Design and Development of Jig for drilling machine

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Contents:-

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What is Jig and Fixture ?

- These are work holding device and tool guided device. Quality of performance of process is largely depends on design of jig and fixture.

- A jig differs from a fixture in sence of that it guides a tool to its correct position.

Introduction

- A CNC can also do the drilling work with accuracy but the cost of a CNC is very high. For working with this machine we need special training, which is very costly. Its use for automation into the manufacturing companies.

- So in our project we are creating a one model like CNC. our model is use for the drilling purpose and automation,its a **jig,**which is use for the drilling and automation. its easy to use and understand. so its easy to use in manufacturing companies.

Objectives of Present Investigation

- This project basically consists of manufacturing of a fixture for drilling machine. It has to reduce the time and to increase the accuracy of the drilling machine.

- This project is mainly for small scale industries. This will be very useful for the mass production. So this project is basically for automation of the drilling machine.

- So our project will help to make sure that the time and cost constraint is resolved.

APPLICATION

- Where Less skill labours are worked
- Fast work with high accuracy in industry
- This application can be also used for milling or any kind of cutting machine
- For mass production in small industries

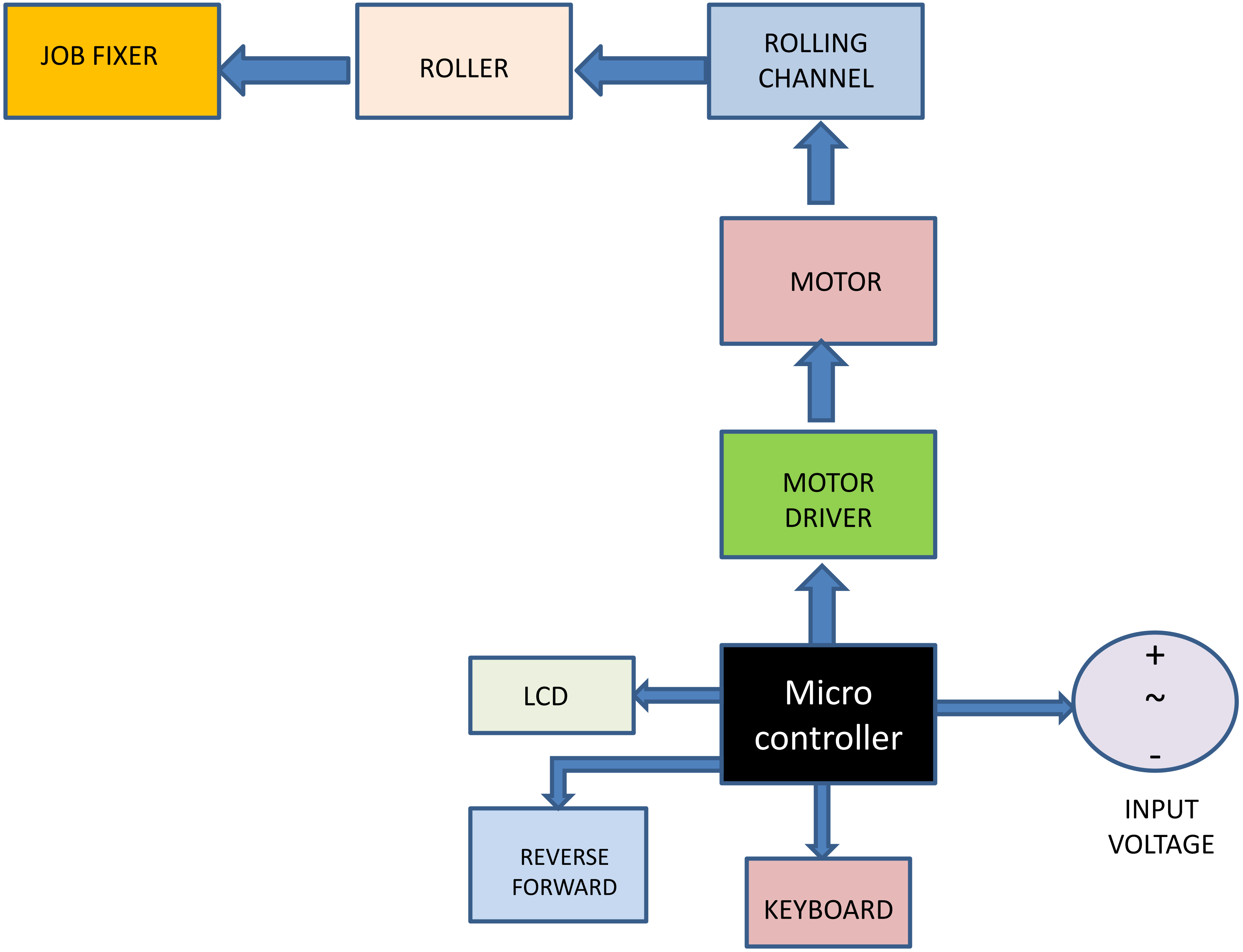
Literature Review:-

Design and requirement	Method	Result	Reference
Better quality and high production	•SPM method are use •Comparisons of SPM, manual method	SPM method are less costly compared CNC And less time required manually	M.P. Groover In USA,2008
development of automated jig saw machine	Three step •Size •User interface and programming •Communication link	**avoid this point** ▪**serious accidents** ▪**inaccuracy in profiles** ▪ **time consumption** ▪**loss of raw material**	Prajakta H. Dahake, Vivek V. Patil (2013)
