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Design And Fabrication Of Emergency Braking System InFour-Wheeler

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Abstract

Mostly people prefer using cars and four wheelers for efficient transportation. Vehicle Technology is increasing to a wide extent especially in braking systems and sensing systems. Vehicles equipped with modern braking technology is designed with simple collision avoidance system, which will help to detect a collision which is likely to occur and applying emergency brake to avoid it. Such technologies will reduce the number of accidents which causes worst damages, serious injury, and even death. In this automatic braking system, there is a four-wheel cart in which rare wheels are being motorized for drive wheel. FRONT wheels have been pivoted for staring mechanisms. New friction brakes are designed for emergency braking. The brakes are operated by motorized mechanism, which is spring-loaded. The drive of the car is remote operated. Two sensors are used for front and rare for avoiding damage to the car at the time of parking. The sensors used are a capacitive type which can sense both Metal and non-metal obstacles. Also, two relays are used after the sensors which activate the braking motor when obstacles are sensed either in forward or reverse direction.

Keywords: Photoelectric sensor, Electronic relay, intelligent braking system.

1. INTRODUCTION

Driving is a compulsory activity for most people. People use their car to move from one place to other place. The number of vehicles is increasing day by day. Nowadays, accidents are increasing and are uncertain. Accident will occur every timeand everywhere and cause worst damage, serious injury and even death. These accidents are mostly caused by delay of thedriver to hit the brake. This project is designed to develop a new system that can solve this problem where drivers may not brake manually but the vehicles can stop automatically by detecting 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 transmitting by transmitter, the wave can reflect when obstacle is detected and then received by receiver. The braking circuit's function is to slow down or stop the car automatically after receiving signal from the sensor. Integrated safety systems

based on these principles can be broadly divided into three categories

II. LITERATURE REVIEW

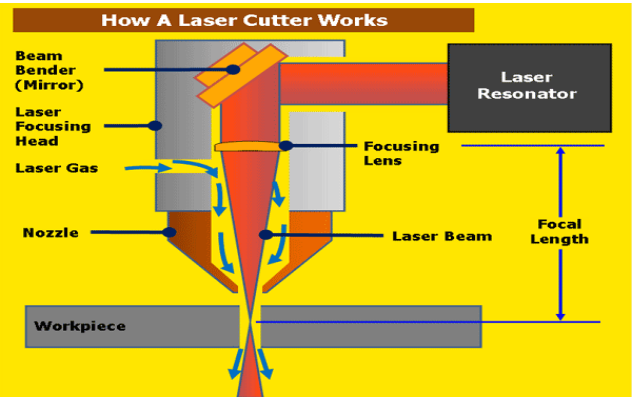
While going through the paper intelligent braking system we have gone through the research paper "Intelligence BrakingSystem" using IR sensor of author Gajanan koli (et al) in they developed a system called intelligent braking system in which they used IR sensor which sense the obstacle and applying the brake to avoid the collision between the prototype and obstacle. But IR sensor get affected by smoke, fog, sunlight. We found that the photoelectric sensor is good as itdoes not get affected through smoke fog, sunlight that's why we decide to use the photoelectric sensor in our paper from this paper. Now while working on this paper now we were thinking that which brake we should use during this we have gone through the paper "Design and Analysis of Intelligence braking system of Mr. Tushar kavatkar (et al),this paper suggest intelligent braking system using disc brake instead of drum brake. In our paper we are using wheels without drum. So to arrange the braking system properly and effectively we found out that the disc brake will be perfectly suited for our project. So by analyzing this paper, we decide to use disc brakes instead of drum brake**.** While going through one more paper of K. Harishwar Reddy (et al).In their project they used ultrasonic sensor to sense the obstacle but we found that the range of the ultrasonic sensor is very less as compared to the photoelectric sensor hence, we used photoelectricsensor in our project for more range of the sensor.

