



VOLTAGE LEVEL DETECTOR CIRCUIT

**A MINI PROJECT REPORT**

*Submitted by*

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*In partial fulfillment for the award of the degree of*

**BACHELOR OF**

**ENGINEERING**

**IN**

**ELECTRONICS AND COMMUNICATION ENGINEERING**



## DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

### CERTIFICATE

Certified that the mini project work entitled “**Four application of touch switch panel**” carried out by Ujjawal (1NH18EC756) bonafide students of Electronics and Communication Department , New Horizon College of Engineering, Bangalore.

The mini project report has been approved as it satisfies the academic requirements in respect of mini project work prescribed for the said degree.

Project Guide

Mr.Ashok

Sanjeev Sharma

HOD ECE

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### External Viva

Name of Examiner

Signature with

Date      1.

2.

### ACKNOWLEDGEMENT

The satisfaction that accompany the successful completion of any task would be, but impossible without the mention of the people who made it possible, whose constant guidance and encouragement helped us succeed.

We thank **Dr. Mohan Manghnani**, Chairman of **New Horizon Educational Institution**, for providing necessary infrastructure and creating good environment.

We also record here the constant encouragement and facilities extended to us by **Dr. Manjunatha**, Principal, NHCE and **Dr. Sanjeev Sharma**, head of the department of Electronics and Communication Engineering. We extend sincere gratitude to them.

We sincerely acknowledge the encouragement, timely help and guidance to us by our beloved guide Ashok to complete the project within stipulated time successfully.

Finally, a note of thanks to the teaching and non-teaching staff of electronics and communication department for their co-operation extended to us, who helped us directly or indirectly in this successful completion of mini project.

**Ujjawal (1NH18EC756)**

## **CHAPTER-1**

### **INTRODUCTION**

This venture depends on a capacitive touch sensor for controlling four electrical machines. Flip switches have been utilized for working lights or fans, and fleeting press switches for working electric doorbells. The greater part of these switches is mechanical and powerless to harm through earth, dampness or misusing.

Mechanical switches are being supplanted by contact switches in some advanced homes. Contact switches don't have mechanical mileage issues and are regularly encased in appropriate boxes, making these flexible in the hardest situations. Some touch switches are structured wonderfully, making them stylishly satisfying and mix with the room stylistic layout. Be that as it may, industrially accessible touch switches are exorbitant. The circuit introduced here is minimal effort and simple to assemble.

## **CHAPTER-2**

### **LITERATURE SURVEY**

**TITLE:** Four applications of touch switch panel

**AUTHOR:** ASHOK BAJAI

**YEAR OF PUBLICATION:** 2019

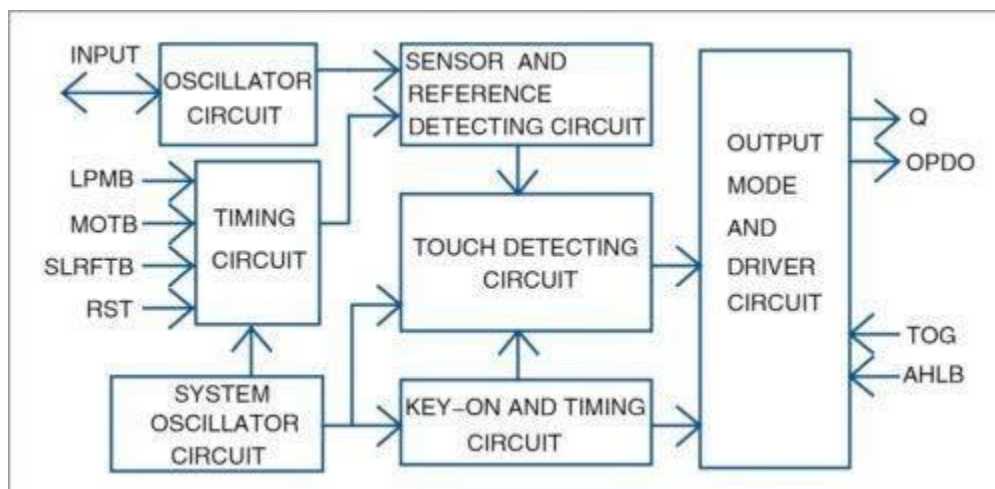
**OUTCOME:** When the voltage supply is not as expected, the outcome of the touch will be not sure as we expected.

## CHAPTER-3

### PROPOSED METHODOLOGY

- Collecting components
- Understand the function of each component
- Construction of the circuit
- Observation of result and verification

### 3.1 BLOCK DIAGRAM



BLOCK DIAGRAM OF TOUCH SWITCH DETECTOR

## 3.2 RESISTER

A resistor is a passive -terminal electrical thing that implements electrical resistance as a circuit detail. In electronic circuits, resistors are used to lessen current go with the flow, modify sign ranges, to divide voltages, bias lively factors, and terminate transmission traces, among other uses. High-electricity resistors which can dissipate many watts of electrical electricity as warmness, may be used as part of motor controls, in energy distribution systems, or as check loads for mills. Fixed resistors have resistances that handiest alternate slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (along with a quantity control or a lamp dimmer), or as sensing gadgets for heat, mild, humidity, pressure, or chemical interest.

Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in digital equipment. Practical resistors as discrete additives can be composed of diverse compounds and paperwork. Resistors also are carried out within included circuits.

