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Anti Fall Ceiling Fan While Rotating

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Abstract: Today most of the electrical appliances are moving towards energy efficient designs. But what about the safety measures? Ceiling fans are one of the most important electrical gadgets of our life. This paper discusses about the safety and new designs of ceiling fans so that when it falls while rotating it stops within a moment and nobody will get hurt. An experimental prototype was built and results have proven good performance. In future this concept will prove a golden change in the life of people and ceiling fans.

I. INTRODUCTION

A ceiling fan is a device suspended from the ceiling of a room, with hub-mounted rotating blades that circulate the air, thereby producing a cooling or de-stratification effect. Most ceiling fans have an electrical switch that allows one to reverse the direction of rotation of the blades.

II. PRINCIPLE BEHIND CEILING FAN

The electric motor is the electric machine within the ceiling fan that converts electrical energy into mechanical energy. The ceiling fan capacitor torques up the electric motor, allowing it to start and run. An electrical current reaches the motor and then enters coils of wire that are wrapped around a metal base. As this current passes through the wire, a magnetic field is caused that expends force in a clockwise motion that actually changes the electric energy into mechanical energy. This action causes the motor coils to spin. As the coils are spinning, the fan captures this spinning motion, transferring it to the fan blades.

III. OVERVIEW

Anti fall ceiling fan is a type of fan which won't fall until stop because of the device installed in it. We installed a lightweight device near the stator part which works only when fan is about to fall.

IV. LITERATURE

Our project is based on Faraday law of electromagnetism the solenoid coil will pull the free movable conductor towards it. We have completed the hardware i.e. Solenoid coil ,ceiling fan, aluminium clips.
Since innovation is necessary to bring the change in this world to make the life more comfortable for the present and for upcoming generation so our project is also based upon the safety of people in the entire world by making it safe that if anybody sit under the high speed ceiling fan and if it falls then no serious wound is there or damage to anybody part.

V. APPLICATIONS

Each and every home, shops, departments, public places need and have ceiling fan. Everyone cannot afford air conditioners (ACs) and coolers. So it is necessary to be safe and to keep people safe from any kind of injury cause by falling of high speed ceiling fan.
Our device and arrangements can be applied in any kind of ceiling fan and provides safety in both ways-

1) When bolt of the ceiling fan loses from the ceiling itself.
2) When bolt of the stator part of the fan loses.
3) We use this fan technology anywhere in the world where we use ceiling fan.

VI. SYSTEM DESCRIPTION

In our project we have installed two aluminium clips in the rod of fan. We have two ways in which fan falls-

1) Falls from ceiling
2) Only rotor part falls

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So one clip is installed on rod near ceiling and other is installed just above rotor. Circuit is in series with the coil and clips and other wire with phase is put directly below the clips as shown In fig.1.

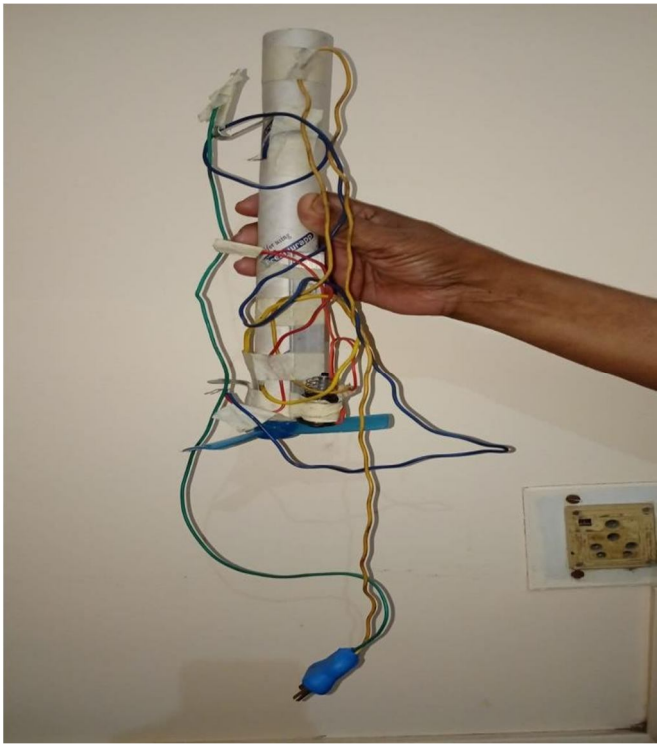


Figure1. Prototype

The clips are connected in the type of two way switch which we use in stair case wiring and these clips are connected with the solenoid coil. Hence the whole systemworks as a simple two way switch staircase connections.

