न हि ज्ञानेन सदृशं पवित्रमिह विद्यते ।

Smt. S. R. PATEL ENGINEERING COLLEGE

Modification In Bicycle With 4 Wheel & Flywheel

Under The Valuable Guidance Of

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Group No:-37

Team No:-

OUTLINE

- Introduction of Bicycle
- Objective of 4 wheel with flywheel Bicycle
- Purpose of 4 wheel with flywheel Bicycle
- Scope of 4 wheel with flywheel Bicycle
- Principle of Bicycle
- Bicycle with components
- Methodology
- Project Planning and Scheduling

- Literature Review
- Market survey
- Bicycle Design
- Calculation
- Application
- Advantages
- Conclusion
- Final modal
- References

INTRODUCTION

- Bicycle were introduced in 19th Century and now number approximately one billion worldwide. They are the principal means of transportation in many parts of the world.
- Cycling is widely regarded as a very effective and efficient mode of transportation optimal for short to moderate distances.
- Cycling also offers a reduced consumption of fossil fuels, less air or noise pollution, much reduced traffic congestion. These lead to less financial cost to the user as well as to society at large By fitting bicycle racks on the front of buses, transit agencies can significantly increase the areas they can serve.
- Bicycle were introduced in the 19 century in Europe and , as of until 2003, the bicycles are worldwide.
- Wooden daisies (around 1820),the first two-wheeler and as such the archetype of the bicycle.

PROJECT OBJECTIVE

- Family or Group Transportation
- Cost of bicycle is less compare to car.
- 4 seat arrangement for drive with four wheel
- Reduced the driving effort during Running condition.
- Easy to drive
- Handling the bicycle is easy
- Noise less
- Eco friendly

PURPOSE OF 4 WHEELS BICYCLE

- Transportation
- Touring
- Student using go to college
- Farmer
- Racer
- Sport

SCOPE OF 4WHEEL BICYCLE

- Reduce the fuel energy consumption which is finished after few decade.
- Transportation cost decrease.
- Pollution of environment are also decrease by use of bicycle.

PRINCIPLE OF BICYCLE

- Bicycle is one type of transportation device .
- it’s basic principal to use of human effort and it can change from one place to another place with human, good etc
- As showing fig ,this is 4 wheel bicycle with 4 seat arrangement. Taking the human effort from pedal and transmitted the power rear wheel by help of gear chain and sprocket device.

WORKING PRINCIPLE OF 4 BICYCLE WITH FLYWHEEL

BICYCLE COMPONENT

The basic units consist bicycle component are :-

- Frame
- Axel
- Wheel and tires
- Sprocket
- Chain
- Steering system
- Seating arrangement
- Brakes etc.

MAJOR COMPONENT OF BICYCLE

1) Bicycle Frame:

- A bicycle frame is the main component of a bicycle, onto which wheels and other components are fitted.
- The modern and most common frame design for an upright bicycle is based on the safety bicycle, and consists of two square, a main square and a paired rear squre. This is known as the *H frame*.
- Frames are required to be strong, stiff and light, which they do by combining different materials an

MAJOR COMPONENT OF BICYCLE

2) Axel :

- Axel is used in bicycle for rotating wheel as well as support the frame
- Material : M S solid bar
- (Diameter :30mm,wight :5.55 kg/mtr)

3)Bicycle Wheels:

- A **bicycle wheel** is a wheel, most commonly a wire wheel, designed for a bicycle.
- A pair is often called a **wheel set**, especially in the context of ready built "off the shelf" performance-oriented wheels.
- Bicycle wheels are typically designed to fit into the frame and fork via dropouts, and hold bicycle tires.
- Diameter:26 to 28 mm

MAJOR COMPONENT OF BICYCLE

- 27.5-inch mountain bike wheels use a rim that has a diameter of 584 mm (23.0") with wide, knobby tires are approximately the midway point between the 26-inch and the 29-inch (ISO-622mm) standards. They carry some of the advantages of both formats, with a smoother ride than a 26 inch wheel and more stiffness and durability than a 29" wheel.