The electric feature of a resistor is certain by way of its resistance: common business resistors are manufactured over a range of greater than 9 orders of significance. The nominal price of the resistance falls in the manufacturing tolerance, indicated at the issue.



3.2 fig of resister

Resistors won't display the fee outs debut resistor color pattern via their resistance Can be calculated. PTH (plated-thru-hollow) resistors use a color-coding machine (which without a doubt provides some flair to circuits), and SMD (floor-mount device) resistors have their personal price-marking system.

Following is a table with color code of resistors

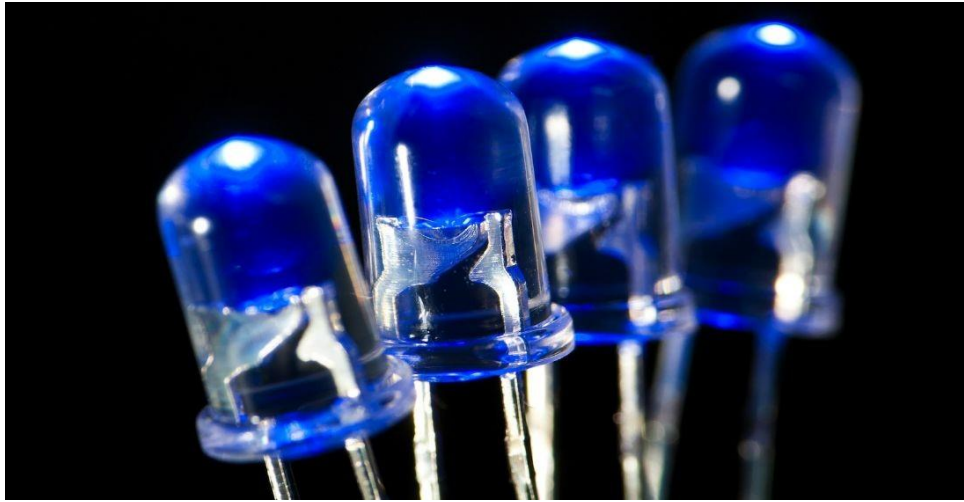
Colour	Value
Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Grey	8
White	9
Gold	-
Silver	-
No band	-

### APPLICATIONS OF RESISTOR:

- Wire wound resistors discover software in which balanced contemporary manage, high Sensitivity and accurate size are required like in shunt with ampere meter.
- Photo resistors locate utility in flame detectors, burglar alarm, in photographic devices and so forth.
- Resistors are used for controlling temperature and voltmeter.
- Resistors are utilized in virtual multi-meter, amplifiers, telecommunication, and oscillators.
- They also are used in modulators, demodulators, and transmitters.



### 3.3 LED



A light-emitting diode (LED) is a semiconductor device that emits light when current flows via it. Electrons inside the semiconductor recombine with electron holes, freeing power in the form of photons. The color of the light (corresponding to the energy of the photons) is decided through the energy required for electrons to go the band gap of the semiconductor. White light is acquired by using more than one semiconductor or a layer of light-emitting phosphor at the semiconductor device.

Appearing as practical electronic additives in 1962, the earliest LEDs emitted low-intensity infrared light. Infrared LEDs are utilized in remote-control circuits, such as the ones used with a huge form of consumer electronics. The first seen-light LEDs have been of low intensity and restricted to red. Modern LEDs are to be had across the visible, ultraviolet, and infrared wavelengths, with excessive light output.

Early LEDs were often used as indicator lamps, changing small incandescent bulbs, and in seven phase displays. Recent trends have produced excessive-output white light LEDs suitable for room and outdoor area lights. LEDs have brought about new shows and sensors, even as their high switching charges are useful in advanced communications era.

LEDs have many benefits over incandescent light assets, consisting of lower energy intake, longer lifetime, stepped forward bodily robustness, smaller size, and faster switching. LEDs are utilized in programs as numerous as aviation lighting, automotive headlamps, advertising and marketing, general lighting, visitor alerts, camera flashes, lighted wallpaper, plant growing light, and scientific gadgets.

Unlike a laser, the mild emitted from an LED is neither spectrally coherent nor even incredibly monochromatic. However, its spectrum is satisfactorily slender that it seems to the human eye as a natural (saturated) coloration. Nor, in contrast to most lasers, is its radiation spatially coherent, so that it cannot method the very high brightness function of lasers.

### 3.4-4CHANNEL RELAY



## FEATURES

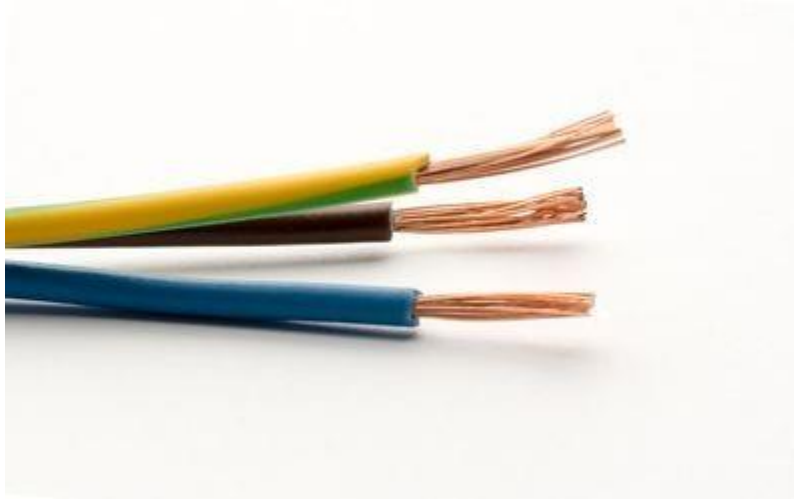
- Low power consumption
- Long lasting
- Optional I2c address
- Advantages over mechanical relays:
- Solid-state relays have much faster switching speeds compared with electromechanical relays, and have no physical contacts to wear out
- Totally silent operation

