न हि ज्ञानेन सदृशं पवित्रमिह विद्यते।

Smt. S. R. PATEL ENGINEERING COLLEGE

DESIGN AND DEVELOPMENT ON ELECTRO MAGNETIC AND AUTOMATIC BREAKING SYSTEM

GUIDED BY :- PROF. MANOJ P . RAJPARA

PREPARED BY: GROUP NO:-27

- RAJPUT VIPUL 11ME64
- PARAJAPATI NIKUL 12ME02
- MODI SAGAR 12ME17
- DARJI MILAN 12 ME18

CONTENT

- Introduction
- Project Principal
- Literature Review
- Types of brake
- Component
- Component design
- Construction
- Future Scope
- Advantage
- Disadvantage
- Application
- Work Planning
- Reference

INTRODUCTION

In this project we have designed and establishment and Electromagnetic disk braking system so as to have a future alternative to traditional breaking systems. Electromagnetic disk braking system slows an objects by creating an eddy current through electromagnetic induction which create resistance. When electromagnetic are used, control of the breaking action is made possible by varying the strength of the magnetic field of the electromagnets creates eddy currents in the discs. These eddy currents generate an opposing magnetic field (Lenz's law), which then resists the rotation of the discs, providing braking force. The net result is to convert the motion of the rotors into heat in the rotors.

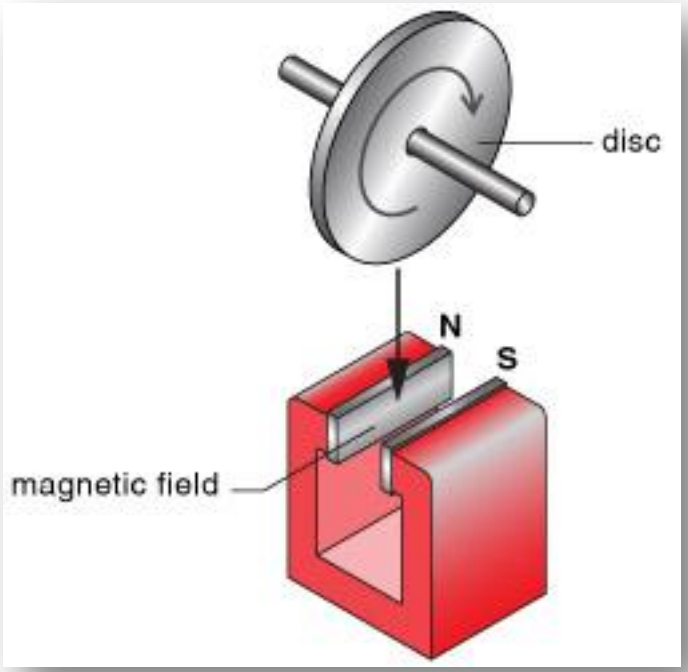
Electro magnetic and auto breaking system

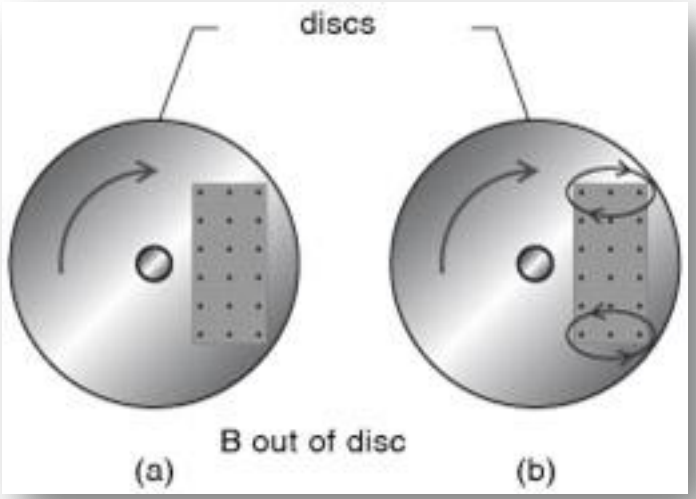
designed to develop a new system that can solve this problem where drivers may not brake manually but the vehicles can stop automatically due to obstacles. This project is about a system that can control braking system for safety. Using ultrasonic as a ranging sensor, its function based on ultrasonic wave. After transmit by transmitter, the wave can reflect when obstacle detected and receive by receiver. The main target for this project is, car cans automatically braking due to obstacles when the sensor senses the obstacles. The braking circuit function is to brake the car automatically after received signal from the sensor.

PRINCIPLE

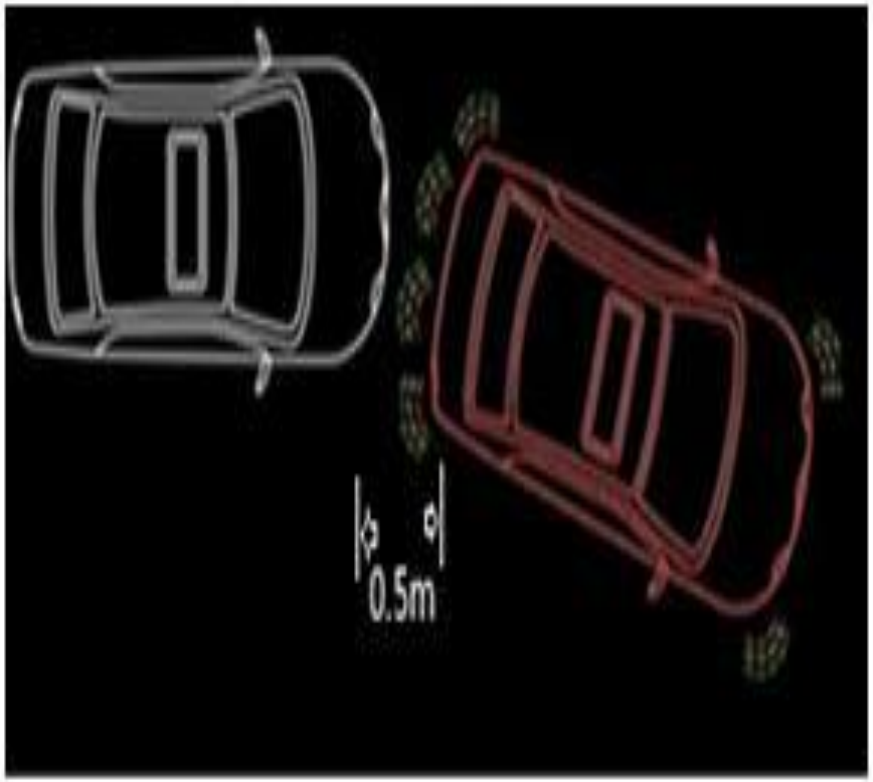
As the disc enters the magnetic field a series of eddy currents will be produced (as explained by Lenz's law). This produces a magnetic field that will oppose the change brought about by the rotating disc. If the magnetic field of the horseshoe magnet is coming out of the page then the induced magnetic field will be into the page. The induced current will be in a clockwise direction to produce this field. This will bring the disc to a halt very quickly and will result in a small amount of heat being produced by the eddy currents.

