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RESEARCH PAPER ON DESIGN AND FABRICATION OF PORTABLE SAW MACHINE

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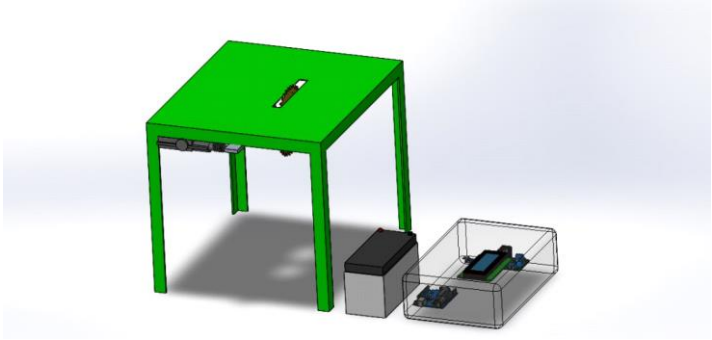
ABSTRACT

In this project we have made the automatic mechanism of safety table saw machine. when the blade is rotating and human hand comes near the blade it falls down for safety of the human body. There were some injuries taking place while working on saw machine during the operation. When the Human flesh comes near the spinning blade it automaticaly stoops the spinning blade and makes the blade to fall down. Because of the accidents on saw machine it has become the matter of concern where we can overcome the safety mechanism while working on table saw machine. The sensors were used to detect the human flesh for the safety mechanism of the humans while operating the saw machine. While the machine is operating when the human flesh comes near the machine the sensors are activated the spinning blade stops and the spinning blade falls down. It is mainly used for the safety mechanism of the human being.

Keywords: Design, Brake Mechanism, Safety, Saw Cutting Machine, Wood.

I. INTRODUCTION

In this we made this safety mechanism because there were many injuries taking place in spinning blade saw machine.12% people meet with an accident in India. because some behaviours like tiredness, laziness, sleepiness etc. The wood cutter is used in all table saws in all workshops and industries. In circular table saws main injury is taken mainly of hand it is the common injury. This injury takes place because of there is no safety while operating. So there is a requirement of wood cutter system. We have used arduino board and sensor to overcome the accidents of saw machine .Accidents are occured because of there is no safety in the present technologies are not sufficient to takeover the accidents. So there is requirement of good advanced machine to overcome the accidents. we have used arduino which gives command to actuator and machine to stop the machine. Actuator is also being used to make the saw blade down the arduino circuit gives command to actuator and the blade to stop and activate the actuator so the blade may fall down. The current wood cutting machine is not enough for doing the operation safely. This devices should be used in the industries for safe working and no harm may take place in industries or in workshops.



VIEW OF MECHANISM

II. LITERATURE REVIEW

In this Research paper the table saw machine consists of circular saw blade. In 1977 the first patent was issued for this machine to English man, named Samuel Miller. Varying the depth of cut, and it is done by adjusting the blade Up and Down. On the top surface support is provided for the wood being cut and blades comes through table top surface. Before table saws has arbor and blade fixed in such way that depth of cut is adjusted of the blade was done by moving the table Up and Down. when the angle of blade is been adjusted it controls and

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gives variation n angle of cut. If we want deeper cut into the material then high protrusion of blade must be there above the table. It is driven by an electric motor directly. It gets support to cut the material. Safety automation in the existing circular saw machines. In this method we have mostly used the safety mechanism for the humans because there were many more injuries taken place in table saw machine. To avoid the injuries we have used safety mechanism to avoid the acidents on table saw machine. An improved protection system can be achieved by using automatic blade guard. Human skin and flesh and wood are not conductive which give same results which makes method in-convenient.