- No physical contacts mean no sparking, allows it to be used in explosive environments, where it is critical that no spark is generated during switching
- Increased lifetime, even if it is activated many times, as there are no moving parts to wear and no contacts to pit or build up carbon
- Compact, thin-profile SSR of Monoblock construction with an all-in-one lead frame incorporates a PCB, terminals and heat sink, which is much smaller than mechanical relays, and can integrate more channels
- Disadvantages:
  - When closed, higher resistance (generating heat), and increased electrical noise
  - When open, lower resistance, and reverse leakage current
  - Only works for AC load

#### Applications:

- Operations that require low-latency switching, e.g. stage light control
- Devices that require high stability, e.g. medical devices, traffic signals
- Situations that require explosion-proof, anticorrosion, moisture-proof, e.g. coal, chemical industries.

### 3.5 Wire:



A wire is a single, usually cylindrical, flexible strand or rod of metal. Wires are used to bear mechanical loads or electricity and telecommunications signals. Wire is commonly formed by drawing the metal through a hole in a die or draw plate. Wire gauges come in various standard sizes, as expressed in terms of a gauge numbers. The term wire is also used more loosely to refer to a bundle of such strands, as in multi-stranded wire, which is more correctly termed a wire rope in mechanics, or a cable in electricity.

Wire comes in solid core, stranded, or braided forms. Although usually circular in cross-section, wire can be made in square, hexagonal, flattened rectangular, or other cross-sections, either for decorative purposes, or for technical purposes such as high-efficiency voice coils in loudspeakers. Edge-wound coil springs, such as the Slinky toy, are made of special flattened wire.

### **3.6 BELL:**

An electric chime is a mechanical or electronic ringer that operates by methods for an electromagnet. At the point when an electric flow is applied, it delivers a dreary humming, banging or ringing sound. Electric chimes have been broadly utilized at railroad intersections, in phones, fire and thief alerts, as school ringers, doorbells, and cautions in mechanical plants, since the late 1800s, however they are currently being generally supplanted with electronic sounders. An electric ringer comprises of at least one electromagnet, made of a loop of protected wire around an iron bar, which pull in an iron strip armature with a clapper. At the point when an electric flow courses through the curls, the electromagnet makes an attractive field which pulls the armature towards it, making the sledge strike the ringer.



### **3.7 TTP223 MODULE:**

The TTP223 is a touch cushion identifier IC imitating a solitary material catch. This touch location IC is intended for supplanting customary direct catch key with differing cushion size.

### Highlights

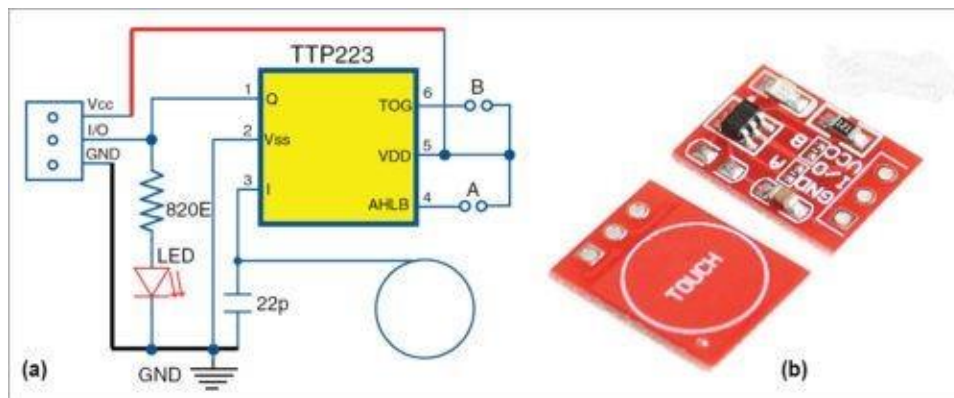
1. Information Voltage: 3.3V - 5.5V DC
2. Module size: 15mm x 11mm
3. Stable contacting recognition of human body for supplanting conventional direct switch key.

## ABOUT TOUCH SWITCH DETECTOR:

TTP223 is a one-contact keypad indicator IC, while TTP224 and TTP225 can oversee four and eight cushions, individually. The square outline of TTP223 IC is appeared.

TTP223 IC is accessible in various bundles having sixteen-, eight-or six-pin designs to suit various applications. In this undertaking, six-pin adaptation is utilized, and its pin-out is appeared.

Conduct of this bundle can be adjusted by rolling out certain improvements on its pins 4 and 6.



(a) Circuit diagram of TTP223 module; (b) PCB OF TTP22

### Pin 4(AHLB)

Yield is dynamic high when this pin is open, and dynamic low when it is associated with VDD (positive rail).

#### **Pin 6(TOG)**

This pin decides the method of activity. In the event that it is open, yield stays in dynamic state as long as the touchpad is contacted. On the off chance that this pin is high (VDD), it works in switch mode.