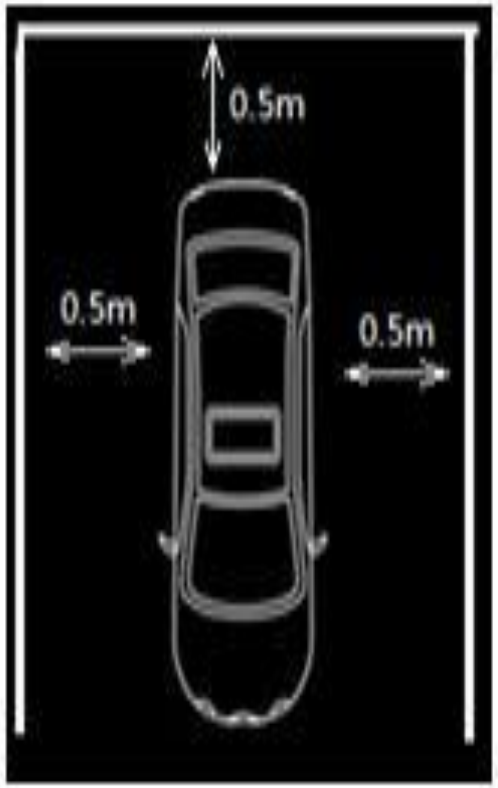
PRINCIPLE





PRINCIPLE





LITERATURE REVIEW:

PAPER TITLE	AUTHOR NAME	OUTCOME
Innovative Electro Magnetic Braking System	Sevvel P1, Nirmal Kannan V2, Mars Mukesh S3	An Electromagnetic Braking system uses Magnetic force to engage the brake, but the power required for braking is transmitted manually. The electromagnetic brakes can be used in commercial vehicles by controlling the current supplied to produce the magnetic flux. Making some improvements in the brakes it canbe used in automobiles in future

PAPER TITLE	AUTHOR NAME	OUTCOME
ULTRASONIC CAR BRAKING SYSTEM	ULTRASONIC CAR BRAKING SYSTEM MOHD SHAHRIZAN B. SAHRI	An ultrasonic car braking system includes; an ultra sonic wave emitter provided in a front portion of an automatic braking car producing and emitting ultrasonic waves frontward in a predetermined dista nce in front of the car.

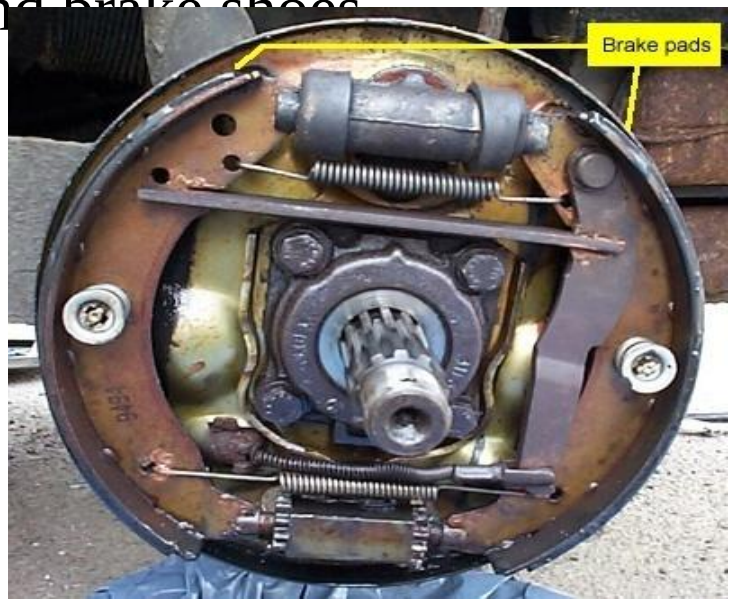
PAPER TITLE	AUTHOR NAME	OUTCOME
Fabrication of Auto-Braking Sy stem for Pre-Crash Safety Using Sensor	Eung Soo Kim	This module can detect the distance between front vehicle and driver's vehicle to keep a constant distance using a sensor and operate the brake system forcibly if the driver does not decrease the speed of car.

PAPER TITLE	AUTHOR NAME	OUTCOME
ANTILOCK BRAKING SYSTEM	Sahil Jitesh1*	ABS generally offer advanced vehicle control and minimize the stopping distance in slippery and dry surface, conversely on loose surface like gravel or snow covered pavement, ABS can significantly increasebraking distance, although still improving vehicle control.