Design of Jigs and Fixtures for Hydraulic Press Machine	*Design(U,V shape), Simulation , analysis in ANSY software*	Better gripping and holding, Less deformation,	Taufik, R.S. , Hirmanto

Design and requirement	Method	Result and Application	Reference
Design and Finite Element Analysis of JIGS and Fixtures for Manufacturing of Chassis Bracket	FEM	Manufacturing of Chassis Bracket of Bajaj car RE60 (passenger)	Sawita D. Dongre
Mathematic simulation of +13 mm particles motion in jig	1. **Analysis of particle motion** **(**vibration, ***motion equation,*** Velocity, Acceleration	. The equations might be used directly in control process of jig.	Kuang Ya-li
Implementation of Automatic Identification Technology in a Process of Fixture	*Radio Frequency Identification (RFID) technology*	automated data identification	Stevan Stankovski

Design and requirement	Method	Result and Application	Reference
Inaccuracy of the AO ELFN recon jig: A case series	ELFN(EXPERT LATERAL FEMORAL NAIL)	USED IN SURGEONS (IN X –RAY RSDIOGRAPHY)	O.A. Lbrahim R. Freeman G.J.R slater
Planar malty-reflecting time of flight mass analyzer With a jig saw ion path	MR TOF(MULTI-REFLECTING TIME OF FLIGHT)	HIGH TRANSMISSION AND STABLE OPERATION	Mikhail yavor Juri hasin Boris kozlov
Self-opimization in large scale assembly	SELF-OPTIMIZING CONTROL ALGORITHMS	AIR CRAFT PRODUCTION AND INCRESE THE	R. Schmitt m. janssen

Design and requirement	Method	Result and Application	Reference
ULTYMATE TROUGH-Fabrication, Erection and commissioning of the worlds largest parabolic trough collector	SCA(solar collector assembly)	Solar power plant	A. Schweitzer W. Schiel P. Nava


JOB FIXER
ROLLER
ROLLING CHANNEL
MOTOR
MOTOR DRIVER
LCD
Micro controller
+
~
-
INPUT VOLTAGE
REVERSE FORWARD
KEYBOARD

Components	Type	Parameters
Lead screw	Single thread	Nominal diameter(d) outer diameter(Do) core diameter(Dc) Pitch(p) Mean diameter(Dm) Lead(l)
microcontroller	**Microcontroller 89s52**	
Bearing	Slider bearing	
motor	Stepper Motor	
Bolt and nut	Single thread	Diameter