Prebuilt modules worked around this single touchpad indicator IC TTP223 have been utilized in this venture. These modules are modest and effectively accessible on online entries. The circuit graph and PCB module are appeared in Figs 3(a) and 3(b), individually.

### **There are three sorts of switches called contact switches:**

#### **Capacitance switch:**

A capacitance change needs just a single cathode to work. The terminal can be set behind a non-conductive board, for example, wood, glass, or plastic. The switch works utilizing body capacitance, a property of the human body that gives it incredible electrical attributes. The switch continues charging and releasing its metal outside to recognize changes in capacitance. At the point when an individual contacts it, their body builds the capacitance and triggers the switch.

Capacitance switches are accessible industrially as incorporated circuits from various producers. These gadgets can likewise be utilized as a short-go closeness sensor.

## **Obstruction contact switch:**

An obstruction change needs two terminals to be genuinely in contact with something electrically conductive (for instance a finger) to work. They work by bringing down the opposition between two bits of metal. It is along these lines a lot more straightforward in development contrasted with the capacitance switch. Setting a couple of fingers over the plates accomplishes a turn on or shut state. Evacuating the finger(s) from the metal pieces kills the gadget.

One execution of an obstruction contact switch would be two Darlington-matched transistors where the base of the principal transistor is associated with one of the anodes.

Additionally, a N-Channel, improvement mode, metal oxide field impact transistor can be utilized. Its door can be associated with one of the cathodes and the other anode through a protection from a positive voltage.

## **Piezo contact switch:**

Primary article: Piezo switch

Piezo contact switches depend on mechanical twisting of piezo clay, normally developed legitimately behind a surface. This arrangement empowers contact interfaces with any sort of material. Another attribute of piezo is that it can work as actuator too. Current business arrangements build the piezo so that contacting it with around 1.5 N is sufficient, in any event, for solid materials like treated steel.



## **CHAPTER-4**

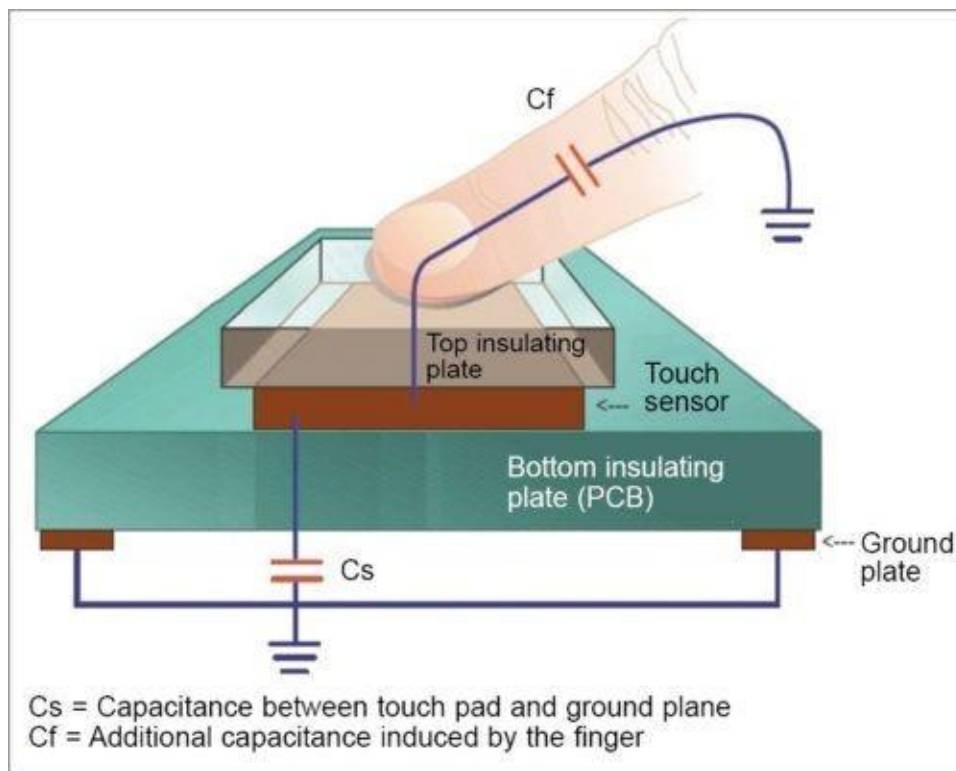
### **PROJECT DESCRIPTION**

A touch switch is a kind of switch that just must be moved by an item to work. It is utilized in numerous lights and divider switches that have a metal outside just as on open work stations. A touchscreen remembers a variety of touch switches for a presentation. A touch switch is the most straightforward sort of material sensor.

#### **4.1 WORKING**

A capacitive sensor works by recognizing an adjustment in capacitance because of impact of an outer item. The touch plate is secured with protecting material, and the client doesn't interact with the electrical circuit.

A capacitive touch switch has various layers—top protecting face plate followed by contact plate, another protecting layer and afterward ground plate, as appeared.



Practically speaking, a capacitive sensor can be made on a twofold sided PCB by seeing one side as the touch sensor and the contrary side as ground plate of the capacitor. At the point when force is applied over these plates, the two plates get charged. In harmony express, the plates have a similar voltage as the force source.

Capacitance is the proportion of charge per volt ( $C_s = Q/V$ ). At the point when a finger is moved close to the sensor plate, electric field around the capacitor plate energizes the human body and vitality gets moved to it. This makes more charge stream to the sensor plate till another harmony state is reached. This builds the charge fixation on the sensor plate, causing a change (increment) in capacitance.