- **Material:** The spokes on the vast majority of modern bicycle wheels are steel or stainless steel. Stainless steel spokes are favored by most

manufacturers and riders for their durability, stiffness,

damage tolerance, and ease of maintenance.

Spokes are also available in titanium, aluminum, or carbon fiber.

BICYCLE WHEEL

MAJOR COMPONENT OF BICYCLE

4) **Flywheel:**

- Flywheel is a rotating mechanical device that is used to store rotational energy.
- Flywheels have an inertia called the moment of inertia and thus resist changes in rotational speed. The amount of energy stored in a flywheel is proportional to the square of its rotational speed.
- Energy is transferred to a flywheel by the application of a torque to it, thereby increasing its rotational speed, and hence its stored energy.
- Conversely, a flywheel releases stored energy by applying to a mechanical load, thereby decreasing the flywheel's rotational speed. Appling this concept to reduced human effort after braking at running condition of bicycle.

Fig. *Flywheel*

- The flywheel material with the highest specific tensile strength will yield the highest energy storage per unit mass. This is one reason why carbon fibre is a material of interest.

MAJOR COMPONENT OF BICYCLE

5)Bicycle chain

- A **bicycle chain** is a roller chain that transfers power from the pedals to the drive-wheel of a bicycle, thus propelling it.

fig. *Bicycle chain*

Material:

- Most bicycle chains are made from plain carbon or alloy steel, but some are nickel-plated to prevent rust, or simply for aesthetics.

MAJOR COMPONENT OF BICYCLE

6) Sprocket:

- Sprocket or **sprocket-wheel** is a profiled wheel with teeth, cogs, or even sprockets that mesh with a chain, track or other perforated or indented material.

fig. *Sprocket*

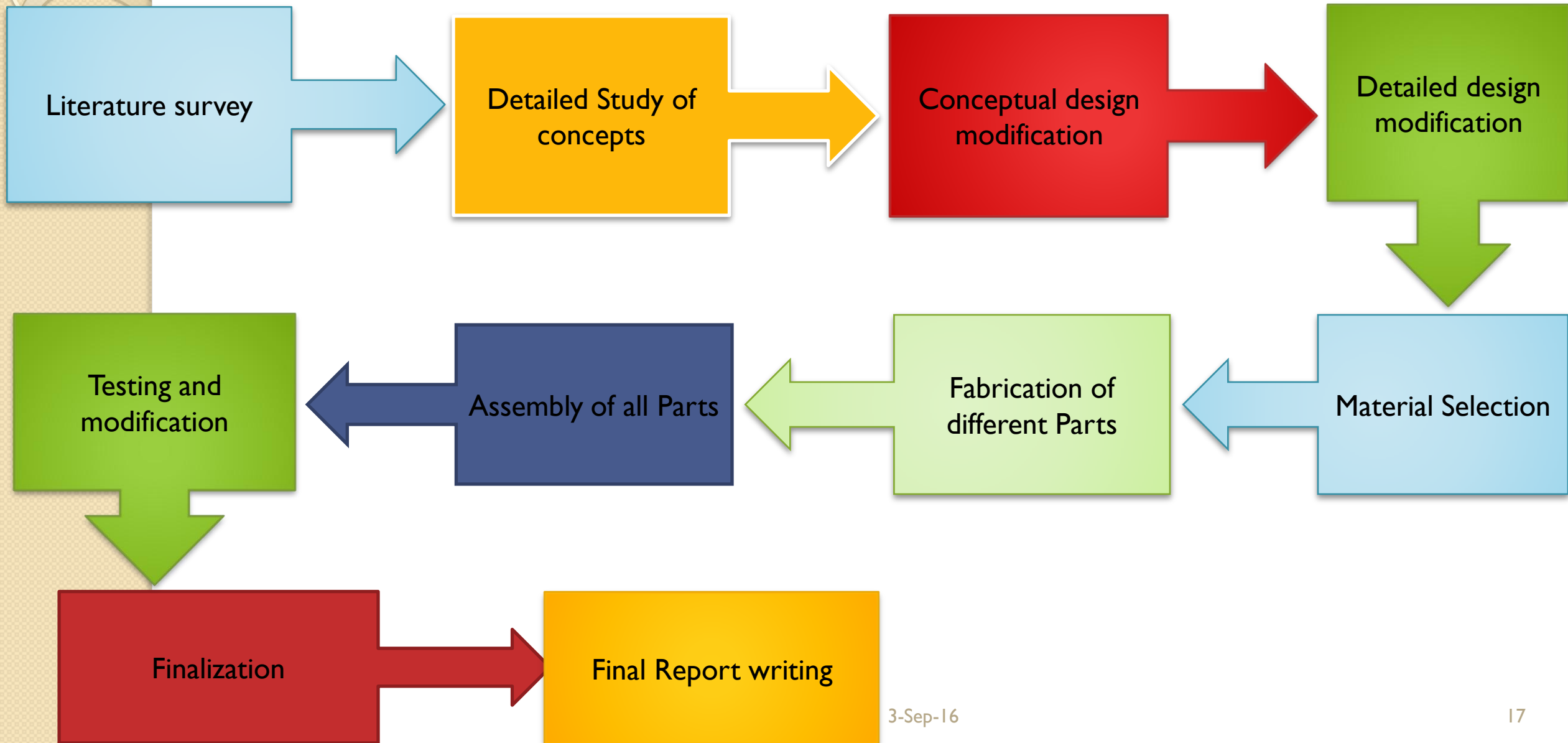
- The name 'sprocket' applies generally to any wheel upon which radial projections engage a chain passing over it.
- It is distinguished from a gear in that sprockets are never meshed together directly, and differs from a pulley in that sprockets have teeth and pulleys are smooth.
- Sprockets are used in bicycles, motorcycles, cars, tracked vehicles, and other machinery either to transmit rotary motion between two shafts where gears are unsuitable or to impart linear motion to a track, tape etc