TYPES OF BRAKE

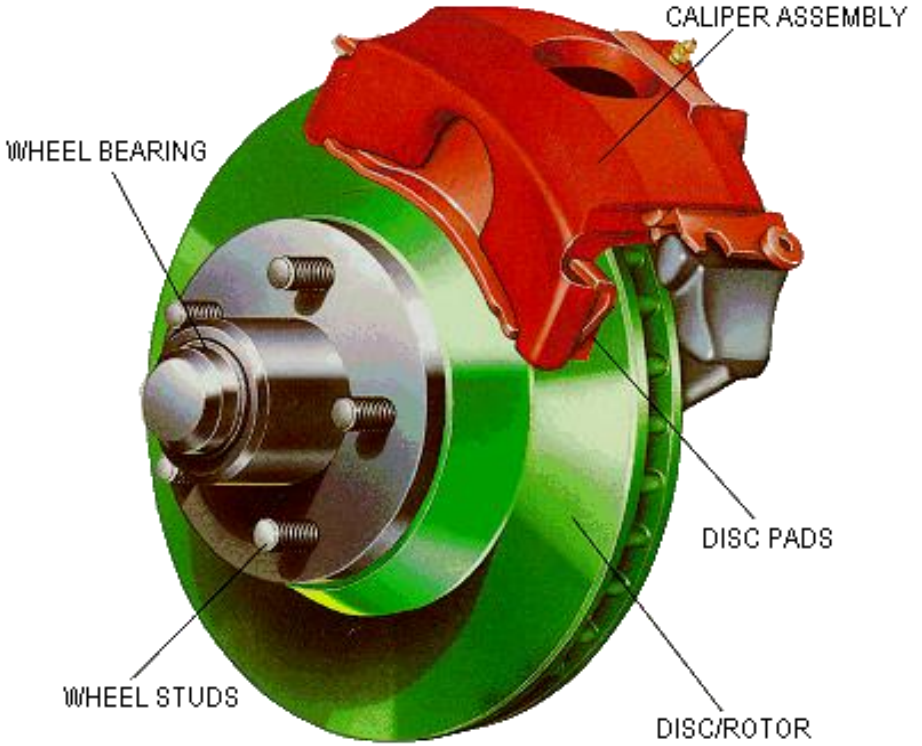
DRUM BRAKE:

It consists of a brake drum which is concentric to the axle hub whereas on the axle casing is mounted a back plate. The back plate is made up of pressed steel sheet and it provides support for the expander, anchor and brake shoes.



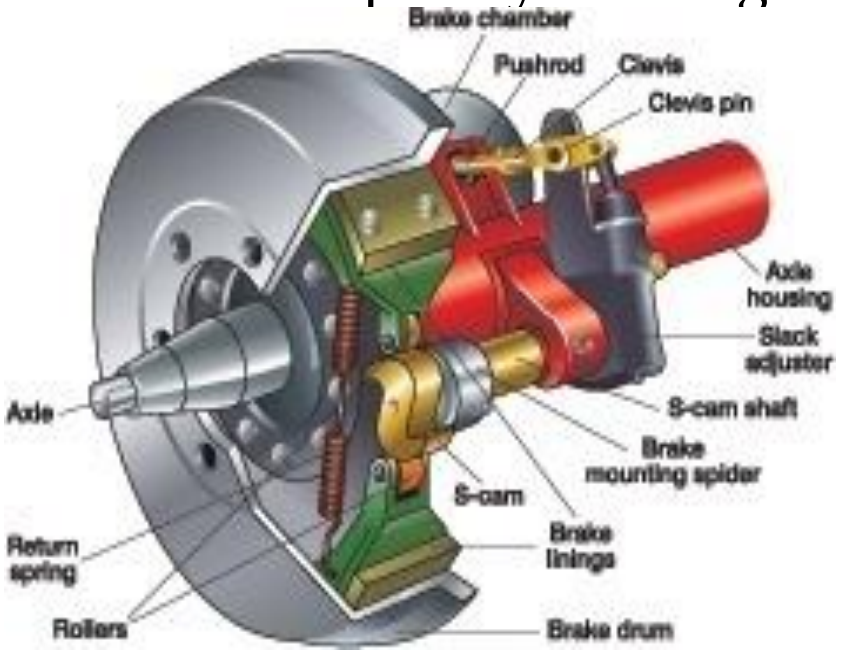
DISC BRAKE:

Disc brakes work using the same basic principle as the brakes on a bicycle as the caliper pinches the wheel with pads on both sides, it slows the vehicle.



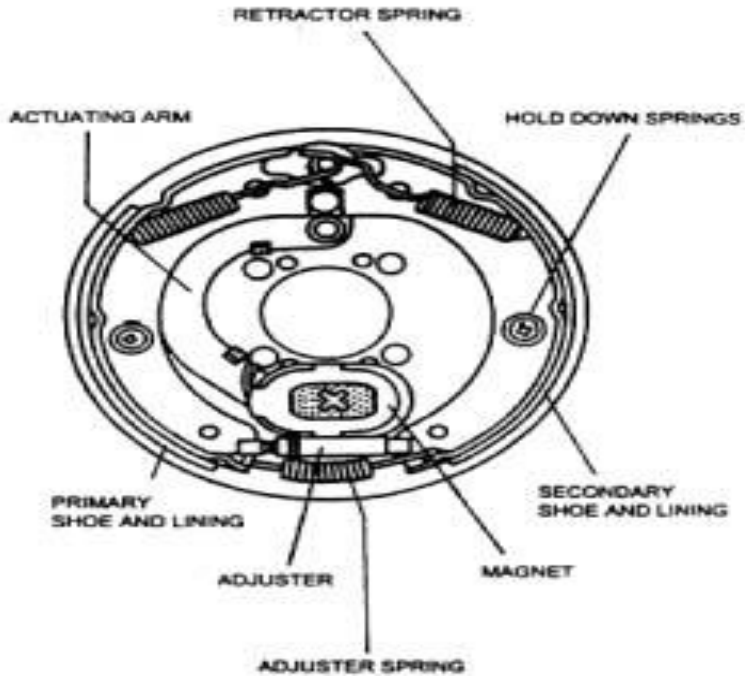
AIR BRAKE :

Air brakes use standard hydraulic brake system components such as braking lines, wheel cylinders and a slave cylinder similar to a master cylinder to transmit the air-pressure-produced braking energy to the wheel brakes. Air brakes are used frequently when greater braking capacity is required.



HAND BRAKE :

Hand brakes are the parking or emergency brakes. They helps a vehicle to park on a slope or during emergencies when primary brakes are disabled. They works independently of primary brakes.