It isn't important to genuinely contact the sensor plate as unsettling influence of the electric field close to the sensor is sufficient to instigate an adjustment in capacitance. The sensor plate can subsequently be put behind a defensive overlay. Initiated capacitance is dictated by the accompanying relationship:

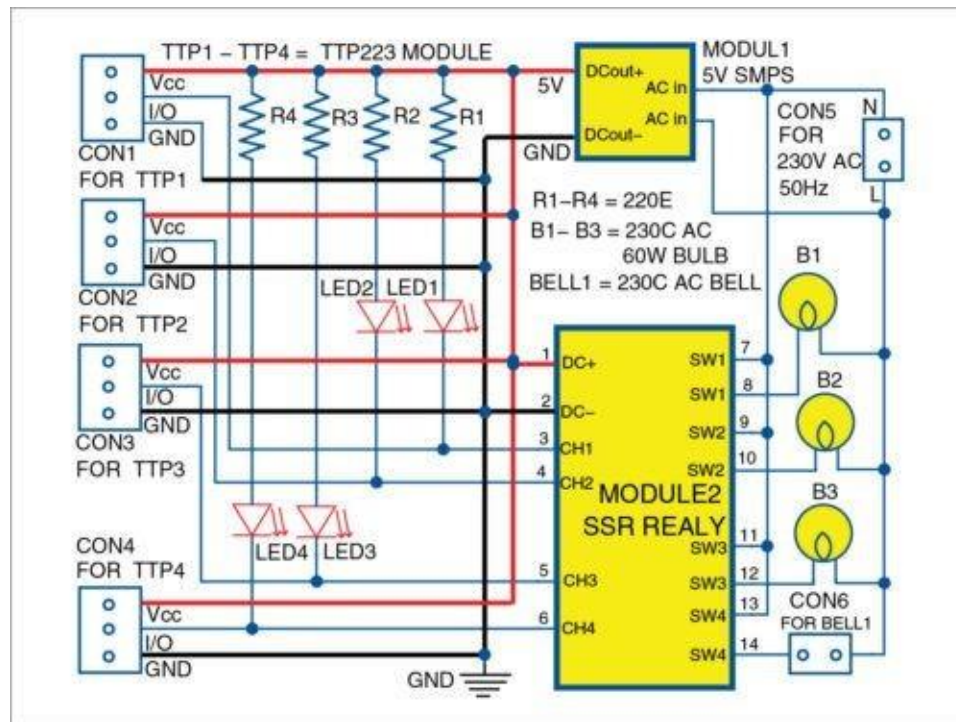
$$C_f = k\epsilon_0(A/d)$$

where,  $k$  is dielectric constant of the defensive overlay,  $\epsilon_0$  is permittivity of vacuum,  $A$  is area of the touch plate and  $d$  is distance separation between the conductive plate and the finger.

Dielectric constant of glass goes somewhere in the range of 3.8 and 14.5, while that of plexiglass (acrylic) is somewhere in the range of 2.6 and 3.5, of paper is 3.6, and wood has a dielectric constant somewhere in the range of 1.4 and 2.9. Accordingly, glass is the best material for the defensive overlay, trailed by plexiglass.

The touch locator circuit has an oscillator whose recurrence is reliant on capacitance of the touchpad. At the point when a finger is moved near the touchpad, extra capacitance makes recurrence of this interior oscillator change. The identifier circuit tracks oscillator recurrence at planned stretches, and when the move crosses the edge change, the circuit triggers a key-press occasion.

## 4.2 CIRCUIT DIAGRAM



### 4.3 REQUIRED COMPONENTS

## PARTS LIST

Set of components:

LED1-LED4          5mm LED

Resistors (1/4 W, 5% tolerance):

R1-R4          - 220-ohm

Other components:

TTP1-TTP4          TTP223 module

CON1-CON4          3-pin connector

Module1          5V SMPS module

Module2          5V Channel SSR relay

BI-B3          - 230V AC, 60W bulb

BELL1          230V AC bell

Box with acrylic sheet

*(All these are available in the kit)*

## 4.4 WORKING OF CIRCUIT

For this touch switch board, four touch switches are utilized. Three switches work like typical on/off switches, while the fourth fills in as a transient switch (ringer switch). The quantity of switches on the board can be fluctuated relying upon necessity.

In this task, a reasonable size Bakelite switch box is utilized to encase the circuit. Take an acrylic sheet and slice it to the size of the container to make the front touch board. Different information names are set apart on the acrylic front board. The creator's model of the touch switch board.

Before utilizing off-the-rack contact switch modules, we have to adjust them to change their default conduct. For light switches, two weld cushions, denoted An and B on the module, must be shorted. For the ringer switch, just cushion an is to be shorted, though cushion B is to be left open. Cushion A must be shorted to coordinate the transfers, which have dynamic low information sources.

Further, there is a LED marker on the module that shines when yield is high, as appeared. Since this hand-off module requires a functioning low sign, marker LED on the module is continually sparkling in off state. Expel the pointer LED from every module and rather associate an outside 3mm LED, as appeared in Fig. 5. Shining of LED will demonstrate on condition of the apparatus on the front board.

