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Touch Controlled Switch Board with Multiple Load Switches

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Abstract: ***As everything gets advanced day by day, Nowadays people are giving importance to their safety and security for this we are introducing this project where, A switch is implemented that is turned on and off by touching a TTP223 module, instead of a regular switch. which prevent us from getting shocked. This circuit is useful in places such us electrical doorbells , toys , wet areas and industries.***

Keywords: TTP223 (Capacitive touch module) , 5V Relay , Transformer , Power supply.

I. INTRODUCTION

A touch control load switch is a very low-power working switch with different equipment connected for various applications. Its architecture uses many separate switches according to our need for particular loads. It also reduces the risk factors in industrial areas(wet places). It consists of a TTP223 module-which is used in the operation of touch control, which controls the load by touching TTP223, transformer, Transistor(BC547)- which has high gain properties, and a relay that helps to give maximum efficiency and increase the switching time. The touch control load switch has a very high performance for accurate and fast switching of any load element. It has Six loads connected which consist of 5 loads for LED bulbs, fans, and other loads equipment, and one load for connecting external loads like mobile chargers and other equipment. [1]Here, we relay for the switch operation of the different loads. A relay is an electrically operated switch that helps in the switching mechanism using an electromagnet. Relays were used where we needed to control the circuit using a low power signal, or we can say that circuits are controlled by a single signal only.As we know that these relays work on low voltage, so we need a transformer that can convert high voltage into low voltage. For the conversion process, we used a mobile charger that consists capacitor, inductor, diode, rectifier circuit, control circuit, etc.

A. Features

The touch control load switch feature are as follows-

1) It uses Fast working switching techniques.
2) Switching at lightning-fast speeds with no lag in timing.
3) Designed and easy to operate user-friendly touch load switches.
4) It has six capacitive touch-enabled input/output pins.
a) Here we use a mobile charger which helps in the step-up and step-down process of voltage(i.e. 220 V to 5V). It is necessary for the working of this device. A transistor (BC547) is used which has high gain properties
b) It has a spark less switch that can be implemented in wet industries where normal switches would not last.
c) If we talk about the regular switch it might get damaged easily from the outside but in the case of touch switches, they have no mechanical parts to wear out, so the durability of touch switches is more than regular switches.

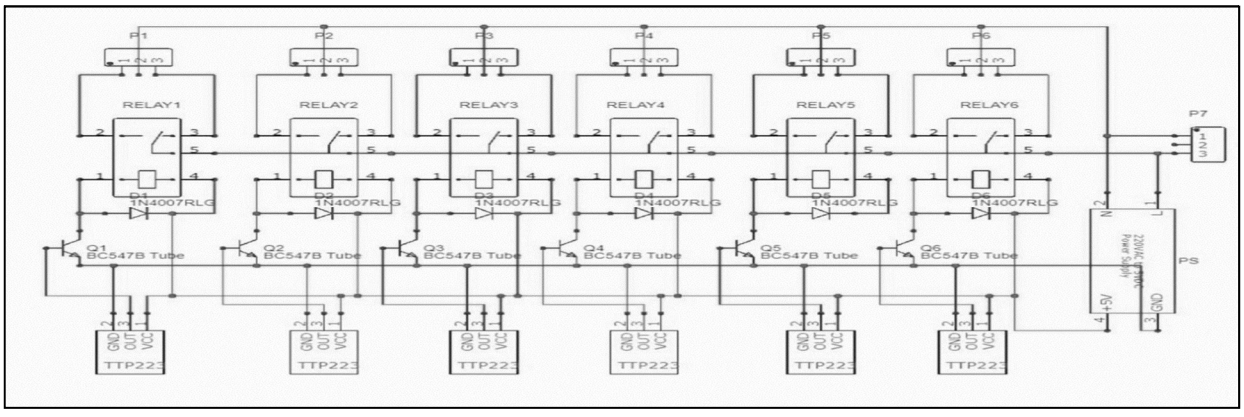


Figure1:Circuit diagram of touch control load switch

II. HARDWARE DESCRPITION

1) 5V Relay: A 5v relay is an electrically automatic switch commonly used in a control circuit to control a high-current using a low-current signal. The input voltage of the relay signal ranges from 0 to 5V.The relay are also used in protection devices to protect devices from faulty conditions.[2]