COMPONENTS USED

- DC motor (as engine)
- DC electromagnets
- Chain
- Pedals
- Relay
- Transformer
- Ultrasonic sensor

COMPONENT

1.DISC

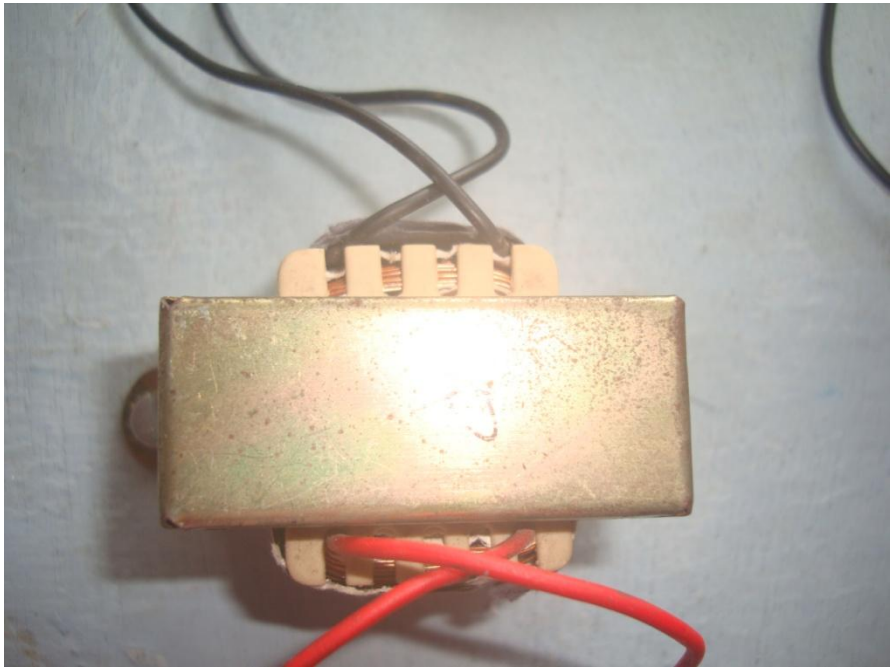
The brake disc is the component of a disc brake against which the brake pads are applied. The material is typically grey iron a form of cast iron. The design of the disc varies somewhat. Some are simply solid, but others are hollowed out with fins or vanes joining together the disc's two contact surfaces (usually included as part of a casting process)..

Dc Motor

Dc motor is an electric motor converts electrical energy into mechanical motion. The reverse task that of converting mechanical motion into electrical energy, is accomplished by a generator or dynamo. In many cases the two devices are identical except for their application and minor construction details.

Transformer

An electric current flowing in a wire creates a magnetic field around the wire (see drawing below). To concentrate the magnetic field, in an electromagnet the wire is wound into a coil, with many turns of wire lying side by side. The magnetic field of all the turns of wire passes through the center of the coil, creating a strong magnetic field there.



Electromagnet

Electromagnets are very widely used in electric and electromechanical devices, including:

- Motors and generators
- transformers
- Relays, including reed relays originally used in telephone exchanges
- Electric bells
- Loudspeakers
- Magnetic recording and data storage equipment: tape recorders, VCRs, hard disks
- Scientific instruments such as MRI machines and mass spectrometers
- Particle accelerators

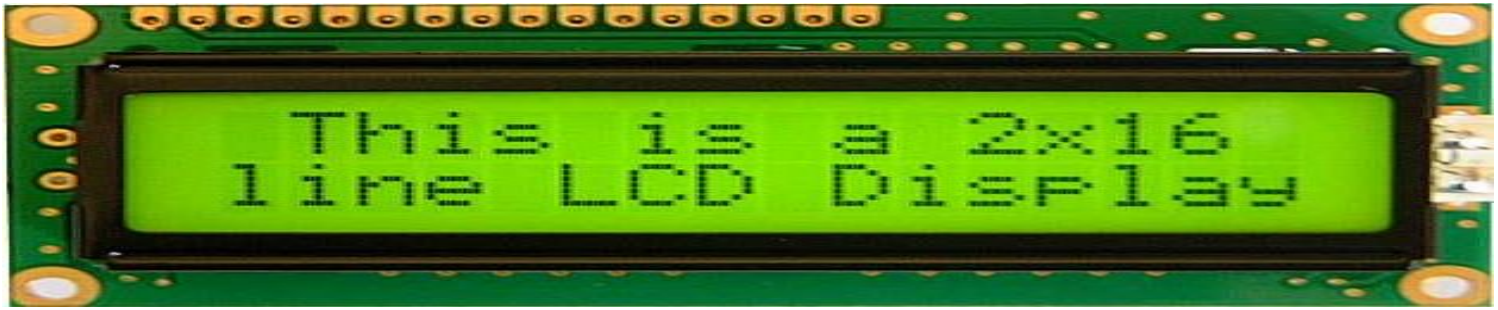
chain

A chain drive is a mechanism for transferring mechanical powerbetw two places, and is common means of locomotion in bicycles and motorcycles. It is alsmotive source for many different types ofmachinery. Chain drives have existed as a technology sinc. he third century BC and have remained he same in their basic design since that time.

INFRARED PROXIMITY SENSOR

An **infrared proximity sensor** is a sensor able to detect the presence of nearby objects without any physical contact. A infrared proximity sensor often emits an electromagnetic field or a beam of electromagnetic radition in(frared, for instance), and looks for changes in the field or return signal. The object being sensed is often referred to as the infrared proximity sensor's target. Different infrared proximity sensor targets demand different sensors. For example, a capacitive photoelectric sensormight be suitable for a plastic target; an inductiveinfrared proximity sensor always requires a metal target.