MAJOR COMPONENT OF BICYCLE

7) Transmission system :

- Using the chain mechanism and power can be transmitted from big sprocket to small sprocket.

Methodology



PROJECT PLANNING AND FUTURE WORK PLAN

	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April	May
Project Define											
Literature Survey											
Detailed Study of concepts and Conceptual design modification											
Detailed design modification											
Material Selection											
Fabrication of different Parts											
Assembly of all Parts											
Testing and modification											
Finalization											
Preparation Final Report											

LITERATURE REVIEW

1) Title :DESIGN AND ANALYSIS OF KINETIC ENERGY RECOVERY SYSTEM IN 2 WHEEL BICYCLES

Aerodynamics of bicycle wheel and frame

Author: Sreevalsan S Menon& Sooraj M S

Kinetic Energy Recovery System (KERS) is a system for recovering the moving vehicle's kinetic energy under braking and also to convert the usual loss in kinetic energy into gain in kinetic energy. When riding a bicycle, a great amount of kinetic energy is lost while braking, making start up fairly strenuous. Here we used mechanical kinetic energy recovery system by means of a flywheel to store the energy which is normally lost during braking, and reuse it to help propel the rider when starting. The rider can charge the flywheel when slowing or descending a hill and boost the bike when accelerating or climbing a hill. The flywheel increases maximum acceleration and nets 10% pedal energy savings during a ride where speeds are between 12.5 and 15 mph.

2) Title: MEASUREMENT OF PEDAL LOADING IN BICYCLING:II. ANALYSIS AND RESULTS

Author: R. R. DAVI& M. L. HUI.