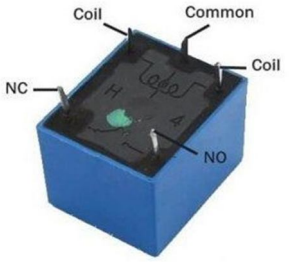


Figure 2: Relay pin diagram

2) IN4007 Diode: It's a rectifier diode, that is meant specifically for circuits that require to convert alternating current(AC) to direct current(DC). It will pass currents of up to 1 A, and have a peak inverse Voltage (PIV) rating of 1000 V.[3]

a) Average Forward Current = 1.0Amp

b) Peak Forward Surge Current = 30Amp



Figure 3 : IN4007 diode

3) Transistor(BC547): It is an NPN transistor; therefore, the collector and emitter as to be left open (Reverse biased) when the base pin is held at the ground and closed (Forward limited) when a signal is provided to the base pin.BC547 Transistor Features

- Bi-Polar NPN Transistor
- DC Current Gain =800
- Continuous Collector current (I_C) = 100mA
- Emitter Base Voltage (V_{BE}) = 6V
- Base Current(I_B) = 5mA
- Available in To-92 Package

1N4007 Characteristics:

- Maximum Recurrent Peak Reverse Voltage 1000V
- Maximum RMS Voltage =700V
- Maximum DC Blocking Voltage = 1000V

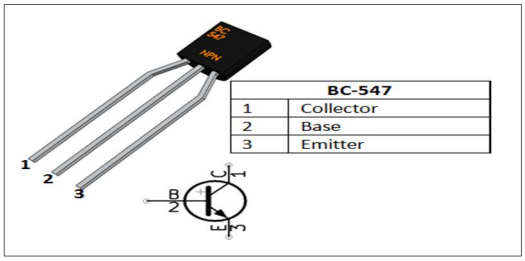


Figure 4 : BC547 Transistor

4) *Touch Sensor:* The sensor is based on touch- a sensing IC (TTP223) capacitive touchable switch chip. The module output is the low or off state in the normal state, with less energy utilization. However, when our finger touches the module, the result is high or on the state.[5] To use this touch module as an on-off switch operation we need to short the B terminal of TTP223 using soldering wire. Otherwise, the TTP223 module would conduct for short period and gets off automatically after a short duration(5-6seconds).

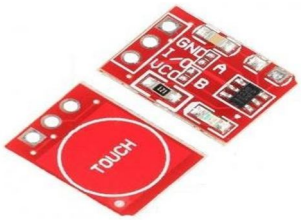


Figure 5: TTP223 touch module

5) *Transformer:* It is a made of soft iron core which helps in steps up or steps down of voltage . In this project, the device that we are using works on 5v voltage. So it is necessary to transfer 220 V AC into 5 V DC. For the conversion process, we used a mobile charger that consists capacitor, inductor, diode, rectifier circuit, control circuit, etc.



Figure 6: Transformer

6) *Terminal Connector:* An terminal connector is an electro-mechanical connector which helps in connecting two different conductors and create an electronic circuit. There are two types of terminal connectors– that is the male terminal connector(plug), which attaches to the female terminal connector(socket).[6] Here we the terminal connector to connect the different loads like a light bulb, tube light, fans, and other types of electrical equipment



Figure 7 : 3 Pin terminal connector

III. RESULT, CONCLUSION AND FUTURE SCOPE

A. Result

Hence, we've successfully designed and operated our project , where the on and off operation is carried out using the TTP223 module which prevents us from getting shocked. Touch switch has a greater advantage over a regular switch if we compare the lifetime of both switches. The touch switch would long last than the regular switch because it does not mechanical parts to wear out, so it does not broke easily.