III. WORKING

In this automatic braking system, there is a four-wheel cart in which rare wheels are being motorized for drive wheel. FRONT wheels have been pivoted for staring mechanisms. New friction brakes are designed for emergency braking. The brakes are operated by motorized mechanism, which is spring-loaded. The drive of the car is remote operated. Two sensors are used for front and rare for avoiding damage to the car at the time of parking. The sensors used are a capacitive type which can sense both Metal and non-metal obstacles. Also, two relays are used after the sensors which activate the braking motor when obstacles are sensed either in forward or reverse direction.

IV. FABRICATION PROCESSES USEDLaser Beam Machining (LBM)

Lasers are used for many purposes. One way they are used is for cutting metal plates. On mild steel, stainless steel, andaluminum plate, the laser cutting process is highly accurate, yields excellent cut quality, has a very small kerf width andsmall heat affect zone, and makes it possible to cut very intricate shapes and small holes.



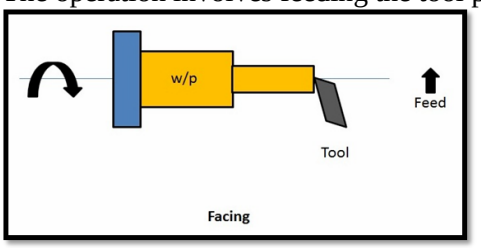
Advantages of LBM:

- Tool wear and breakage are not encountered.
- Very small holes with large aspect ratio can be achieved.
- A wide variety of hard and difficult-to-machine materials can be tackled.
- Machining is extremely rapid and the setup times is economical.
- Holes can be located accurately by using an optical laser system for alignment.
- The operating cost islow.

Lathe Machine Operations

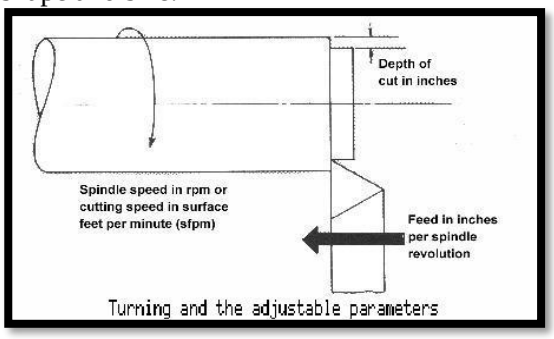
Facing

Facing is the operation of machining the ends of a piece of work to produce flat surface square withthe axis. The operation involves feeding the tool perpendicular to the axis of rotation of the work.



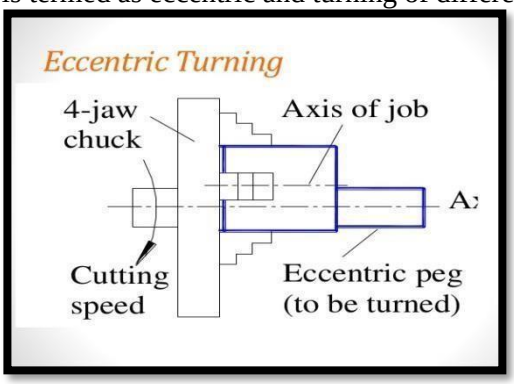
Turning

Turning in a lathe is to remove excess material from the workpiece to produce a cylindrical surface ofrequired shape and size.



Eccentric turning

If a cylindrical workpiece has two separate axes of rotating, one being out of centre to the other, the workpiece is termed as eccentric and turning of different surfaces of the workpiece is known as eccentric turning.