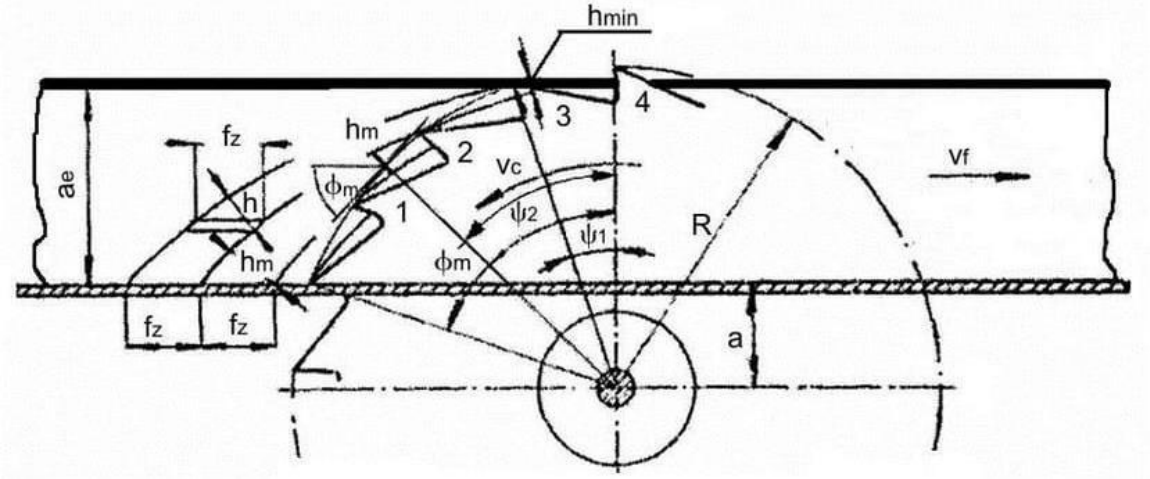
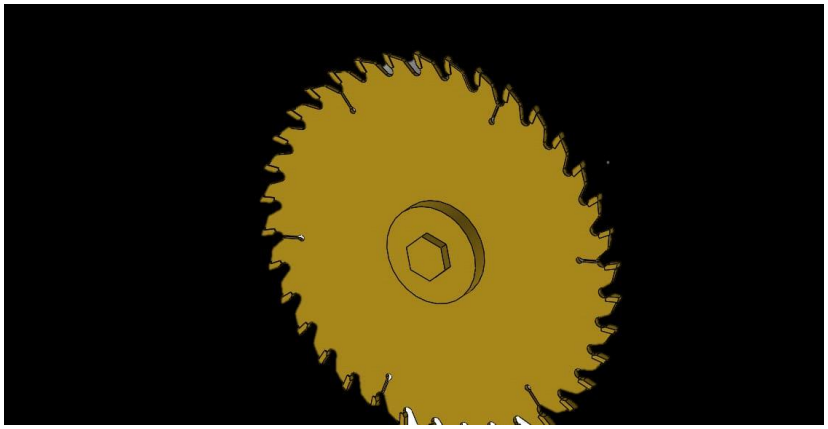


Illustration of circular saw cutting wood

Main components of Model:

PMDC MOTOR



SAW BLADE

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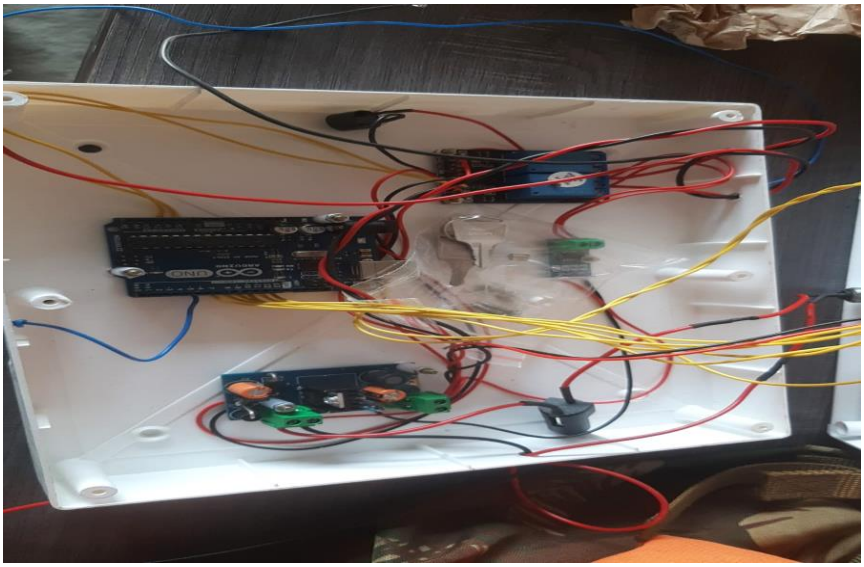
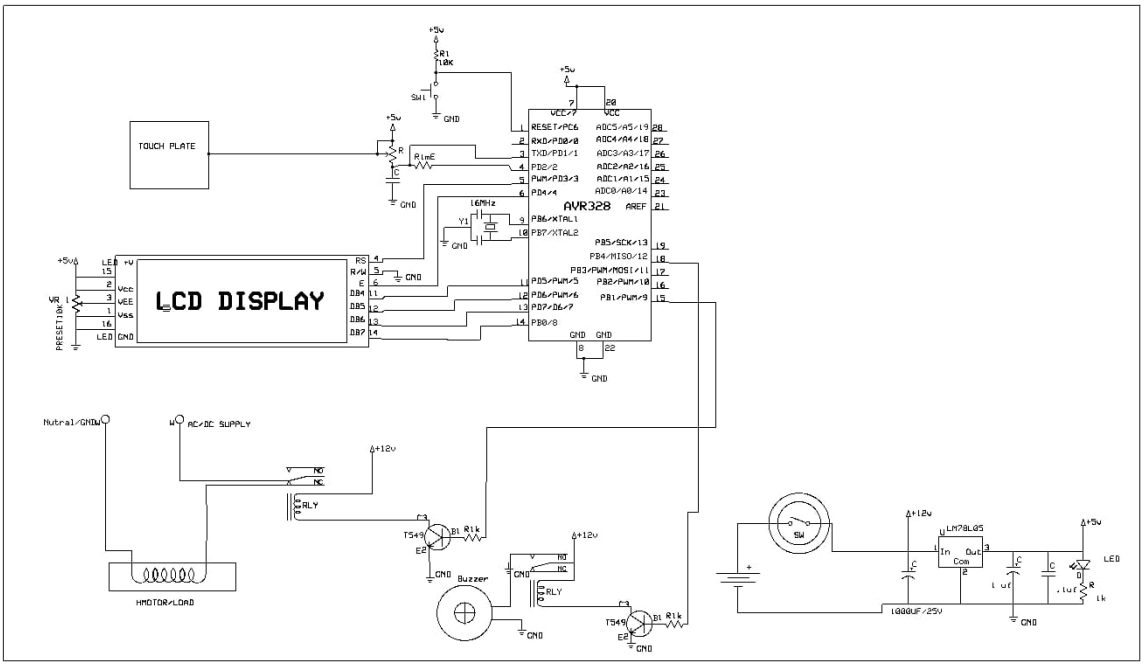
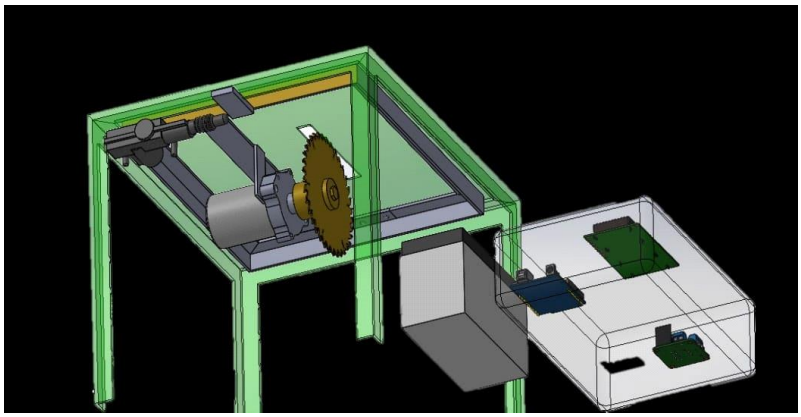


ARDUINO AND CONTROL CIRCUIT

III. METHODOLOGY



SCHEMATIC CIRCUIT



SOLENOID AND BLADE MECHANISM

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WORKING:

In this we have discovered the saw machine which works on quick responce method.in this table saw machine we have used arduino circuit and the actuator. Actuator acts as a sensor. When the cutter is running and when the skin or flesh or a human hand comes near the blade the blade goes down and the motor stops. arduino circuit is placed to activate the actuator and which stops the motor. Arduino gives command to actuator and motor stops automatically and blade comes down that the injury may not take place. Actuator acts like the sensor and sensor gives signal to solenoid. The running motor stops and solenoid releases the blade and the blade goes down and prevent the accident and injury of the motor. When the earthing is given the machine stops automatically.

CALCULATIONS:

DESIGN OF MOTOR:

Power of Motor=20 Watt

RPM of Motor =1500rpm

$P=\frac{2\pi NT}{60}$

Where,

N=Rpm of Motor

T=Torque Transmitted

$20=\frac{2\pi x1500xT}{60}$

T=0.01273N-m

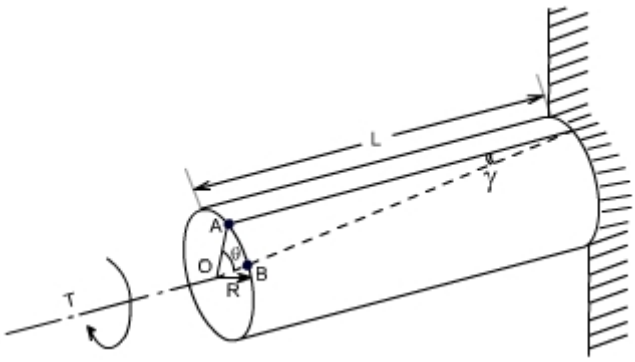
T=127.3N-mm

DESIGN OF SHAFT:

$T=\pi/16x135xd^3$

d=1.68=2mm

but we are using 5mm shaft so design is safe.