The results presented here both confirm the conclusions of previous research and shed new light on the pedalling process. The results of the foot-pedal connection study support the findings of Houtz and Fisher(1959). Also, Tate and Sherman's (1977) claim that more muscle groups come into play with toe clips is substantiated. However, toe clips alone do not produce an increase in the amount of pedal arc that experiences positive work. the primary function of the toe clip is to increase efficiency by permitting greater plantar flexion and shear loads in the initial stages of the pedalling cycle

3)Title: Bicycle seat interface pressure: reliability, validity, and influence of hand position and workload

Author : Eadric Bressel & John Cronin

Researchers exploring solutions for reducing bicycle seat injuries often examine seat pressure; however, reliable and valid methodology for studying seat pressure has not been reported. The current study was

designed to address this issue and to establish baseline pressure measurements and patterns for females and males during still bicycling under different workloads and hand positions

4) title: Finite element analysis and optimization of composite wheelchair wheels

Author : S. Kalyanasundaram & A. Lowe & A.J. Watters

- A methodology for the design of Paralympics wheelchair wheels has been developed and provided a framework for comparison between design solutions. Finite element analysis was used as a tool to develop an understanding of wheel design, provide a basis for evaluation of design solutions, and as a mean of design optimisation

- These optimization studies resulted in a decrease in displacements in the wheel rim from 3.31 mm to 2.39 mm, indicating a 27% increase in wheel stiffness at the rim over the design prior to optimization. Optimization of the ply count and orientation resulted in a decrease in displacement in the push rim from 1.73 mm to 0.95 mm, indicating an increase in stiffness of 55%.

5) Title: The Economic Benefits of Bicycling

Author : Lynn Weigand

• they have a small, but growing, base of studies on the economic impacts of bicycle-related industry, tourism and facilities on which to build. Additional research on this topic will provide important information to support bicycling activity and industry at the local, regional and state levels by demonstrating the value of bicycling in dollars and cents.

6) Title: Functional electrical stimulation-based cycling assisted by flywheel and electrical clutch mechanism: A feasibility simulation study

Author :S.C. Abdulla & O. Sayidmarie & M.O. Tokhi

•A new assist mechanism, represented by a flywheel and an electrical clutch is developed and evaluated in simulation studies, to assist paralyzed legs during functional electrical stimulation (FES)-based cycling exercise in a closed-loop control configuration. The flywheel is engaged and disengaged, by the clutch, to assist or retard the cycling when necessary. The flywheel engages with the crank to absorb the surplus energy, produced by stimulating the leg, store it as kinetic energy and slow down the movement. Also, it engages again to use the same stored energy to assist the leg and speed up the cycling. A comparative assessment of FES-cycling, using fuzzy logic control, is carried out with and without the new assist mechanism.

7) title: Study on virtual force sensing and force display device for the interactive bicycle simulator

Author : Song Yin, Yuehong Yin

• In this paper, a set of novel force display devices for the interactive bicycle simulator is presented for indicating the human–bicycle contact forces at handlebars and foot pedals. The force display devices are attached, respectively, to the handlebars and pedals of the bicycle. The bicycle is placed on a Stewart platform to provided bicycle riding on different terrains and configurations. The electromagnetic torques used to simulate the forward and steering resistance forces are controlled by adjusting the armature current of the DC motor, according to the developed rider–bicycle dynamic(RBD) model.

•A virtual bicycle riding environment is successfully constructed by the developed devices together with the motion generating subsystem and the visual subsystem. Experimental results have shown that the developed RDB model and the constructed force display devicesare effective in capturing and displaying the information on forces.

Market Survey

•During market surveying our group know which type bicycle use in the world as well as india.

• types of bicycle.