LCD



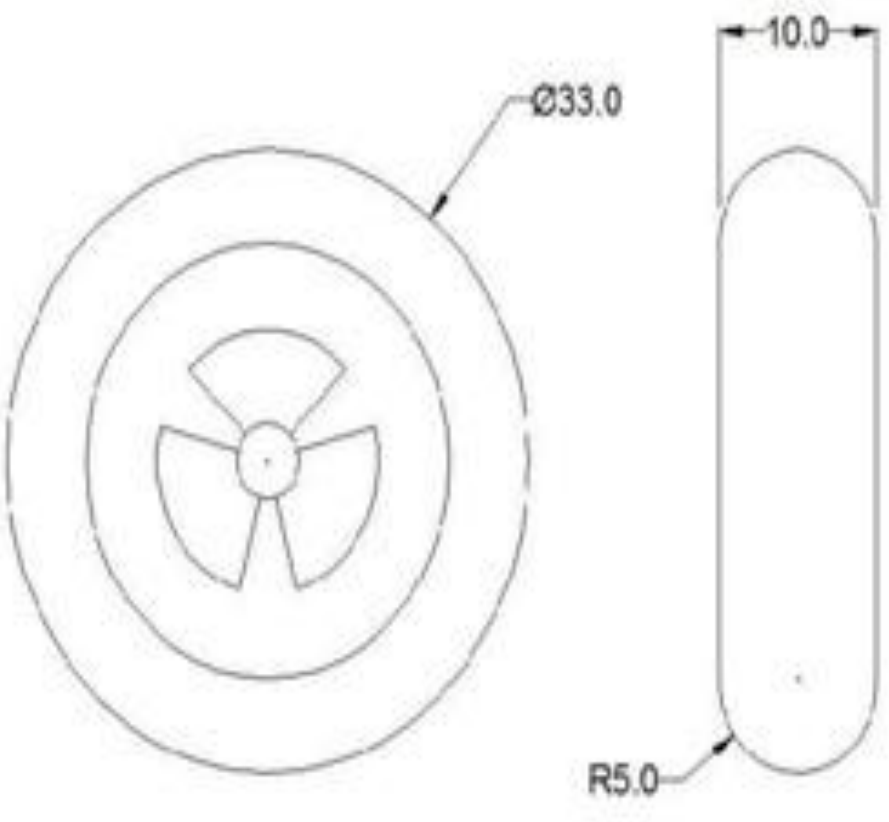
A **liquid-crystal display** better known as (**LCD**) is a flat panal display,electronic visual display or video displaythat uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly.

LCDs are used in a wide range of applications including computer monitors, televisions, instrument panels,aircraft cockpit displays, and signage. They are common in consumer devices such as video players, gaming devices, clocks, watches. calculators, and telephones, and have replaced cathode ray tube (CRT) displays in most applications.