Design:-

1. Lead screw
2. Gear pair
3. Bolt and nut
4. Motor calculation

Torque required	**Total Motor Torque Required,** **T = T1+T2**	**T1-due to inertia** **T2-frictional**
	T1=w*(d/2)=545 N.mm T2=w*(d/2)*tan(ϕ+α)=230 N.mm	Total T=755 N.mm
Load on lead screw	Tensile stress Torsion stress Buckling effect	σ= w/(п/4*(d)^2)=0.522 Mpa Ґ=16T/(п/4*(d)^3)=2.16 Mpa
Material strenght	Tensile stress Torsion stress	$\sigma_t = \sigma_y$/f.o.s= 112 Mpa σ_c = 1.5 × 112 = 168 Mpa τ = 0.5 × σ_t= 0.5 × 112= 56 Mpa

Design parameter

- **Lead Screw**

  P=3 mm d=13 mm l=280 mm μ=0.15

  Dm =11.5 mm , ƛ = 8.530

- **Design of Bolt**

  p=2 mm l=63 mm d=6 mm

- **Design of nut**

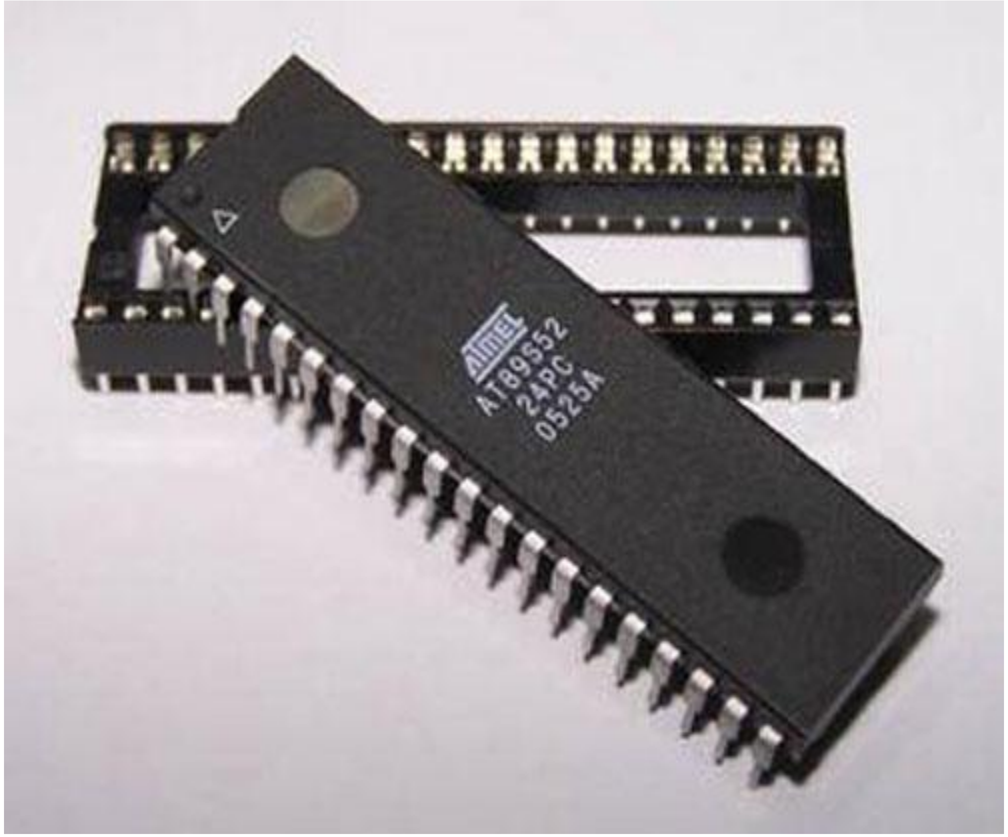
  P=2 mm h=6 mm

- **Design motor**

  RPM= K1 * V, where, K1= induced voltage constant,V=voltage applied

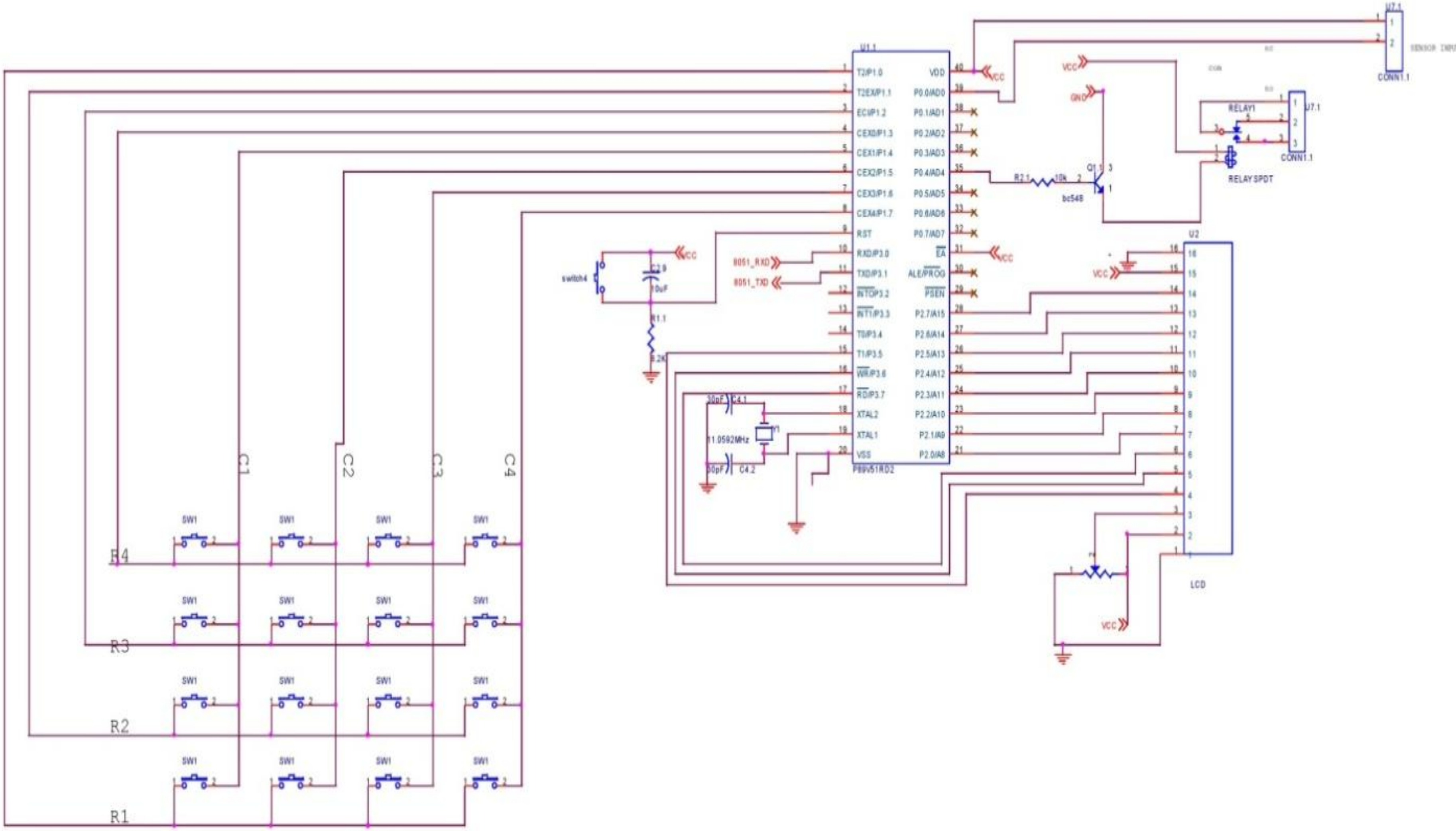
CONTROLLER UNIT

Microcontroller