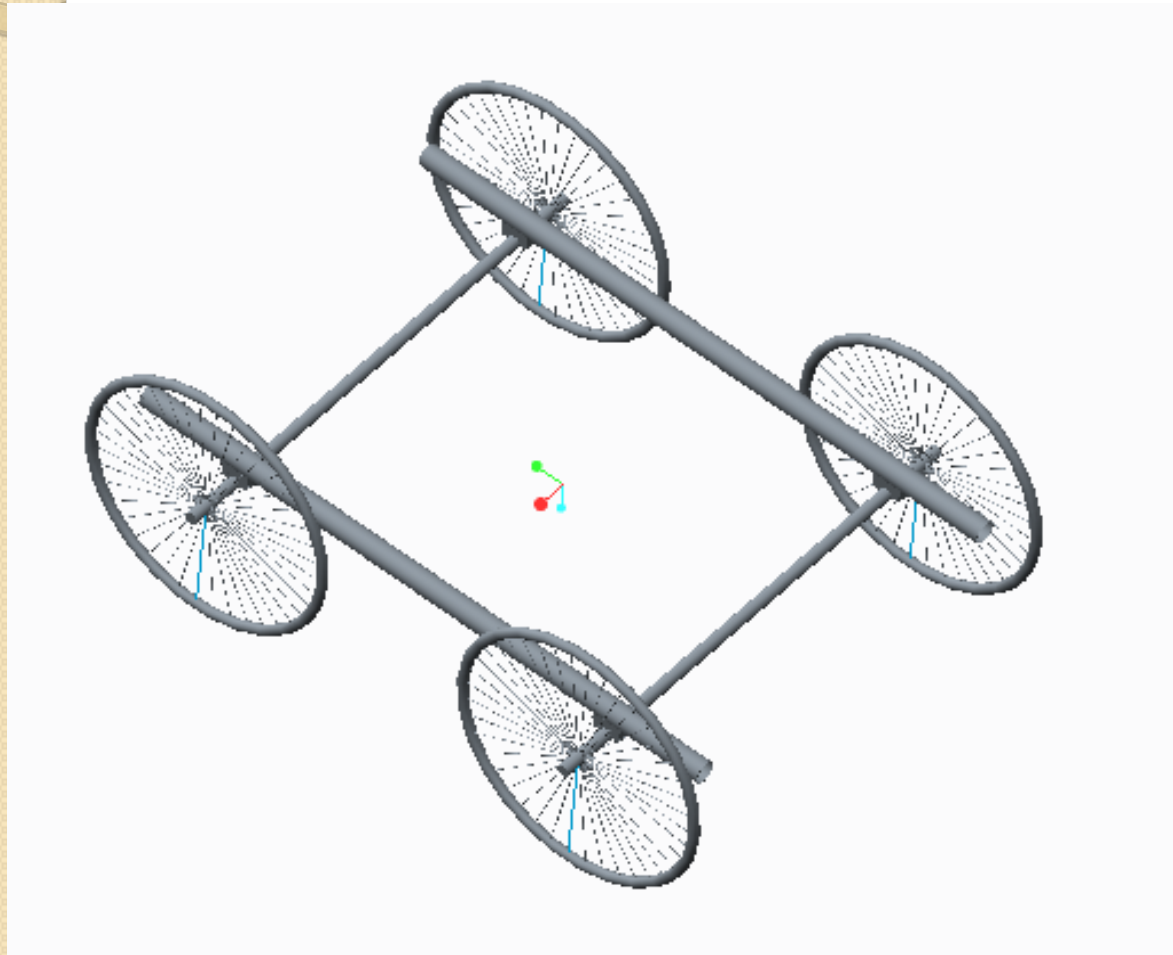
1) The high wheel bicycle

2) The high wheel tricycle

3) The high wheel safety e etc

BICYCLE'S!!!!!!!!

