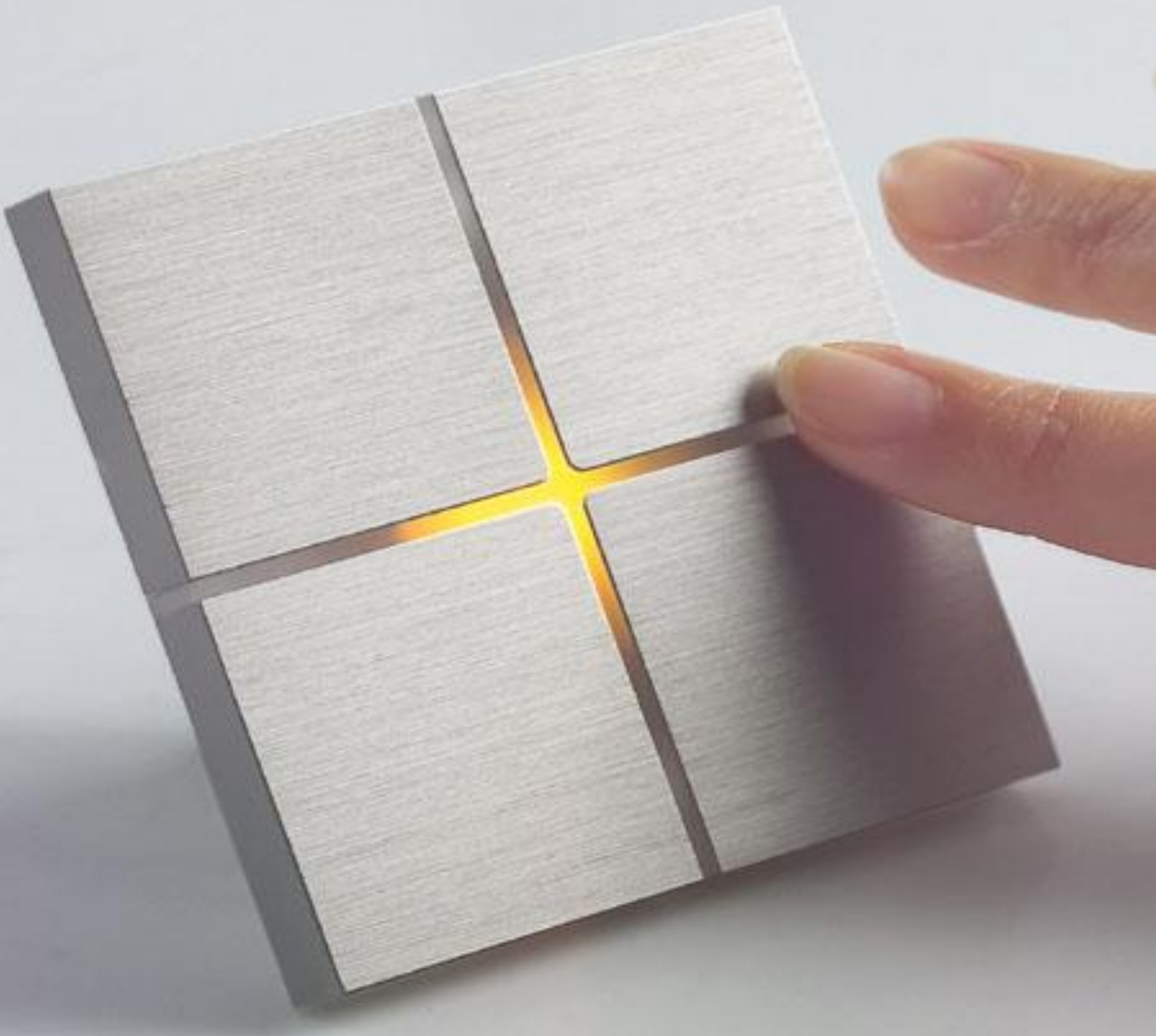# PROJECT REPORT
ON
TOUCH SWITCH

Submitted By:

MAHADEB SINGHA

<u>CERTIFICATE</u>

This is certify that the Final Project report entitled "Touch Switch" submitted
Summer Internship report of the requirement for the degree of "DIPLOMA",
Is a work carried out by Mahadeb Singha, Reg No – D101130169 under my
supervision and guidance.