The board utilizes four touch switch modules, a four-transfer module and a 5V SMPS module to control the circuit. In spite of the fact that any sort of hand-off board can be utilized, a strong state transfer (SSR) module and a 700mA, 5V SMPS power flexibly is utilized here to guarantee that all segments are handily encased in the switch box. TTP223 IC can deal with voltages between 2.0V to 5.5V, and power flexibly ought not surpass 5.5V.

The circuit chart of the four-channel contact switch board is appeared in Fig. 5. It is worked around four inbuilt TTP223 modules (TTP1 through TTP4), 5V SMPS module (Module1), 5V four-channel SSR transfer module (Module2), four LEDs (LED1 through LED4), three 230V AC, 60W bulbs (B1 through B3), 230V AC ringer (BELL1) and a couple of different segments.

# ABOUT TOUCH PAD DETECTOR

## GENERAL DESCRIPTION

The TTP223-BA6/TTP223N-BA6 OneTouch is a touch cushion indicator IC which offers 1 touch

key. The contacting identification IC is intended for supplanting customary direct catch key with various cushion

size. Low force utilization and wide working voltage are the contact key highlights for DC or AC

application.

## Highlights

Operating voltage 2.0V~5.5V

Operating current @VDD=3V, no heap

At low force mode common 1.5uA, most extreme 3.0uA

The reaction time max 220mS at low force mode @VDD=3V

Sensitivity can alter by the capacitance(0~50pF) outside

Stable contacting location of human body for supplanting customary direct switch  
key Provides Low Power mode.

Provides direct mode toggle mode by cushion option (TOG

pin) Q pin is CMOS yield

All yield modes can be chosen dynamic high or dynamic low by cushion option (AHLB pin)

After force on have about 0.5sec stable-time, during the time don't contact the key cushion,

What's more, the capacity is incapacitated

Auto adjustment forever

At low force mode the re-adjustment period is about 4.0sec typically,

At the point when key distinguished touch and discharged touch, the auto re-adjustment will re-try after

about 16sec from discharging key

The affectability of TTP223N-BA6 is better than TTP223-BA6's.

Yet, the security of TTP223N-BA6 is more regrettable than TTP223-BA6's.

#### **APPLICATIONS:**

Wide shopper items

Button key

substitution



## Capacity DESCRIPTION OF TTP223:

### 1. Affectability change

The complete stacking of cathode size and capacitance of interfacing line on PCB can influence the

affectability. So, the affectability change must as indicate by the pragmatic application on PCB. The

TTP223-BA6/TTP223N-BA6 offers a few strategies for altering the affectability outside. 1-1 by the terminal size

Under different conditions are fixed. Utilizing a bigger terminal size can build affectability. Else it

can diminish affectability. Be that as it may, the cathode size must use in the powerful extension.

1-2 by the board thickness

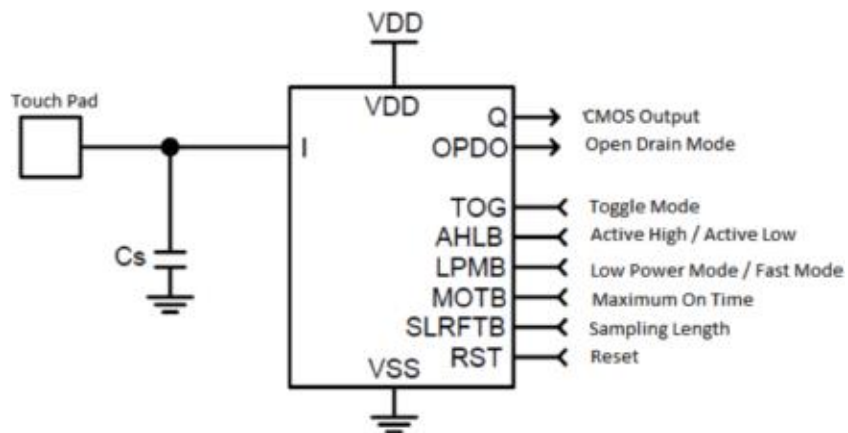
Under different conditions are fixed. Utilizing a slenderer board can expand affectability. Else it can

decline affectability. In any case, the board thickness must be underneath the greatest worth. 1-3 by the estimation of  $C_s$  (if it's not too much trouble see the down figure)

Under different conditions are fixed. When don't utilize the Cs to VSS, the affectability is generally touchy.

While including the estimations of Cs will decrease affectability in the helpful range ( $0 \leq C_s \leq 50\text{pF}$ ).

**The connection diagram of IC is:**



## Limitations while designing PCB:

- The ground plane plate ought not cover the sensor cushion however moved from under the touch cushion. This outcomes in lower capacitance however higher affectability as the electric field is anticipated further noticeable all around.
- The touch cushion ought not be pointlessly huge as a littler plate has a higher charge thickness and along these lines a more grounded electric field than a bigger plate. A suggested size is the size of a fingertip, state 15mm \* 15mm.
- The length of the track from the touch cushion to the information pin of the locator ought to be as short as could reasonably be expected. The tracks ought to likewise not be equal or cross different tracks.
- The locator circuit ought to have a low sign to commotion proportion.
- On the off chance that more than one switch is suited on a board, the space between two cushions ought to be sufficiently huge so two neighboring touch switches are not activated with one touch.