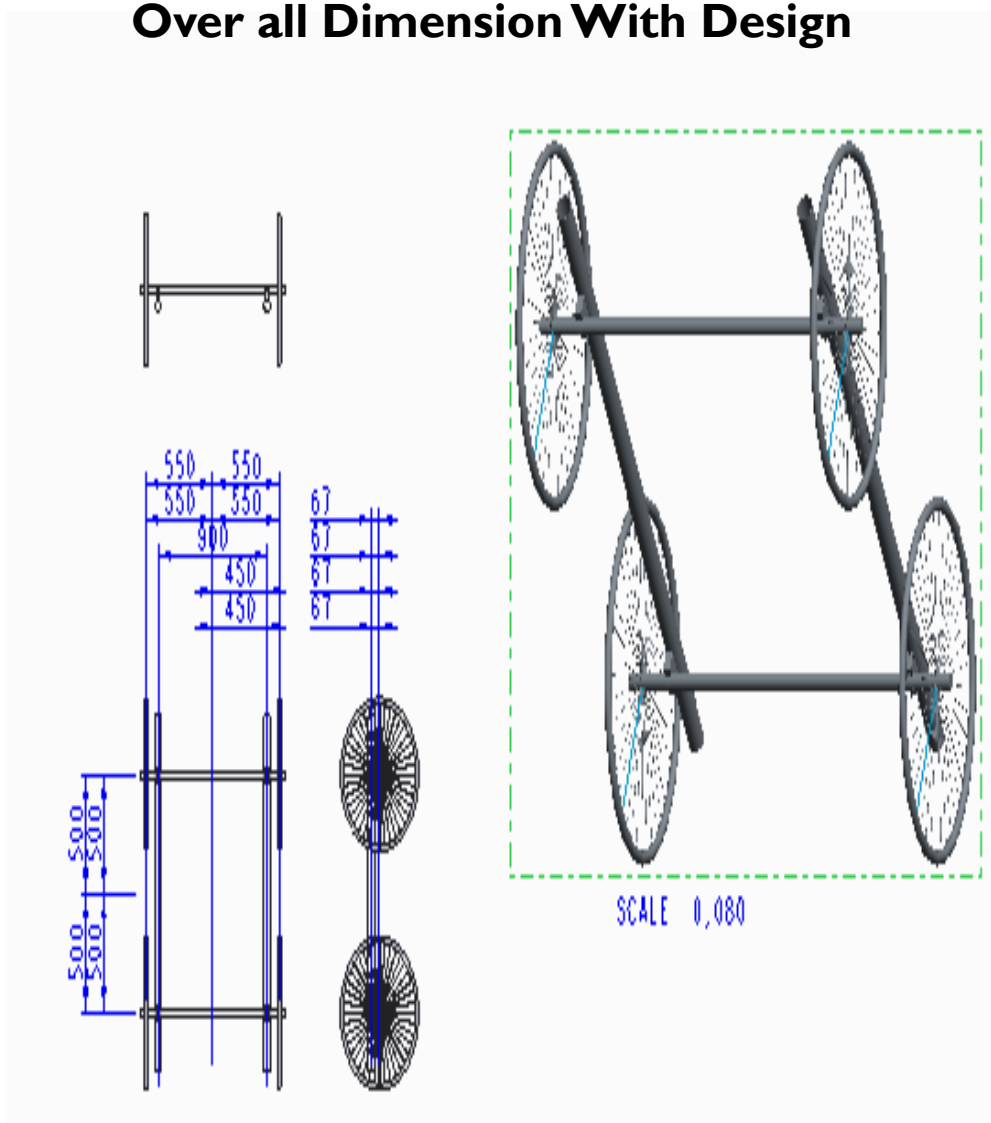
BICYCLE FRAME DESIGN



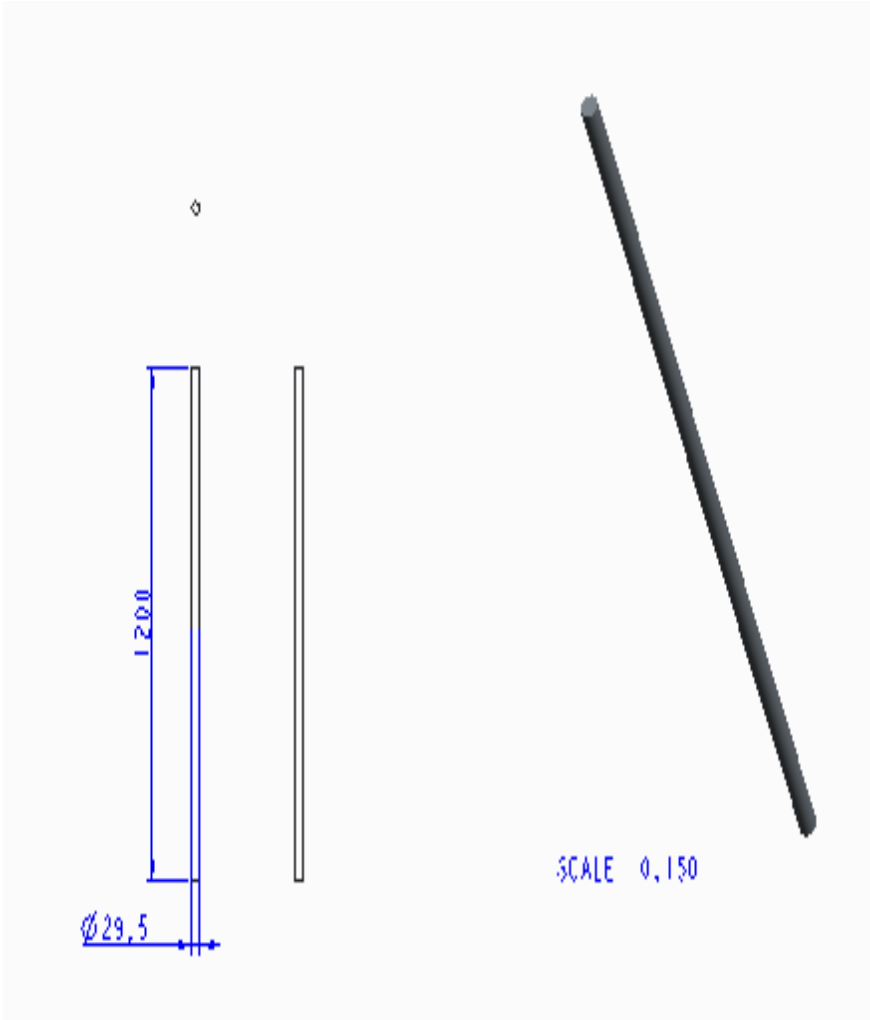