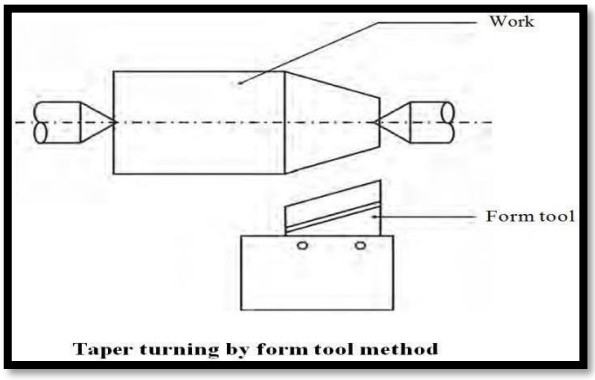


Taper TurningTaper

A taper may be defined as a uniform increase or decrease in diameter of a piece of work measuredalong its length. Taper turning methods

1. Form tool method

A broad nose tool is ground to the required length and angle. It is set on the work by providing feed tothe cross-slide. When the tool is fed into the work at right angles to the lathe axis, a tapered surface is generated.



2. Compound rest method

The compound rest of the lathe is attached to a circular base graduated in degrees, which may be swiveled and clamped at any desired angle. The angle of taper is calculated using the formula

$$\tan \alpha = \frac{D_1 - D_2}{2l}$$

Where,

D_1& D_2 = large and small dia. respectively

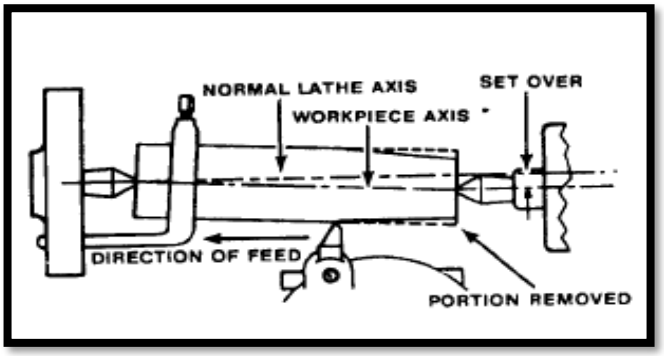
l = length of taper

α = taper angle or the angle about which compound rest is swiveled

The compound rest is swiveled to the angle calculated as above and clamped. Feed is given to the compound slide to generate the required taper.

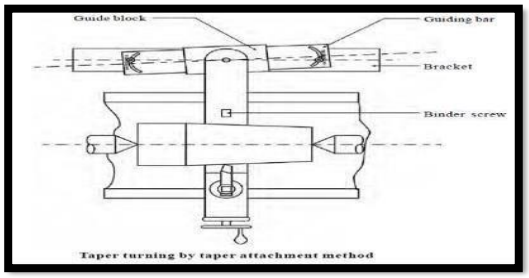
3. Tailstock setover method

Turning taper by the setover method is done by shifting the axis of rotation of the workpiece at an angle to the lathe axis and feeding the tool parallel to the lathe axis. The construction of tailstock is designed to have two parts namely the base and the body.



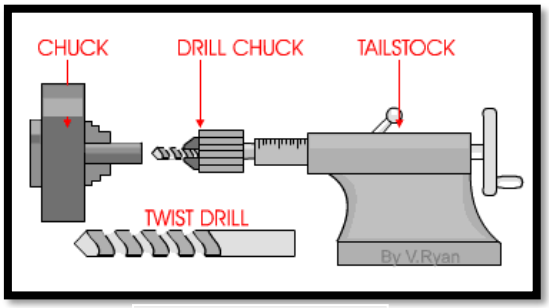
4. Taper attachment method

The taper attachment consists of a bracket which is attached to the rear end of the lathe bed. Itsupports a guide bar pivoted at the centre. The bar having graduation in degrees may be swiveled on either side of the zero graduation and set at the desired angle to the lathe axis. A guide block is mounted on the guide bar and slides on it. The cross slide is made free from its screw by removing thebinder screw.