The solenoid coil is simple coil which works on Faraday law of electromagnetism (as shown in fig.2). Faraday's law of induction (or simply Faraday's law) is a basic law of electromagnetism predicting how a magnetic field will interact with an electric circuit to produce an electromotive force (emf), a phenomenon known as electromagnetic induction. It is the fundamental operating principle of transformers, inductors, and many types of electric motors, generators and solenoids.

Faraday's first law of electromagnetic induction states that ,"Whenever a conductor is placed in a varying magnetic field, an electromotive force is induced. But how fast solenoid works.? A direct-acting solenoid coil typically operates in 5 to 10 milliseconds.

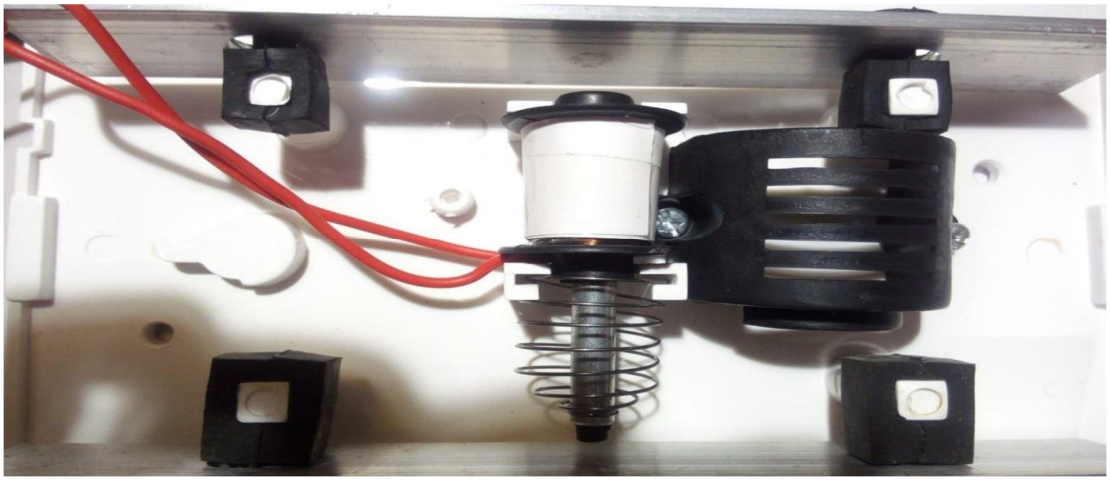


Figure2.Solenoidcoil

Electromechanical solenoids consist of an electromagnetically inductive coil, wound around a movable steel or iron slug (termed the armature). The coil is shaped in such a way that the armature can be moved in and out of the space in the center of the coil, the altering the coil's inductance and thereby becoming an electromagnet. In simple words when fan falls then the wire touches with the clips and circuit gets completed and coil moves down and stops the rotating fan.