1.wheel

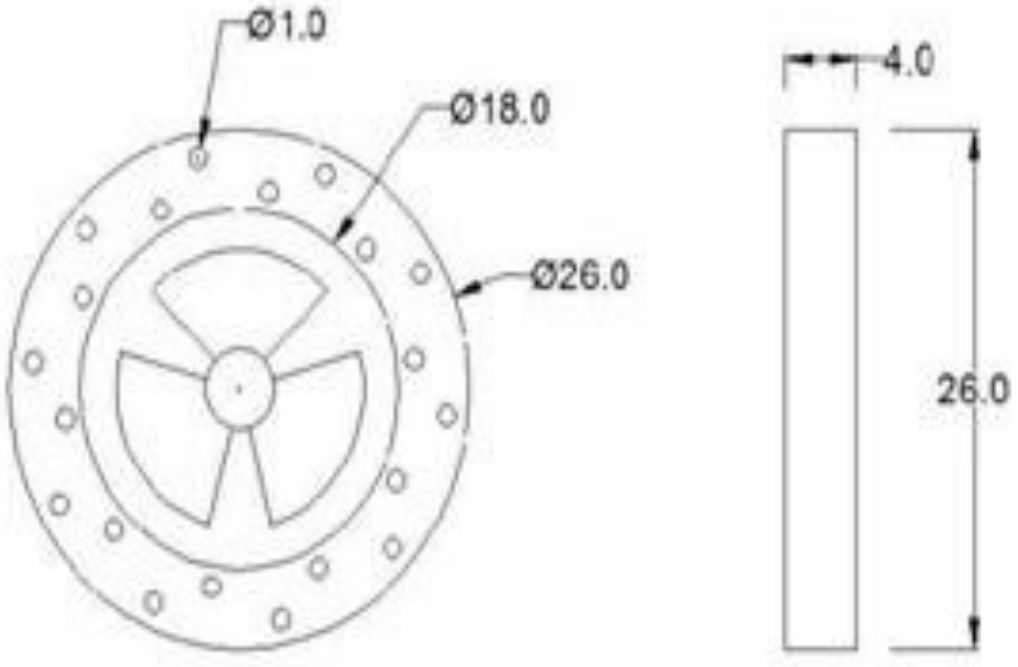
N1d=N2D

N2=80 RPM



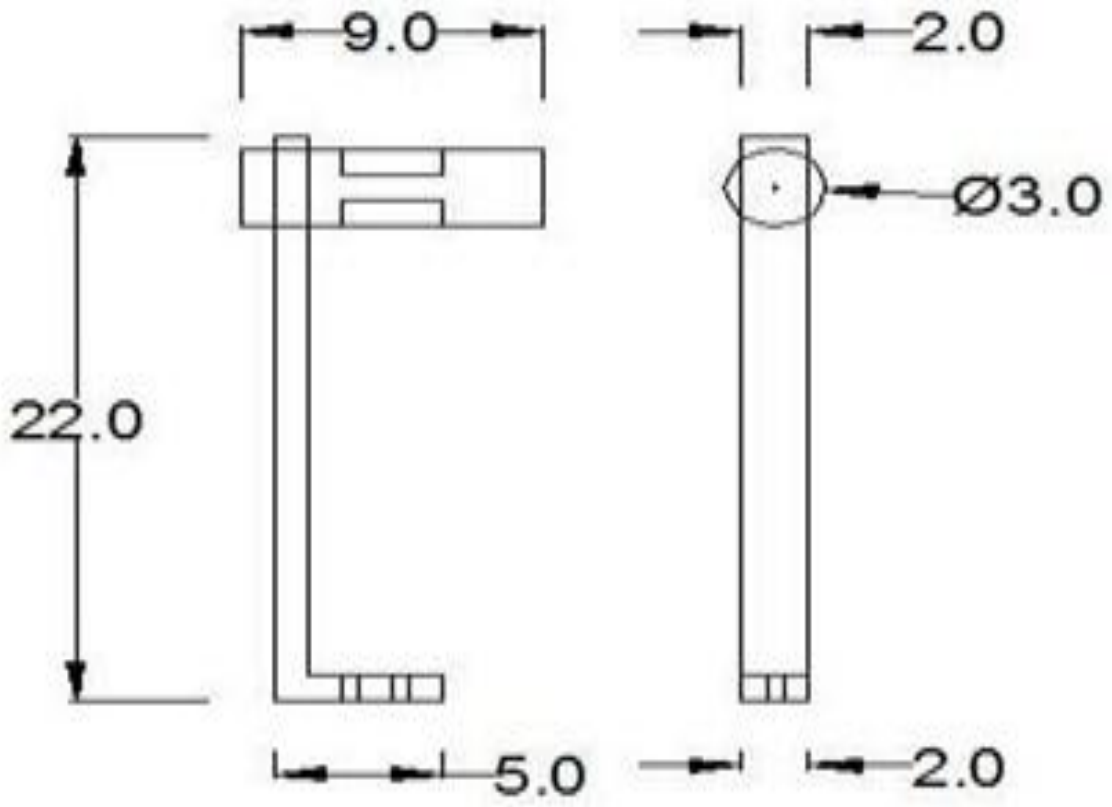
2.disc

Centre distance between the pulleys= 32cm
Diameter of the driving pulley = 4.4cm=d
Diameter of the driven pulley = 5.5cm=D Speed of the driving pulley = 100 rpm=N1