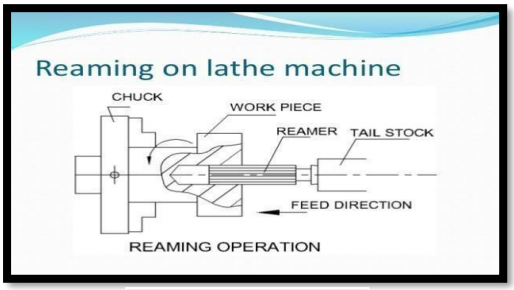


5. Combined feed method

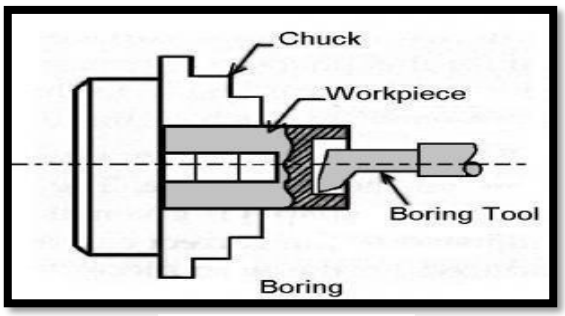
Feed is given to the tool by the carriage and the cross-slide at the same time to move the tool at resultant direction to turntapers.



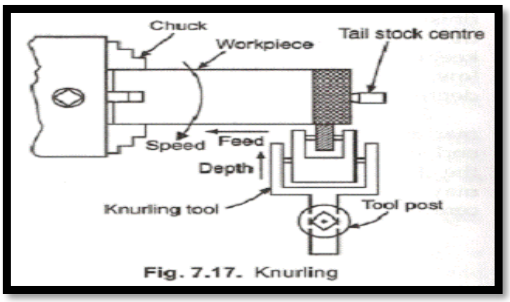
Drilling



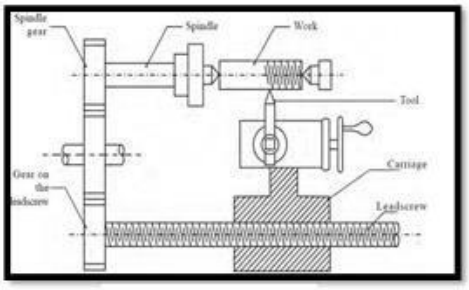
Reaming



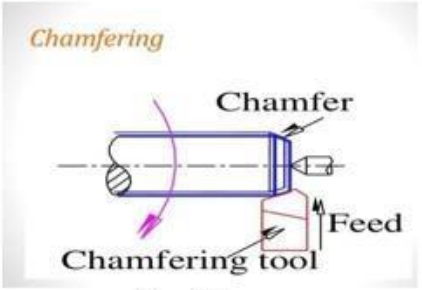
Boring



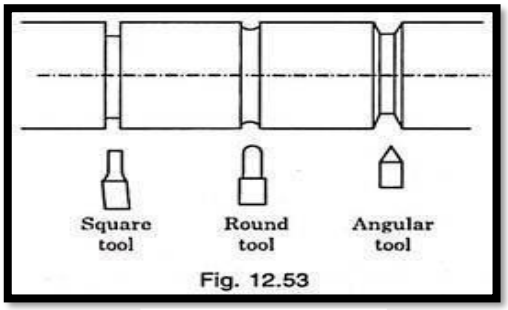
Knurlin



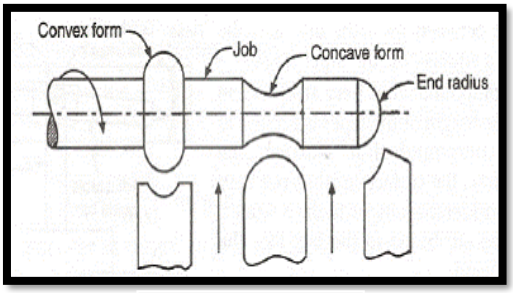
Thread Cutting



Chamfering



Groovi



Formi

V. CALCULATION

a) Design of Bearing: Selection of bearing: Series 62:

ISI NO.	BEARING OF BASIC DESIGN NO.(SKF)	D	D_1	D	D_2	B	Basic capacity	
20BC02	6204	20	26	47	41	14	10000	6550

b) Design of Pneumatic Cylinder:

- Cylinder pressure = 10 bar
- Cylinder force = 491 N
- Piston cylinder actuator applied maximum pressure =10 bar

1) Force (F):

AS per formula, $\Pi d^2/4F = 1\times\pi \ (25)^2/4$

F = 491 N

2) Volume of cylinder (V): As per formula, (V) = A×L Where,

A = Area of cylinder in mm2 L = Length of cylinder in mm2V = volume of cylinder

$V = \pi d^2/4\times L$

$= \pi\times 25^2/4\times 15073.63\times 10^3\ mm^3$

3) Discharge (Q) = volume/ time

$= 73.63\times 10^3/60$

= 1227.16 mm3/sec

4) Area of piston (A):

$A = \pi d^2/4$

$= \pi\times 25^2/4$

$= 78.54\ mm^2$

5) Piston Speed (S):

As per formula, s=28.8×Q/ AWhere,

S = velocity in mm/ sec

Q = volume of flow mm3 /secA = area of piston in mm2

S = 28.8×1227.16 /78.54

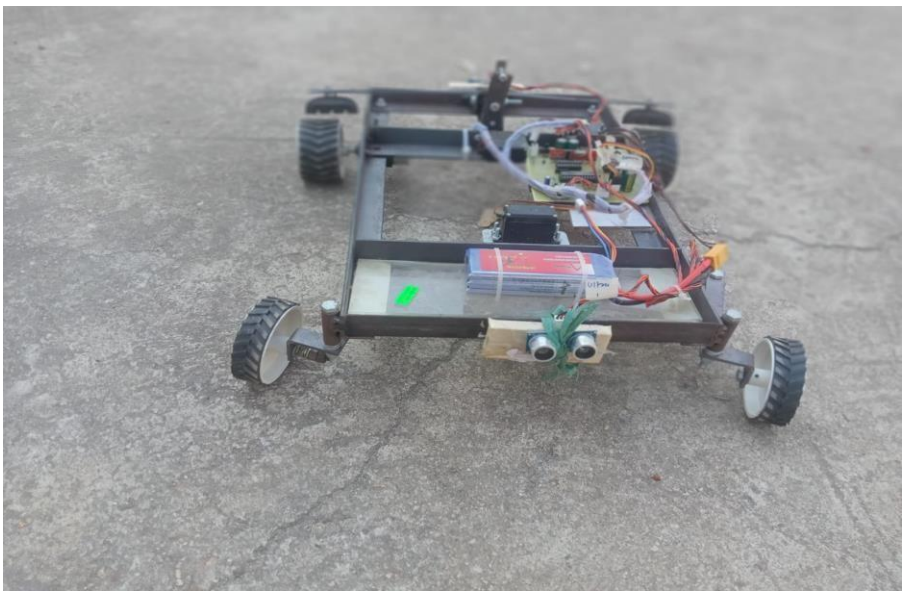
= 450 mm/sec=0.45 m/sec.