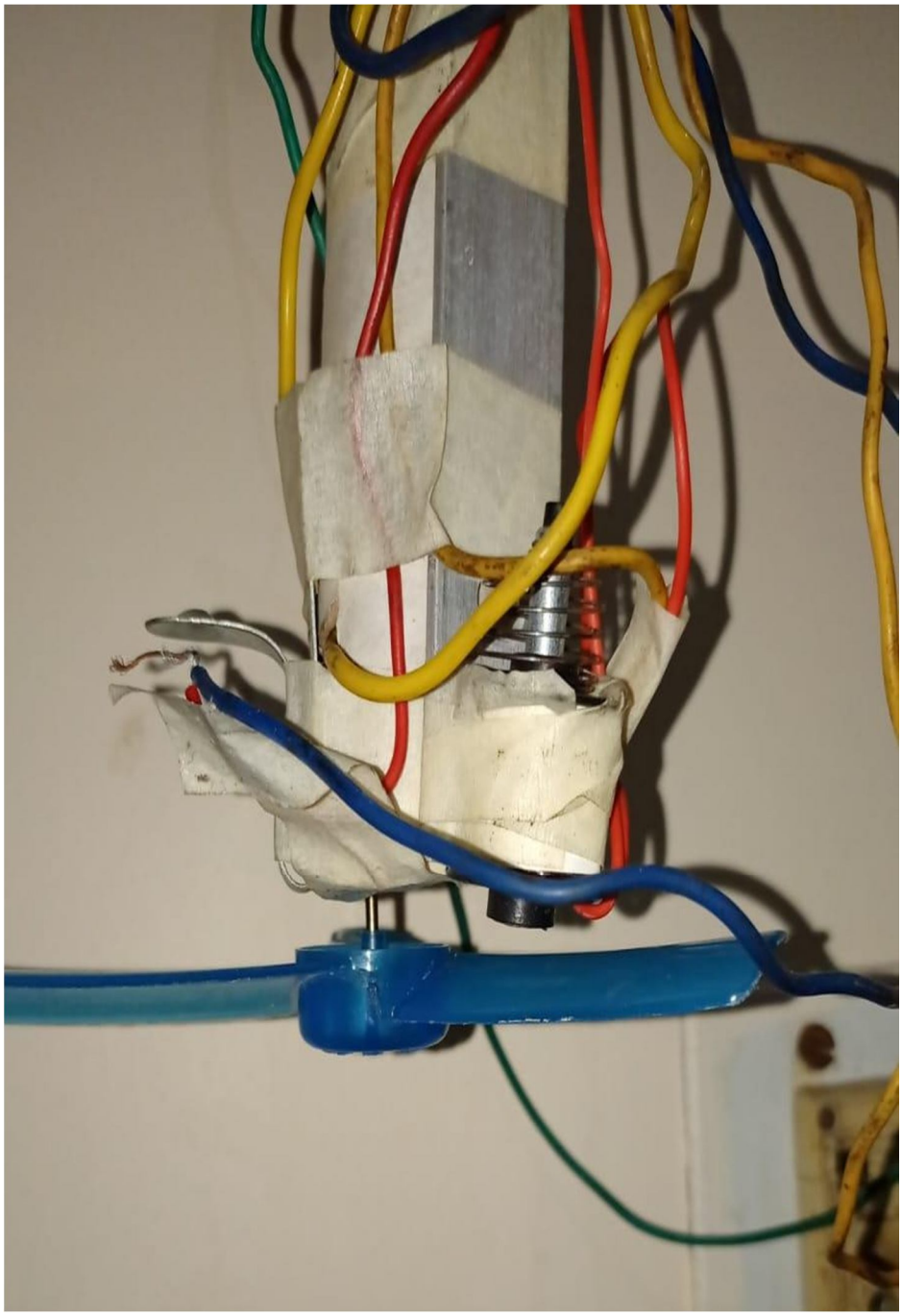


Figure3. Solenoid Coil and Aluminium Clip Arrangement

When circuit gets completed through the aluminium clips the conductor inside solenoid coil comes outside with a force and struck in between the blades of a moving fan as shown in fig.3 This will stop the moving fan before the gravity pulls the fan downwards. When the supply gets disconnected then the solenoid coil will pull the free movable conductor towards it.