DESIGN OF FRAME FORCE GENERATED BY CUTTER:

Torque Transmitted,

T=Forcexradius

127=Fx60

F=2.12N

F=2.12/9.81

F=0.21Kg

DESIGN OF LEG:

Let the total weight(P) of our machine including be 10kg

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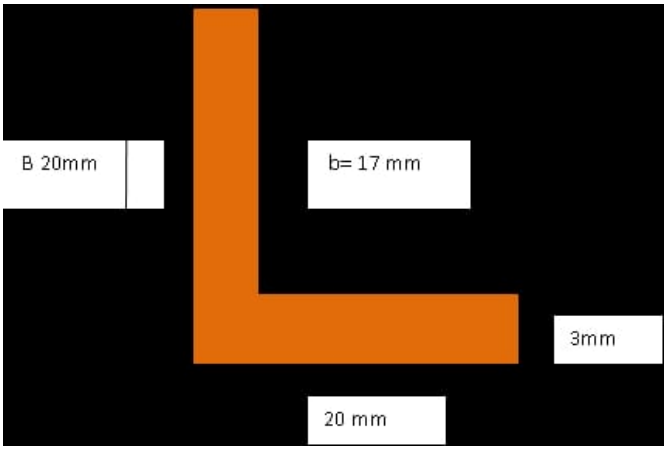


P=10kg

P=10x9.81=100N

L=300mm

M=WL/4=100x300/4

=7500N-mm

Section of modulus=$Z=B^3/6-b^4/6xB$

$Z=20^3/6-17^4/6x20$

=1333.3-696.4

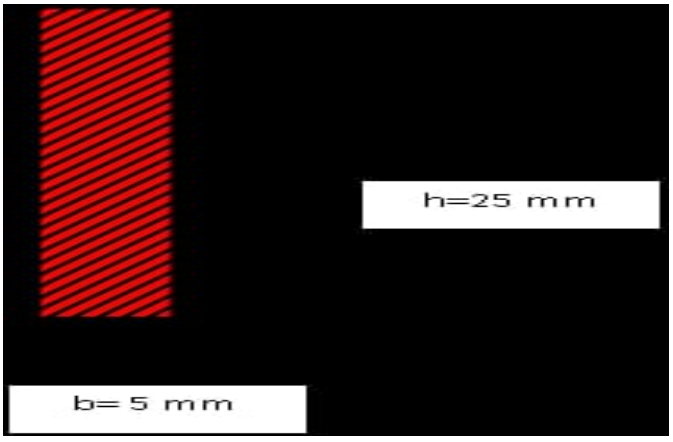
$Z=638mm^3$

Bending stress=M/Z=7500/638

$=11.75N/mm^2$

As induced bending stress is less than allowable bending stress i.e $270N/mm^2$ design is safe.

DESIGN OF TRANSVERSE FILLET WELDED JOINT:



Hence, selecting weld rod size=3.2mm

Area of Weld=0.707xWeld sizexL

=0.707x3.2x25

=56.56mm^2

Force exerted = ----N

Stress induced=Force Exerted/Area of Weld

21=F/56.56

F=1187.76N=121.07kg

Maximum Allowable Stress For Welded Joints =21N/mm^2

IV. CONCLUSION

We have made this project for safety of the operator that the accident may not take place, and for making the cost low as possible. In this we have used the circuits for controlling the machine and stop the machine when accident is going to take place and confirms it to stop the machine in seconds. this paper is on Table saw machine by adding some components which can change the operations in the machine which is safe for the operator. When the human flesh is detected the machine stops in seconds which may prevent accident of an operator. The main reason was to discover the machine to avoid accidents and injuries when the operator is working on machine.

V. FUTURE SCOPE

In future the table saw machine may become more advanced. And it may become more accurate and some new components may be added to make the system more advanced. In future the operation may be done on computerised system by giving some new operations. In future many more components may be discovered for safety mechanism of the operator In some more years many more applications can be added for safety mechanism of the operator. To avoid injuries more many more applications will be added.

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