Place**:**

Date**:**

Head of the Department   Project Co-ordinator   Project Supervisor

<u>ACKNOWLEDGEMENT</u>

I am glad in presenting this project report based on Quality of Work Life In my effort would be considered fruitful if it helps the organization and its readers in one way or the other.

I am indebted to " Mr. SATYA SADHAN DUTTA", (Chairman, BPIE) & " Mr. SATYA SADHAN DUTTA" (Director, BPIE), who offered me such an opportunity.

I externally my he artful appreciation to all, who had contributed to this assignment/both exp licitly and implicitly. Contributions made by each of them have been equally valuable.

I am thankful to (H.O.D, E.T.C) for giving me valuable time, guidance and support to gain insights in making the project.

I wish to express my deep sense of gratitude especially to "Mr. ALI IMAM KHAN" to supervise me in my project. It was his understanding and help that stimulated me during the moments of difficulties.

Last but not the least, our sincere thanks to all the faculties of Electronics &Communication department. Friends for installing this idea or sense of self-confidence.

Mr. MAHADEB SINGHA
(DIPLOMA, 3rd YEAR)
(ETC)

ABSTRACT

A touch switches apparatus for detecting the presence of an object such as a human appendage, the apparatus having a switch and a local control circuit connected to the switch and to a controlled device. The control circuit is preferably in integrated circuit form Electronic on/off switch for a load connected to an a-c supply network, including a controlled semiconductor switch connected in a series circuit with the load, control circuit.

First of all let us consider a few basics in building electronic circuits on a printed circuit board. Smart Kit boards also come pre-drilled and with the outline of the components and their identification printed on the component side to make construction easier. The soldering iron that you use must be light and its power should not exceed the 25 Watts.

Make sure that you do not use more solder than it is necessary as you are running the risk of short-circuiting adjacent tracks on the board, especially if they are very close together. - After having finished your work cut off the excess of the component leads and clean the board thoroughly with a suitable solvent to remove all flux residues that still remain on it.

The switch only has eight components and its construction is very easy even for the most inexperienced. As usual construction must start from the least sensitive to heat components, which in this case are the IC socket and the pins. After soldering the pins and the socket, make the two jumper connections that are marked on the component side of the board, solder the relay in its place and continue with the transistor the diode and the LED.

Then, place the IC in its socket. The IC is of the CMOS family and should be handled with great care as it can be damaged very easily from static discharges. Avoid touching its pins and keep your body and the circuit board grounded during insertion. You should also take care not to bent any pins underneath the IC body during this operation.

LIST OF NOTATION & SYMBOLS

COMPONENT	CIRCUIT SYMBOL	FUNCTION OF COMPONENT
CD4011- CMOS IC		The 4011 has four separate 2-input NAND gates which you can use independently. The 4011 is a member of the 4000 Series CMOS range.
Diode 1N4148 (Zener Diode)		A special diode which is used to maintain a fixed voltage across its terminals.
12V relay rated at 250 V / 2A		An electrically operated switch, NO = Normally Open, COM =Common, NC = Normally Closed.
PNP Transistor – BC558A		transistor amplifies current. It can be used with other components to make an amplifier or switching circuit.

TABLE OF CONTENTS

INTRODUCTION

A touch switch is an electronic device that enables us to control a circuit by simply touching two wires. A simple touch switch circuit using CD4011 is given here. The IC CD4011 is wires as a flip flop here. The 9, 13 pins of the IC work as the set and reset contacts respectively.CMOS ICs like 4011 require requires a very low current for controlling its gates. Since the pins 9 and 13 are connected to the positive via resistors R1 and R2, the logic gates of the ICs will be in high state. When we touch through the points A, B the gates of the IC will be closed and the output becomes low. This switches ON the transistor Q1 and the relay gets activated. When we touch through the points C, D the gates again becomes high and switches the transistor OFF. This makes the relay OFF. Thus by touching through the contact points A, B and C, D the appliance connected through the relay can be switched ON and OFF.