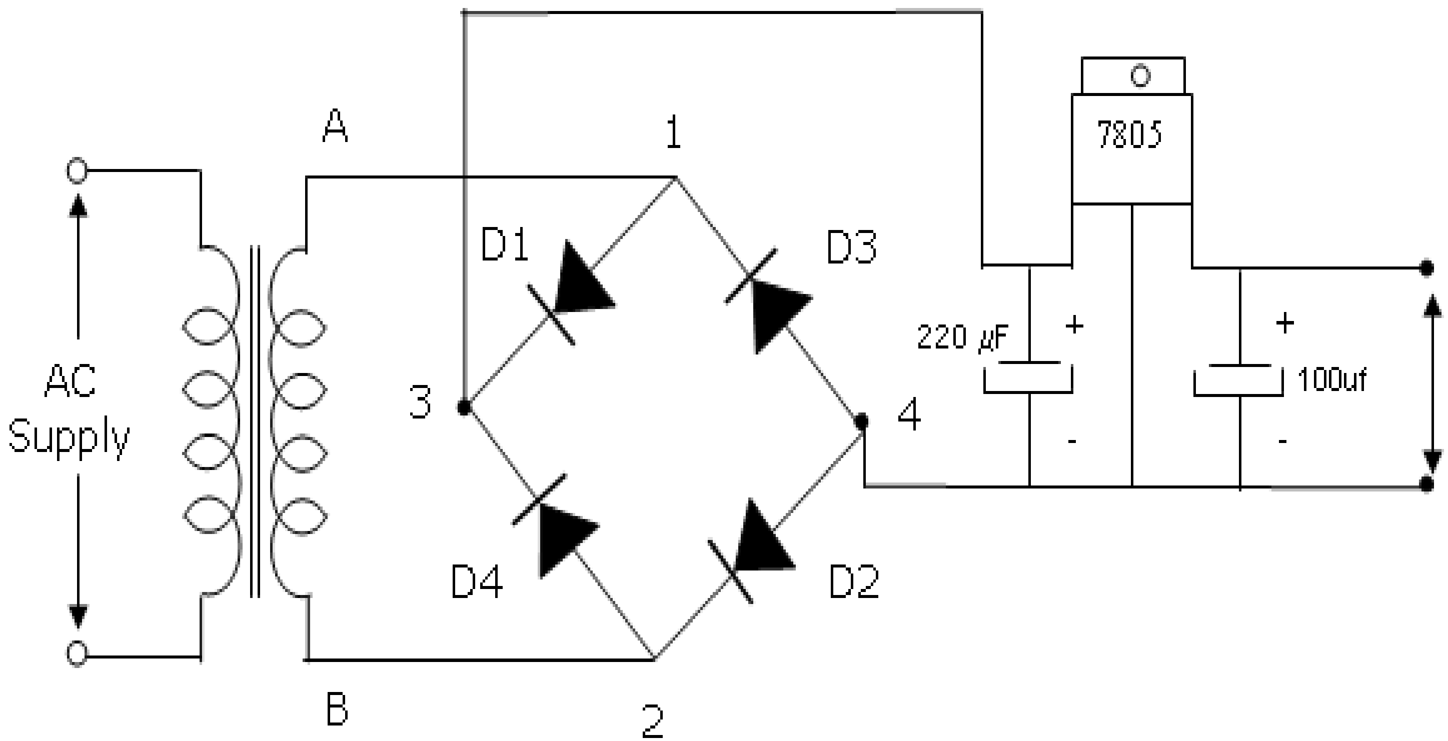


LCD

Circuit diagram

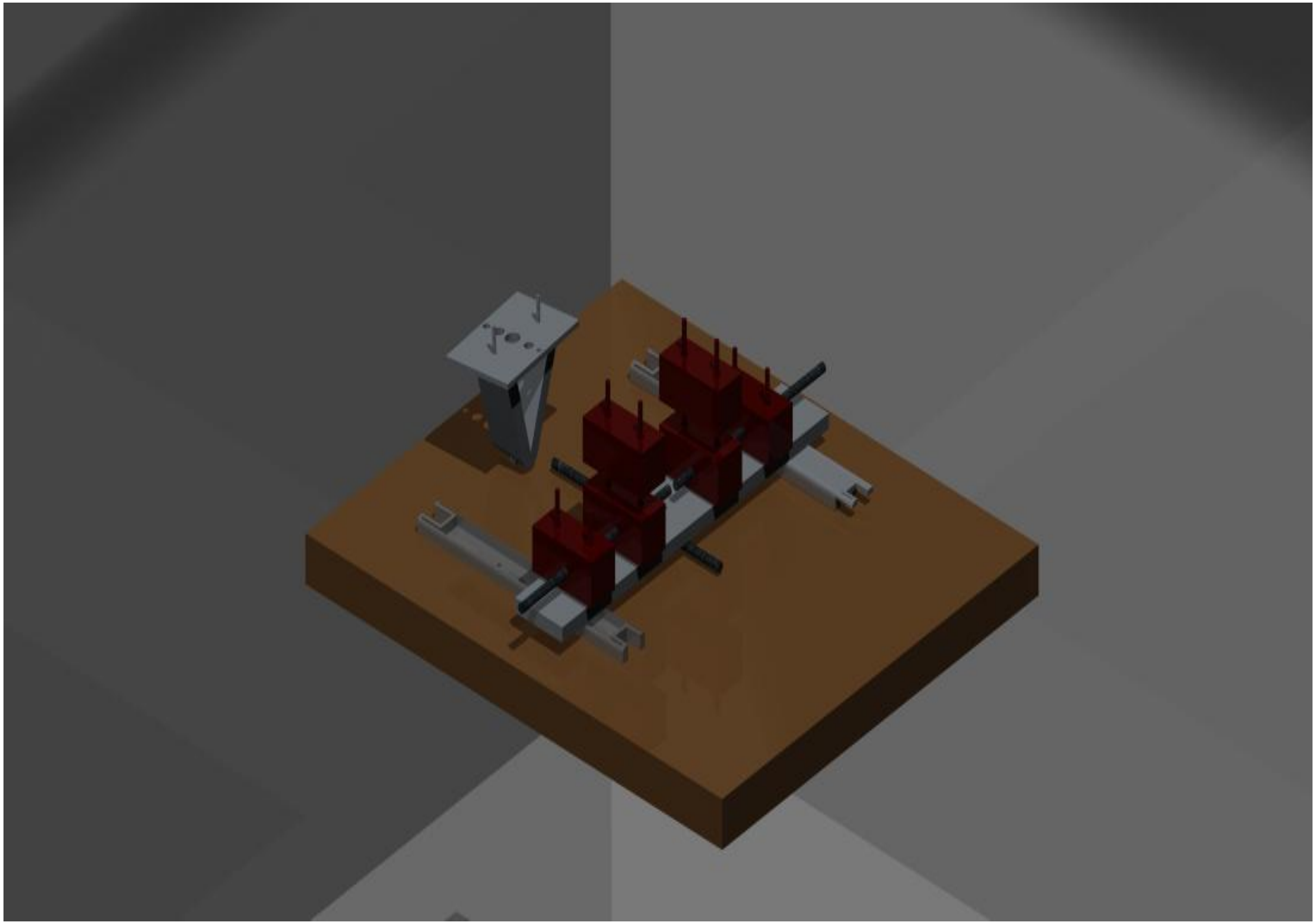


Power supply diagram

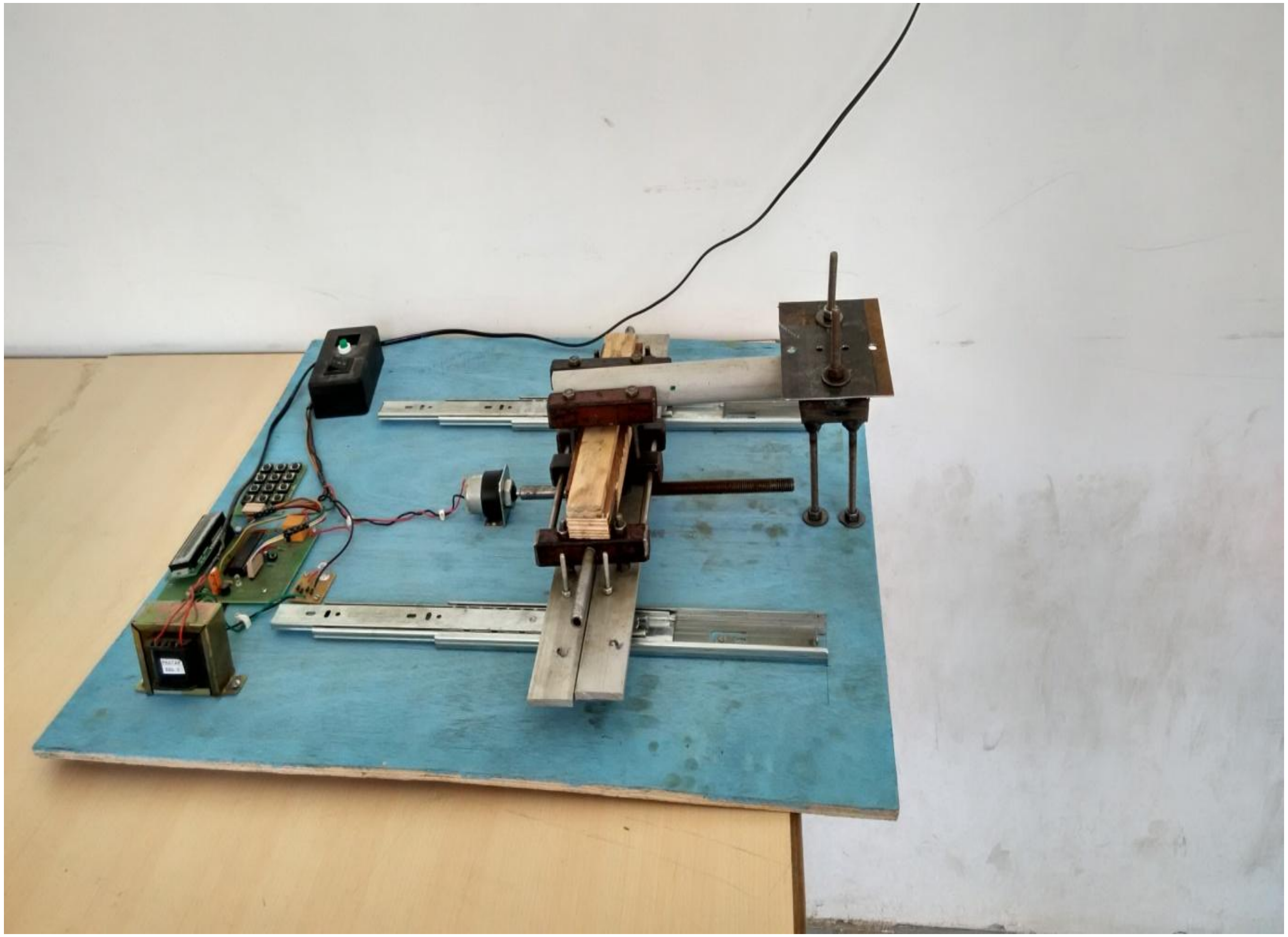


Transformer

Proto type Pro e Model



Model Preparation



THANK YOU