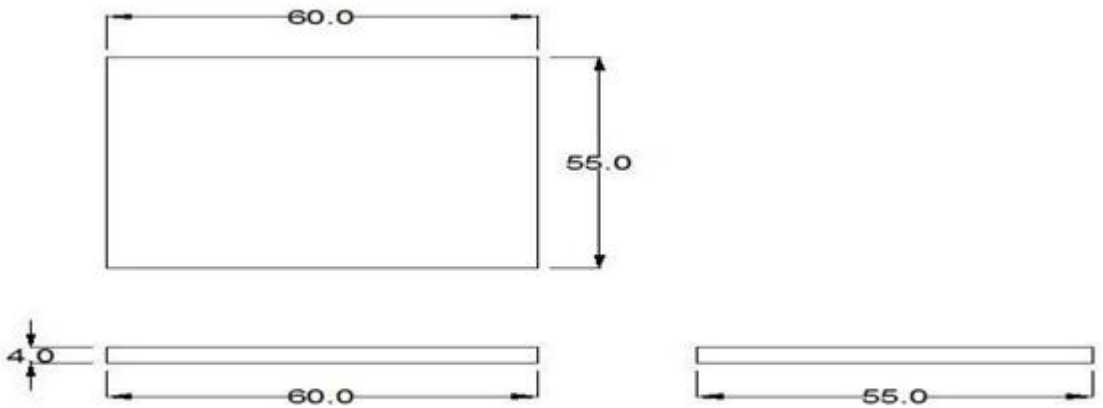


3.electromagnet

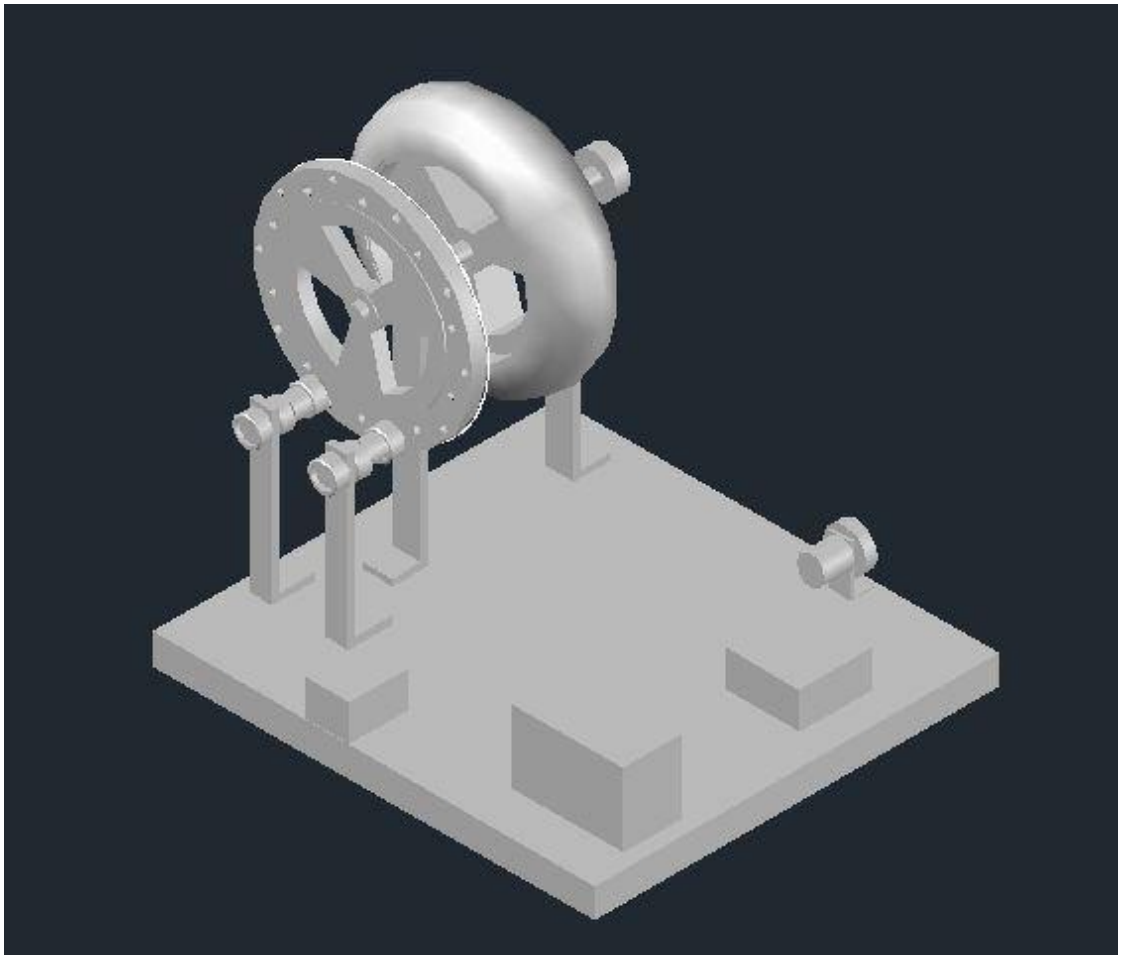
24volt



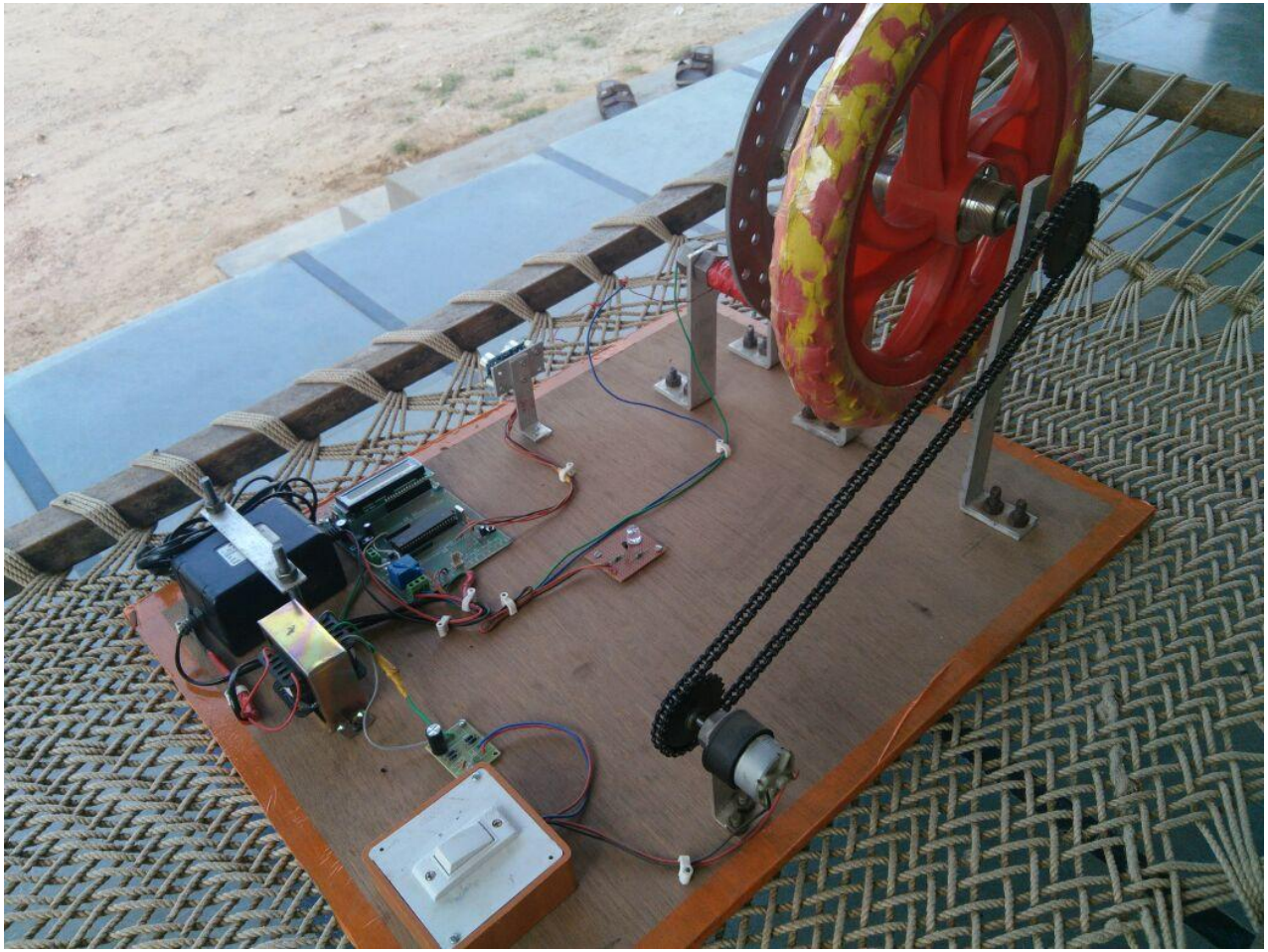
4.Wood bar



3-D Modeal



WORKING MODEAL



Project cost

Sr.No	PARTS	COST
1.	Chain	350
2.	wheel	450
3.	motor	225
4.	switch	110
5.	Transformer 3 –Amp	180
6.	Micro control Board	1000
7.	LCD Display	180
8.	Micro controller I.C	70
9.	Wooden board	250
10.	Wiring cost	150
11.	Bolt & nut	150

Sr. No	PARTS	COST
13.	sensor	400
14.	Main cable	20
	Total Cost	**3635**

CONSTRUCTION

A horseshoe magnet (A-1) has a North and South Pole. If a piece of Iron contacts both poles, a magnetic circuit is created. In an electromagnetic brake, the North and South Pole is created by a coil shell and a wound coil. In a brake, the armature is being pulled against the brake field. (A-3) The frictional contact, which is being controlled by the strength of the magnetic field, is what causes the rotational motion to stop. All of the torque comes from the magnetic attraction and coefficient of friction between the steel of the armature and the steel of the brake field. Example, if the brake was required to have an extended time to stop or slip time, a low coefficient material can be used.

FUTURE SCOPE

A revolutionary invention is made in the field of brakes. The Electromagnetic brakes are excellent replacement for conventional automobile brakes. The use of Electromagnetic brakes can be done for lighter vehicles also. With some modification, a regenerative braking system can be equipped with the Electromagnetic brakes. The Electromagnetic brakes are the future of automobile brakes.

