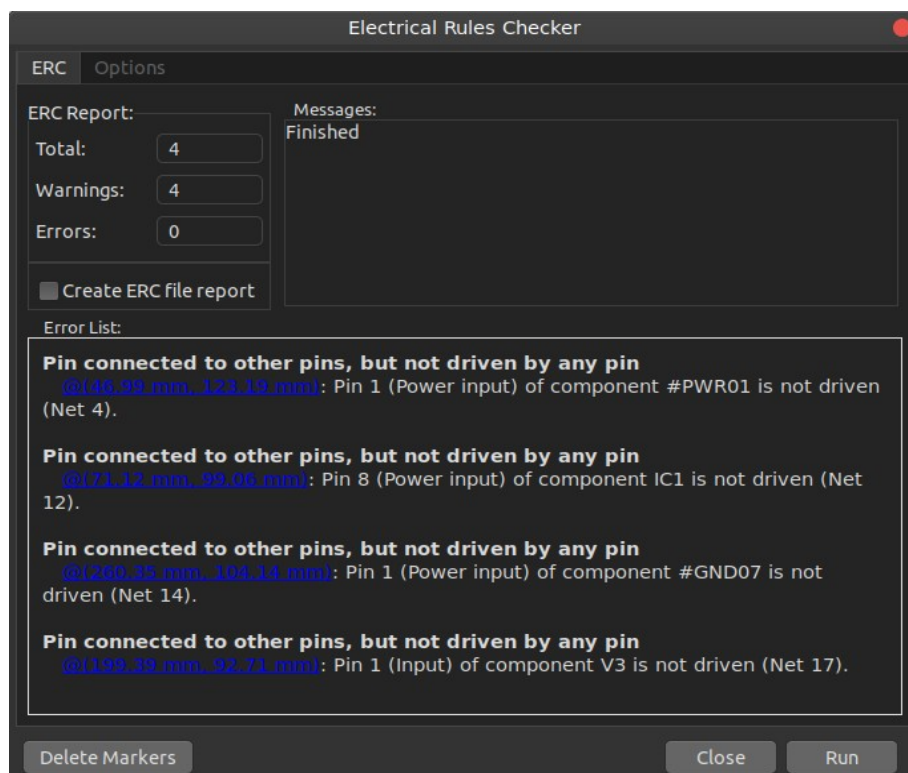
As we can see there are no such errors but warnings only.

The simulation was aborted due to the unavailability of the library for the components and thus will be continued on recieving them.

Summary and Conclussions:-

- Our project is built for the sole purpose of helping the doctors to maintain a sanitized environment in their clinics and nursing homes.

- We have used environment provided by KiCad to create our own design,which can be later implmented onto PCB.

- The threee major components used in this project are:-

  (i) Reed Switch - To generate an input signal when the door is opened.

  (ii) NE555 timer IC - Acting as a Monostable Vibrator to provide time-delays.

  (iii) IR Sensor and Reciever - Detects the output from the NE555 timer IC to generate IR waves which are then recieved by the reciever(TSOP1738) to generate an output,in this case output in the turning ON and OFF of the disinfectant spray.

- Through the working procedure of our project we can conclude that this method will surely be useful for Doctors and other medical staffs in preventing the spread of Novel Coronavirus.

Future Scope : There is tremendous scope for use of this device in Doctor's clinic and O.P.D.'s where huge influx of patients is expected when the lockdown is over.This will surely reduce the manpower requirement in maintaining sanitization.The manpower thus saved maybe

utilized elsewhere for the better management of COVID-19 pandemic. Furthermore functions like temperature sensing and high body temperature alert can be added to this device to make it a universal feature of all the clinics and hospitals.

Bibliography :-

For information on IR receiver and transmitter the following websites were used:

https://circuitdigest.com/electronic-circuits/ir-transmitter-and-receiver-circuit

https://www.electronicshub.org/ir-transmitter-receiver-circuits/

For information on door sensor:

http://www.circuitstoday.com/super-sensitive-intruder-alarm

https://www.electroschematics.com/door-opening-alarm-alert/

For information on hierarchial sheets in Kicad:

https://www.youtube.com/watch?v=XD_PaSrLKBk&feature=youtu.be

For information on basic idealogy on how hand sanitizers are used with pcb design:

https://www.pcbway.com/project/shareproject/
DIY_Automatic_Hand_Sanitizer_Dispenser__without_Arduino_or_MCU___Second_Design.html

Contribution :-

- IR Sensor, IR Reciever and Output Generation by K Venkat Ramnan
- Reed Switch, Input Generation an NE555 timer by Jayant Saxena