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VII. CIRCUIT DIAGRAM

The circuit diagram of our project is given below

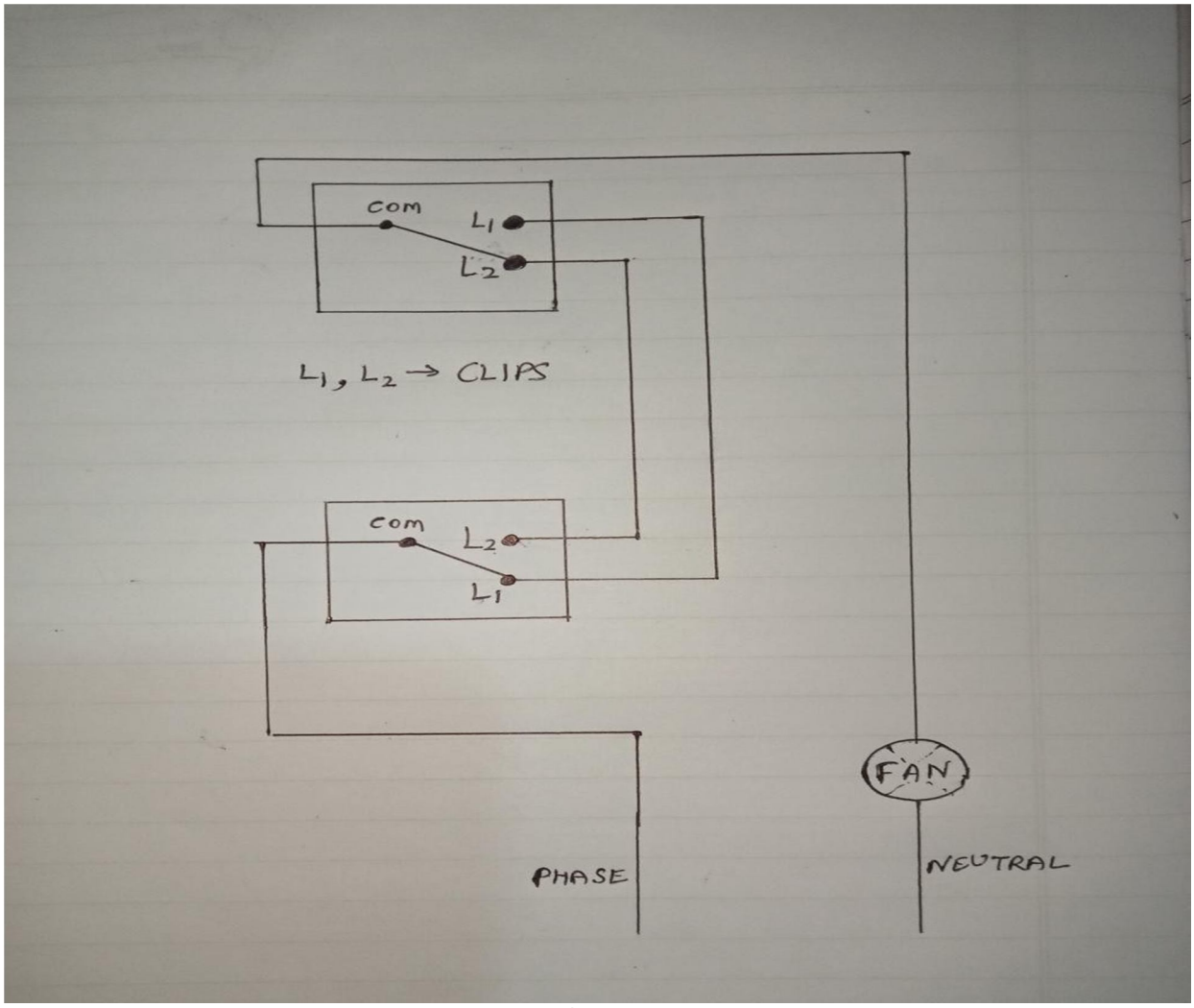


Figure.4.Circuit Diagram

VIII. METHODOLOGY

All the regular use household appliances needs an electricity supply of220 volts and generally rated to work between the range of 220V to 240V. In our concept and practical done by us we conclude that all system works normally in the range of household supply and no need of extra current and voltage regulators. The best part of this system is this that the system only works when the bolts are loose. It does not consume electricity continuously as long as the fan is running.

We fix two aluminium conductors the one on the ceiling near the bolt of the connecting rod (upper part) and the second one near the second pin(bolt)near the stator of the fan. The small wire through the ceiling comes down and put under the upper aluminium clip at the distance of 2mm and the other wire comes through the hanging rod of the ceiling fan and put under the second aluminium clip at the distance of 2mm which is connected below the bolt of stator connected .

When any bolt looses then fan comes down slowly or suddenly. When this happened then the wires and aluminium clips make contact with each other. The time of action of solenoid coil is in some milliseconds (ms), so the coil movement takes place so fast that in that time gravity cannot be able to pull the fan down even in the case of free fall. The coil gets in between the blades of the fast moving fan and stops it.

So this can stops the injury caused to fast moving blades on any one standing below the fan.