CONCLUSION

The prototype work “VEHICLE SPEED CONTROL AND AUTOMATIC BRAKING SYSTEM” has been successfully designed and tested. Integrating features of all the components have used developed it .Presence of every module has been reasoned out and placed carefully thus contributing the best working of the unit. Secondly using highly advanced IC’s and with the help of growing technology the project has been implemented successfully

Electromagnetic brakes can be used for modern Light as well as heavy vehicles. They give better performance with enhanced safety.

APPLICATION

- Commercial vehicle
- Building lift
- Industries machine

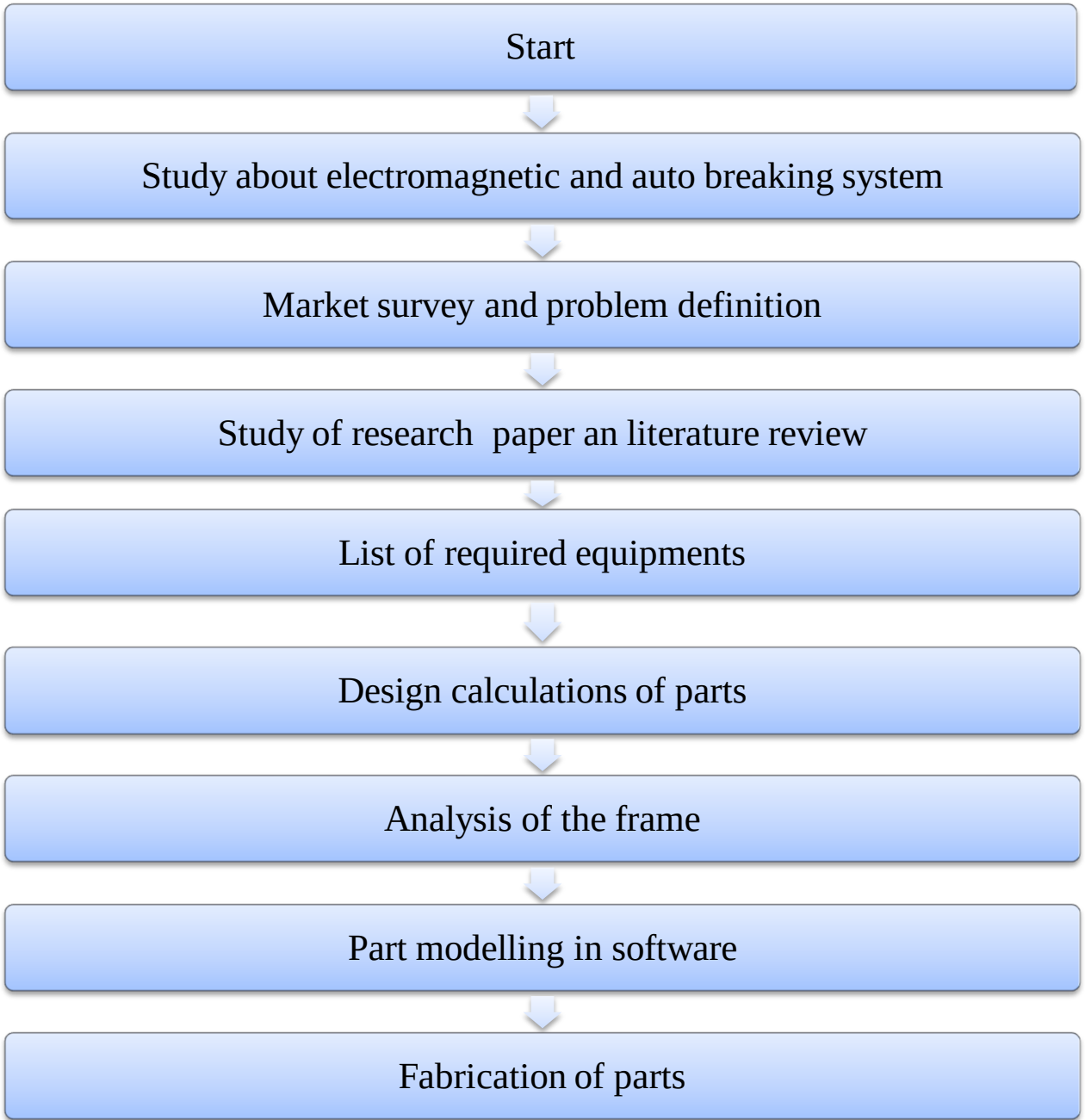
ADVANTAGES

- Electromagnetic brakes are more durable.
- Electromagnetic brakes have a longer life span.
- Electromagnetic brakes are much more effective.
- Electromagnetic breaks works totally frictionless.
- Better cooling of brakes.
- There is less amount of wear.
- Maintenance required is negligible.
- Auto brakes are more durable.
- Auto brakes have a longer life span.
- Auto brakes are much more effective.
- Auto breaks works totally frictionless.
- Maintenance required is negligible.

DISADVANTAGES

- Battery low this time is not working
- Electronic Control Module in side fault that time break not working
- A special spring mechanism needs to be provided for the quick return of the brake shoe.
- Dependence on battery power to energize the brake system drains down the battery much faster.

Methodology



Reference

1. H. Van Oostveen and R. Siezen, “ErfahrungenmitPermanentmag-net-Schienenbremsen”, GlasersAnnalen, Nr 12, S. 613-617, 1997.
2. Biro, O. and Preis, K., “Finite element analysis of 3-D eddy current,” IEEE Transactions onMagnetics, Vol. 26, No. 2, pp. 418–423, Mar, 1990.
3. Ohyma, T., “Adhesion at higher speeds, its basic characteristic, its improvement and somerelated problem,” Japanese Railway Engineering, Vol. 108, 1988.
4. A B Sharkawy (2010), “Genetic FuzzySelf-tuning PID Controllers for Antilock Braking Systems” *EngineeringApplications of Artificial Intelligence, Vol.* 23, pp. 1041-1052.
5. A Poursamad (2009), “AdaptiveFeedback Linearization Control ofAntilock Bracking System Using NeuralNetworks”, *Mechatronics, Vol. 19, pp.* 767-773.

Thank You