Figure 8 : Working view of project

B. Conclusion

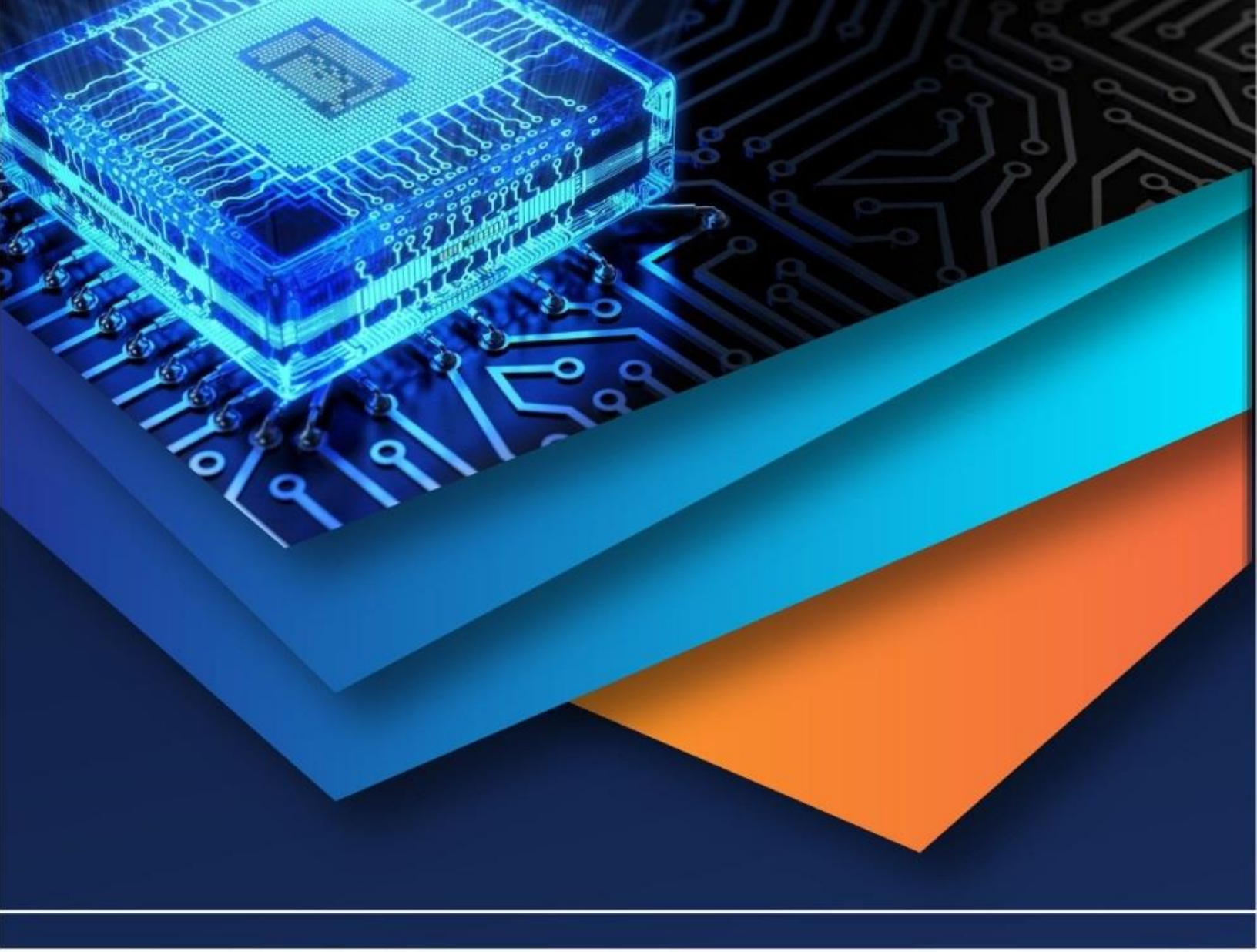
Hence an elementary, low-cost, configurable, easy-to-handle electrical device is designed. The device is constructed, established, approved, and fully verified. This device can be utilized in electrical doorbells or can be useful places that are dusty and wet where chances of getting shocked are high. This system can control any machinery or home appliances.

C. Future Scope

Touch control systems have a vast range of practical applications. This device will show a path for our future generations to complete computerization where everything is controlled automatically. The main reasons to choose this technology instead of regular switches by the manufacturers are; these are instinctive, particularly to younger generations of users. By using this technology, the devices can make smaller and compact.

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