A touch switch is an electronic device that enables us to control a circuit by simply touching a sensor. Smart Kit 1005 is a very easy project to built and will make you the proud owner of a magic switch that will respond to the slightest touch of your hand on its sensitive plates.
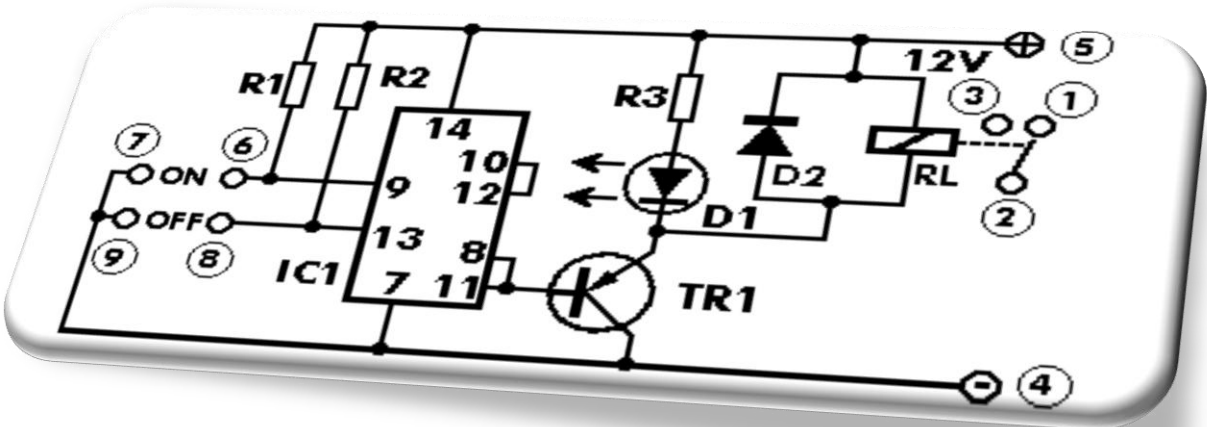
Technical Specifications - Characteristics

Supply voltage: 9 VDC

Max. current:30 mA

Relay rating: 250 V/2 A

CIRCUIT DIAGRAM

DETAIL OF COMPONENT

CD4011- CMOS IC:-

Note how all inputs of the unused gates inside the 4011 chip are connected either to VDD or ground. This is not a mistake, but an act of intentional design. Since the 4011 is a CMOS integrated circuit, and CMOS circuit inputs left unconnected can assume any voltage level merely from intercepting a static electric charge from a nearby object, leaving inputs floating means that those unused gates may receive any random combinations of "high" and "low" signals. At best it means excessive power consumption. It matters little if we choose to connect these unused gate inputs "high" (VDD) or "low" (ground), so long as we connect them to one of those two places.

ZENER DIODE:-

The diodes designed to work in breakdown region are called zener diode. The power handling capacity of these diodes is better. The power dissipation of a zener diode equals the product of its voltage and current. $P_Z = V_Z I_Z$. When zener is forward biased it works as a diode and drop across it is 0.7V when it works in breakdown region the voltage across it is constant V_z and the current through it is decided by external resistance. Zener diode is used for regulating the dc voltage. It maintains the output voltage constant even through the current through changes.

RELAY:-

Generally speaking, a relay circuit is a circuit that uses a small mechanical switch or a semiconductor device (with associated circuitry) to energize a relay, which will then close a contact set to complete another circuit. This system is used by most people on a daily basis, and it is used to start a motor vehicle. The key switch (ignition switch) is turned to "start" and 12 volts (approximately) is applied to the starter solenoid (which is a big relay). The coil is energized, it shuts contacts, and the battery voltage is delivered through the heavy contact set (for high current capacity) to the starter motor. There are variations on this theme to which the term relay circuit can be applied, but the idea remains the same: a small switch of some kind controls switching in another (usually higher voltage and/or current) circuit. It could be argued that the telegraph is a relay circuit.

P-N-P TRANSISTOR:-

It is made of two P-type layers and one N-type layer. In this type, we add two P-type layers, with the two sides of a N-type layer. In this way, we get a P-N junction and an other N-P junction, we can compare a P-N-P transistor with two diodes, whom N-N type semi conductors are jointed, between the two diodes, One is called emitter-base diode or emitter diode and other is called collector base or collector diode.