## **ABOUT THE OSCILLATOR:**

An electronic oscillator is an electronic circuit that delivers an intermittent, swaying electronic sign, frequently a sine wave or a square wave.[1][2][3] Oscillators convert direct current (DC) from a force flexibly to a rotating current (AC) signal. They are generally utilized in numerous electronic gadgets running from least complex clock generators to advanced instruments (like number crunchers) and complex PCs and peripherals etc.[3] Common instances of signs created by oscillators incorporate signs communicate by radio and TV transmitters, clock flags that direct PCs and quartz timekeepers, and the sounds delivered by electronic beepers and video games.[1]

## **Oscillators are frequently portrayed by the recurrence of their yield signal:**

A low-recurrence oscillator (LFO) is an electronic oscillator that creates a recurrence underneath roughly 20 Hz. This term is commonly utilized in the field of sound synthesizers, to recognize it from a sound recurrence oscillator.

A sound oscillator produces frequencies in the sound range, around 16 Hz to 20 kHz.[2]

A RF oscillator produces flags in the radio recurrence (RF) scope of around 100 kHz to 100 GHz.[2]

Oscillators intended to create a powerful AC yield from a DC gracefully are generally called inverters.

There are two primary sorts of electronic oscillator – the straight or symphonious oscillator and the nonlinear or unwinding oscillator.[2][4]

Gem oscillators are omnipresent in current gadgets and produce frequencies from 32 kHz to more than 150 MHz, with 32 kHz precious stones typical in time keeping and the higher frequencies ordinary in clock age and RF applications.

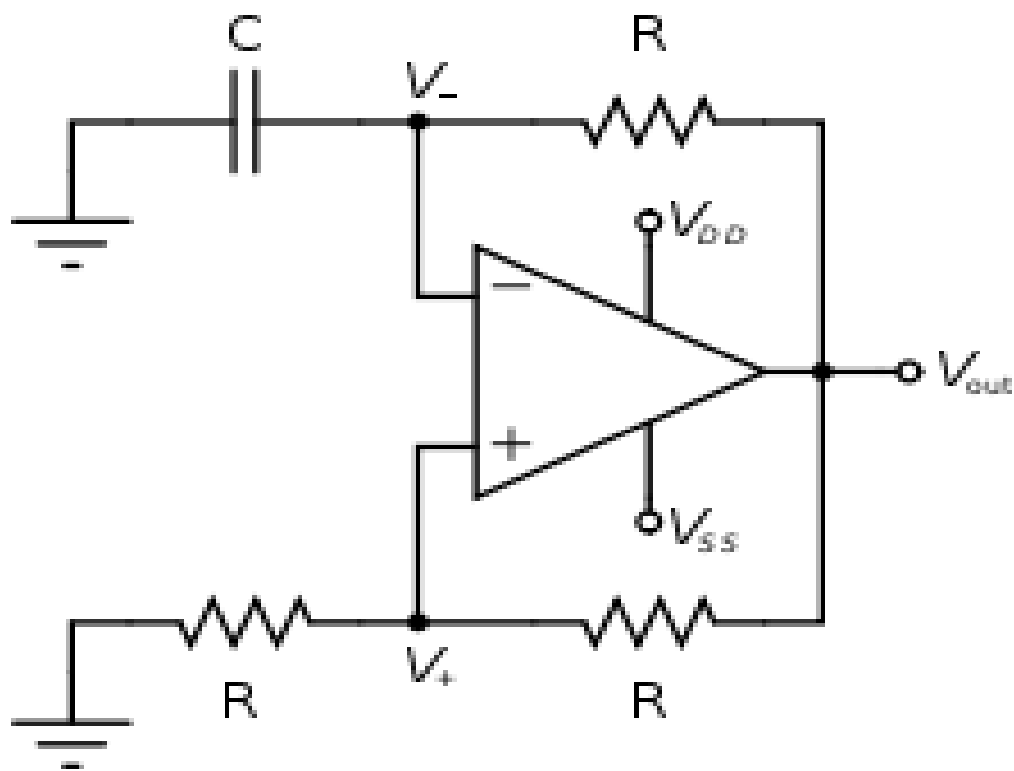
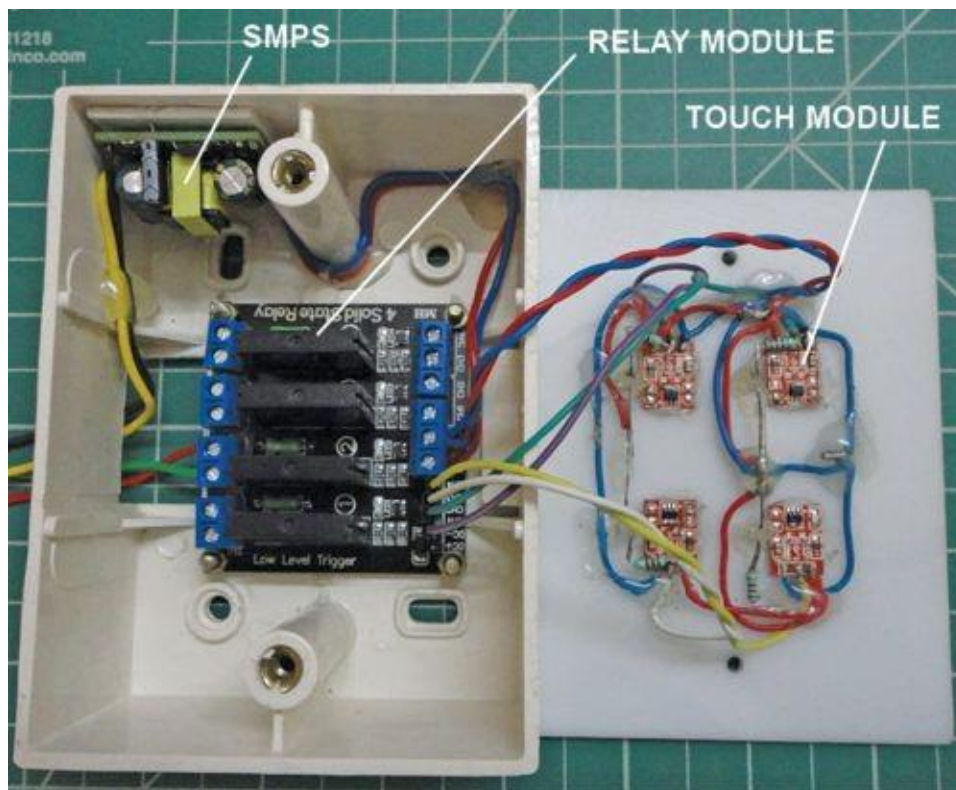