VI. RESULTS

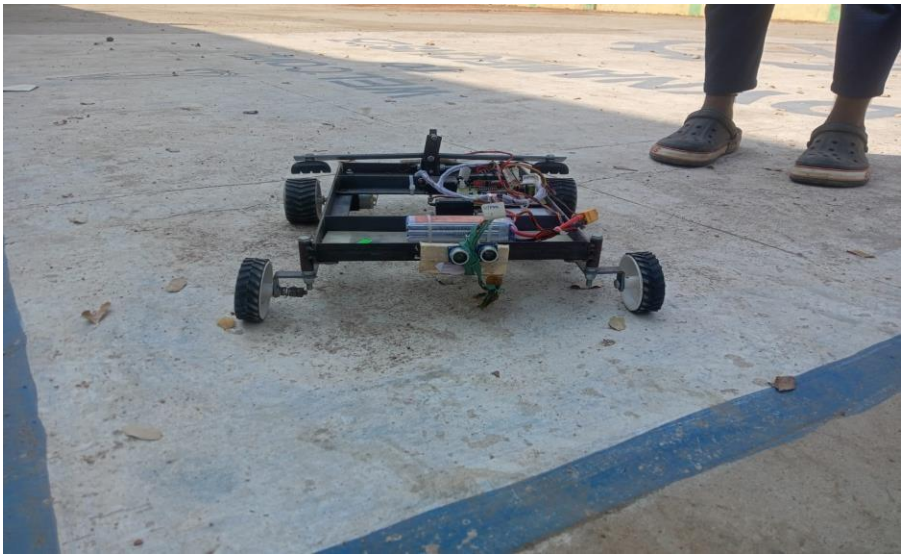
While going on a speed of 25-30km/hr. with a weight of 20kg on it when the obstacle came in front of it the sensor senses the obstacle and the vehicle at a distance of 1m from the obstacle. IF the brake system is falling, the vehicle may pull to one side. This situation can cause accidents that range from fender benders to serious collisions. You might also feel pulling if there's been a leak of brake fluid, if the brakes aren't adjusted properly or if the brake has locked.

FRONT wheels have been pivoted for staring mechanisms. New friction brakes are designed for emergency braking. The brakes are operated by motorized mechanism, which is spring-loaded. The drive of the car is remote operated

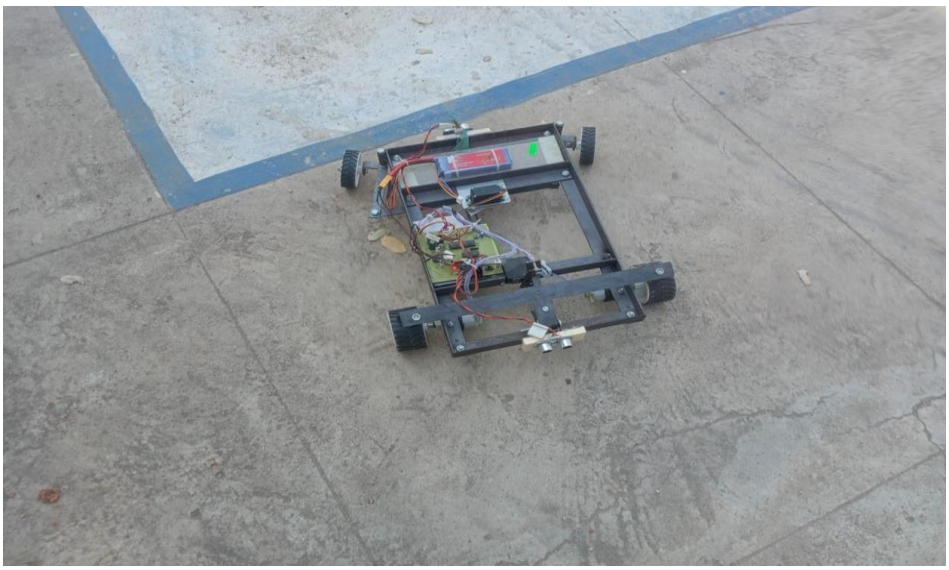
Such technologies will reduce the number of accidents which causes worst damages, serious injury, and even death. In this automatic braking system, IN THIS BREACKING SYSTEM when ever going wehical in front of any animals and humuns (BY USING HANDS) then automatcally sensor activated then stop the wehical



(RIGHT SIDE OF WHEEL)



(FRONT SIDE WHEEL)



(LIFT SIDE WHEEL)

VI. CONCLUSION

Proposed arrangement used for automobile braking system has a lot of potential applications especially in developed countries where research on smart vehicle and intelligent highway are receiving ample attention. We can use this system in the four wheeler vehicle and can reduce the number of accidents taking place on road. Thesystem when integrated with other subsystems like automatic traction control system, intelligent throttle system, and auto cruise system etc., will result in smart vehicle maneuver. In modern industries also for material handling trolley and machinery it requires and it is industries need.

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