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IX. RESULTS

After doing this experiment and calculations we obtained the following results-

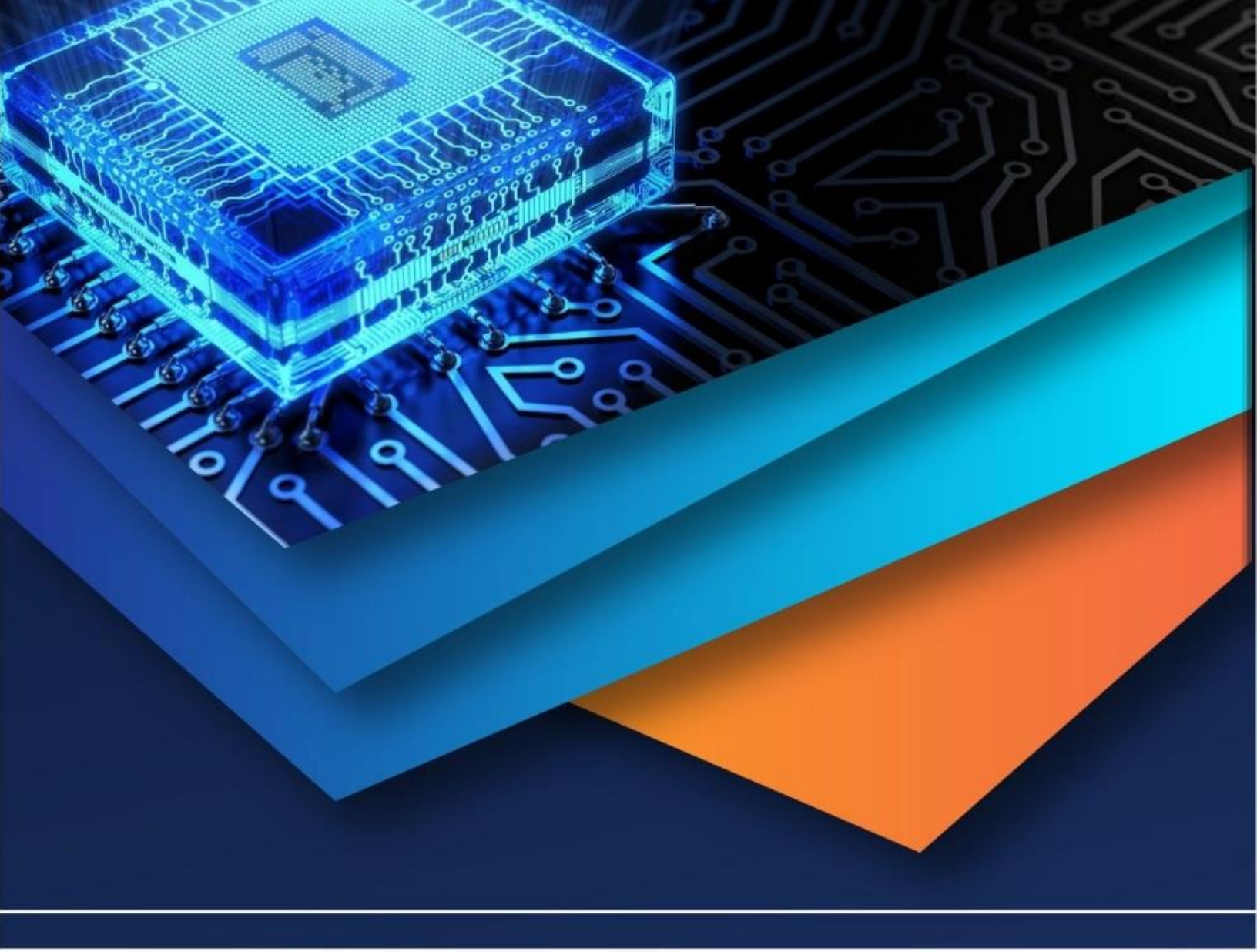
1) The solenoid coil works effectively and with fast response.
2) No wastage of electricity is there.
3) No other devices or equipments required to control the system.
4) Easy installation and very light weight.

X. CONCLUSIONS

1) The developed prototype works in a very simple manner.
2) This can stop the accidents and injury caused by high speed rotating blades when fall on anybody head.
3) In public places like stations or in homes this can be used anywhere because safety is must for all the living beings.
4) Very easy to install.
5) Can be installed in fans which are presently in working.

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