WORKING

The heart of the circuit is the IC CD 4011 that is connected as a FLIP-FLOP. Pins 9 and 13 of the IC are the «SET» and «RESET» contacts of the FLIP-FLOP. The IC is of the CMOS type and requires a very low current to in its gates to control it. This high sensitivity of the circuit makes the touch operation possible. The two gates are held at logic state «1» continuously by means of the two resistors R1 and R3 that connect them to the positive supply rail. These resistors have a very large resistance of 10 M ohm. If we now touch a set of contacts the skin resistance closes the circuit between the corresponding gate and the negative supply rail. The skin resistance for small areas of the skin is normally much lower than 10 M ohm and the gate is effectively brought to logic condition «0» which makes the FLIP-FLOP change state. For any given state of the FLIP-FLOP touching the corresponding set of contacts will make the circuit to reverse its state of balance and in effect toggle the switch. As a switch is used a relay driven by a transistor which is driven from the output of the FLIP-FLOP.
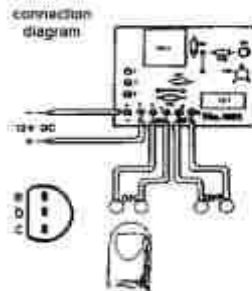
CONSTRUCTION

First of all let us consider a few basics in building electronic circuits on a printed circuit board. The board is made of a thin insulating material clad with a thin layer of conductive copper that is shaped in such a way as to form the necessary conductors between the various components of the circuit. The use of a properly designed printed circuit board is very desirable as it speeds construction up

considerably and reduces the possibility of making errors. Smart Kit boards also come pre-drilled and with the outline of the components and their identification printed on the component side to make construction easier. To protect the board during storage from oxidation and assure it gets to you in perfect condition the copper is tinned during manufacturing and covered with a special varnish that protects it from getting oxidised and makes soldering easier. Soldering the components to the board is the only way to build your circuit and from the way you do it depends greatly your success or failure. This work is not very difficult and if you stick to a few rules you should have no problems. The soldering iron that you use must be light and its power should not exceed the 25 Watts. The tip should be fine and must be kept clean at all times. For this purpose come very handy specially made sponges that are kept wet and from time to time you can wipe the hot tip on them to remove all the residues that tend to accumulate on it.

DO NOT file or sandpaper a dirty or worn out tip. If the tip cannot be cleaned, replace it. There are many different types of solder in the market and you should choose a good quality one that contains the necessary flux in its core, to assure a perfect joint every time.

DO NOT use soldering flux apart from that which is already included in your solder. Too much flux can cause many problems and is one of the main causes of circuit malfunction. If nevertheless you have to use extra flux, as it is the case when you have to tin copper wires, clean it very thoroughly after you finish your work. In order to solder a component correctly you should do the following:

Clean the component leads with a small piece of emery paper. - Bend them at the correct distance from the component body and insert the component in its place on the board. You may find sometimes a component with heavier gauge leads than usual, that are too thick to enter in the holes of the p.c. board.

In this case use a mini drill to enlarge the holes slightly. Do not make the holes too large as this is going to make soldering difficult afterwards.

Take the hot iron and place its tip on the component lead while holding the end of the solder wire at the point where the lead emerges from the board.

The iron tip must touch the lead slightly above the p.c. board.

When the solder starts to melt and flow wait till it covers evenly the area around the hole and the flux boils and gets out from underneath the solder. The whole operation should not take more than 5 seconds. Remove the iron and let the solder to cool naturally without blowing on it or moving the component. If everything was done properly the surface of the joint must have a bright metallic finish and its edges should be smoothly ended on the component lead and the board track. If the solder looks dull, cracked, or has the shape of a blob then you have made a dry joint and you should remove the solder (with a pump or a solder wick) and redo it.

Take care not to overheat the tracks as it is very easy to lift them from the board and break them.

When you are soldering a sensitive component it is good practice to hold the lead from the component side of the board with a pair of long-nose pliers to divert any heat that could possibly damage the component.

Make sure that you do not use more solder than it is necessary as you are running the risk of short-circuiting adjacent tracks on the board, especially if they are very close together. - After having finished your work cut off the excess of the component leads and clean the board thoroughly with a suitable solvent to remove all flux residues that still remain on it.