Fig of oscillator

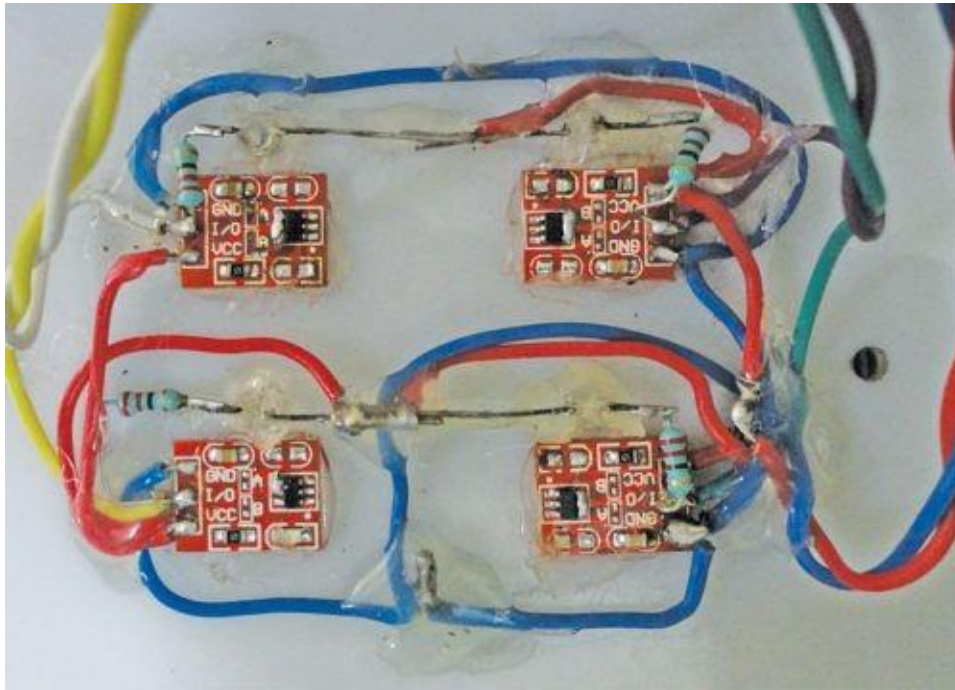
## CONSTRUCTION AND TESTING:

The hand-off board and 5V power flexibly module is reasonably positioned inside the switch box, as appeared in Fig. 6. Outside lights and the ringer are associated with yield terminals of the transfer board. Touchpads set apart as I/O on the modules are associated with input pins of hand-off modules.



*INTERNAL PORTION OF THE PROTOTYPE*

The four altered touch modules alongside four LEDs are put on the acrylic sheet utilizing heated glue, as appeared on the correct side of Fig. 6. Make four little openings for the LEDs (LED1 through LED4) on the front board of acrylic sheet. LED1 through LED4 are fixed on the openings utilizing a heated glue firearm close to the touch modules, with the end goal that when a touch module is contacted, the comparing LED shines (Fig. 7). LEDs ought to be appropriately positioned in the gaps so that these are obviously noticeable on the front board.



Touchpad modules fixed on acrylic sheet

After the associations are made, close the switch box and switch on the force gracefully. Mark the three lights as 1, 2 and 3 on the front board, as appeared in the model (Fig. 4). Name BELL as doorbell for the fourth apparatus. Presently, contact any mark, say, 1, on the front board. LED1 will sparkle, and the comparing hand-off will be stimulated, which will turn on the principal light.

SSR hand-off module utilized in this task can deal with most extreme 2A current, and is reasonable for room lights. For exchanging higher current apparatuses, supplant SSR board with electro-mechanical transfers that can deal with flows up to 10A.

## **CHAPTER- 6**

### **CONCLUSION**



## **FUTURESCOPE**

- It will be used in mobile phones and in laptops as touch screen.
- Touch screen is used in some of the vehicles.
- Touch will be used as touch sensitivity buttons.
- Laterally we can use it for as keyboard by not using buttons.
- Now we using it for lockers to lock with passwords.

## REFERENCES

- <https://www.electronicsforu.com/electronics-projects/touch-switch-panel-control-four-appliances>
- TTP23+MODULE&oq=ABOUT&aqs=chrome.1.69i57j69i59l3j5l3j69i60.5474j0j7&sourceid=chrome&ie=UTF-8
- <https://en.wikipedia.org/wiki/Oscillation>