The switch only has eight components and its construction is very easy even for the most inexperienced. As usual construction must start from the least sensitive to heat components, which in this case are the IC socket and the pins. After soldering the pins and the socket, make the two jumper connections that are marked on the component side of the board, solder the relay in its place and continue with the transistor the diode and the LED. Once everything is in its place clean the board very well from flux residues and check it for short circuits and possible mistakes.

Then, place the IC in its socket. The IC is of the CMOS family and should be

handled with great care as it can be damaged very easily from static discharges. Avoid touching its pins and keep your body and the circuit board grounded during insertion. You should also take care not to bent any pins underneath the IC body during this operation.
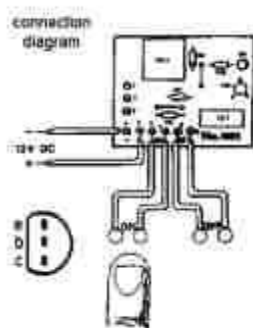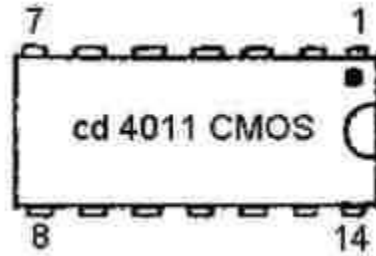
Now connect the points marked + & - on the board with 9 VDC and touch lightly the set of contacts marked «ON». You should hear the clicking of the relay and the LED should light up. (In case the LED turns on at power up then touch the other set of contacts that are marked «OFF».) Touching the contacts marked «OFF» will turn the LED off and the relay should be released. It is up to you

to connect any device you want to control with the touch switch but please remember that you should not exceed the power rating of the relay which is 250 V/2 A.
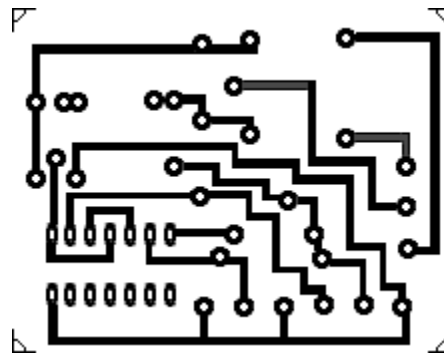
Dimensions 5,5cm x 4,2cm
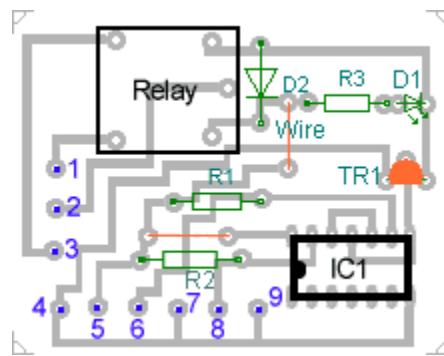
If It Does Not Work

Check your work for possible dry joints, bridges across adjacent tracks or soldering flux residues that usually cause problems.-Check again all the external connections to and from the circuit to see if there is a mistake there. Make sure that all the polarized components have been soldered the right way round. Make sure the supply has the correct voltage and is connected the right way round to your circuit. Make sure that you have inserted the IC in its socket correctly and that you have not bent any pins during insertion. Check your project for faulty or damaged components.

ADVANTAGE

- The switch can be used for switching AC as well as DC.

- It is best to use a 9V-12V DC regulated or unregulated power supply.

- It is used in various applications due to its quicker response .

- Low cost

DISADVANTAGE:-

- It will be damage if the input DC voltage go over 15V .

APPLICATION

❑ This is ideally useful for making touch operated doorbells , buzzer , toys etc .

❑ It also used in door knobs & in relays .

❑ Use this project to make remote operated switch , light operated switch & clap switch .

CONCLUSION:-

We can turn on almost any electrical device with this switch & the switch automatically turns off a short time later. It is used in various applications because of its quicker response. It is very simple.

The switch also contains an additional general function. By touching several surfaces simultaneously or within a pre-defined time, the additional function can be activated. This invention concerns a multiple touch switch for operating lighting, this is in contrast to the current systems in which only a single button in a multiple switch can be used to turn lights on or off or in which a separate button for each light circuit has to be pressed.