Different Part's

1) Front Axel
2) Rear Axel
3) 4 wheels
4) Hollow tubes for chassis

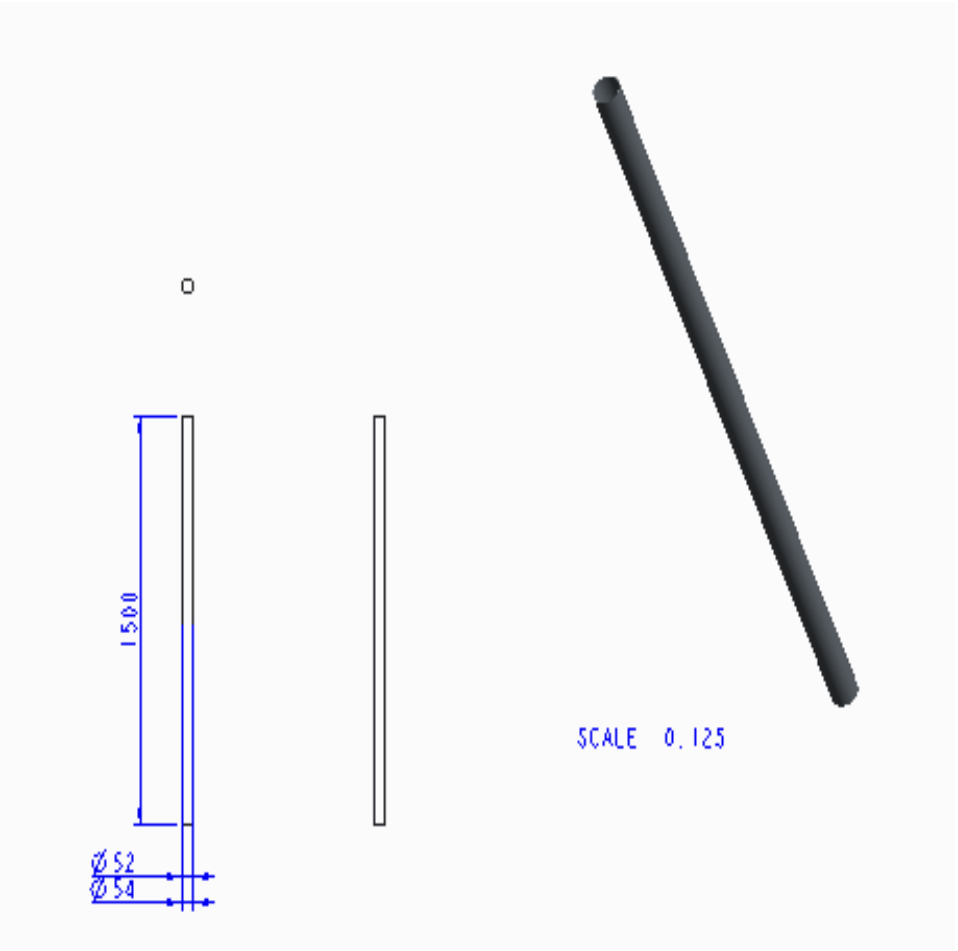
Over all Dimension With Design



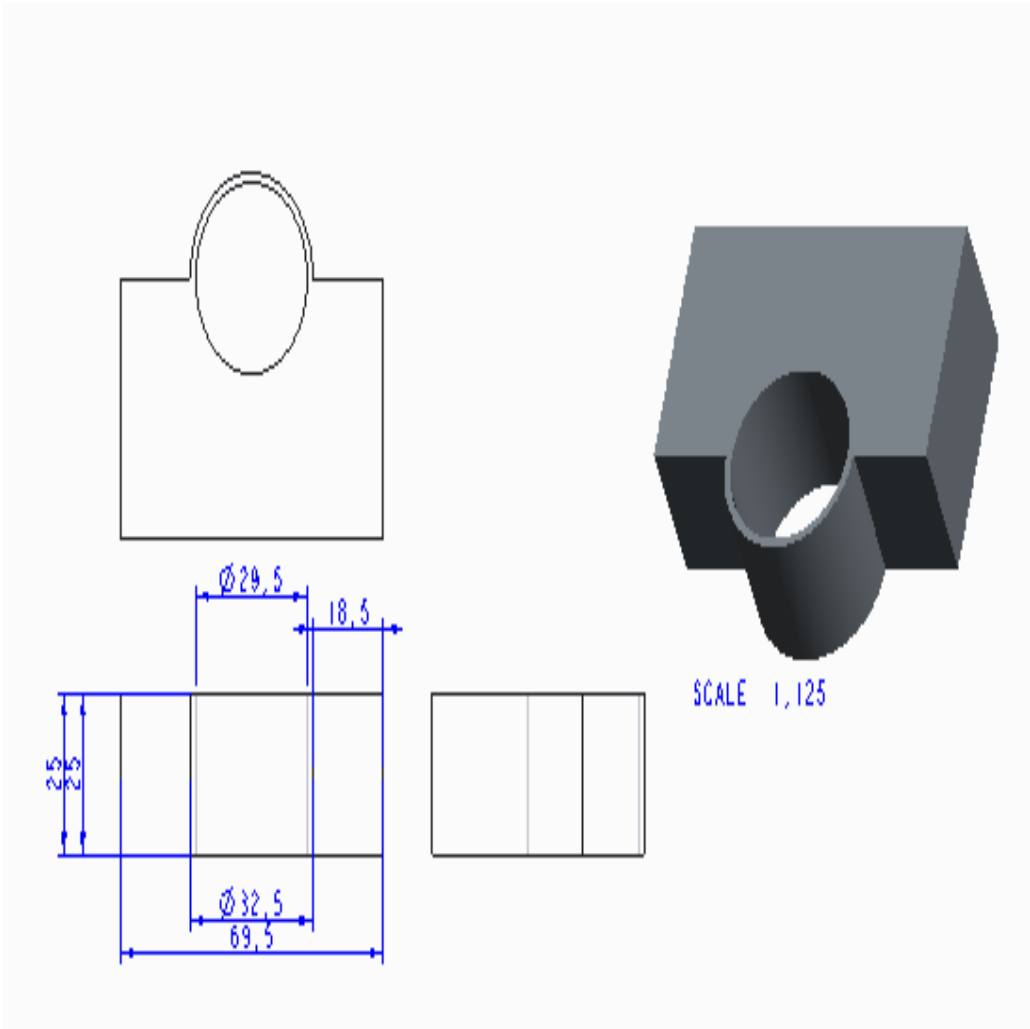
Axel



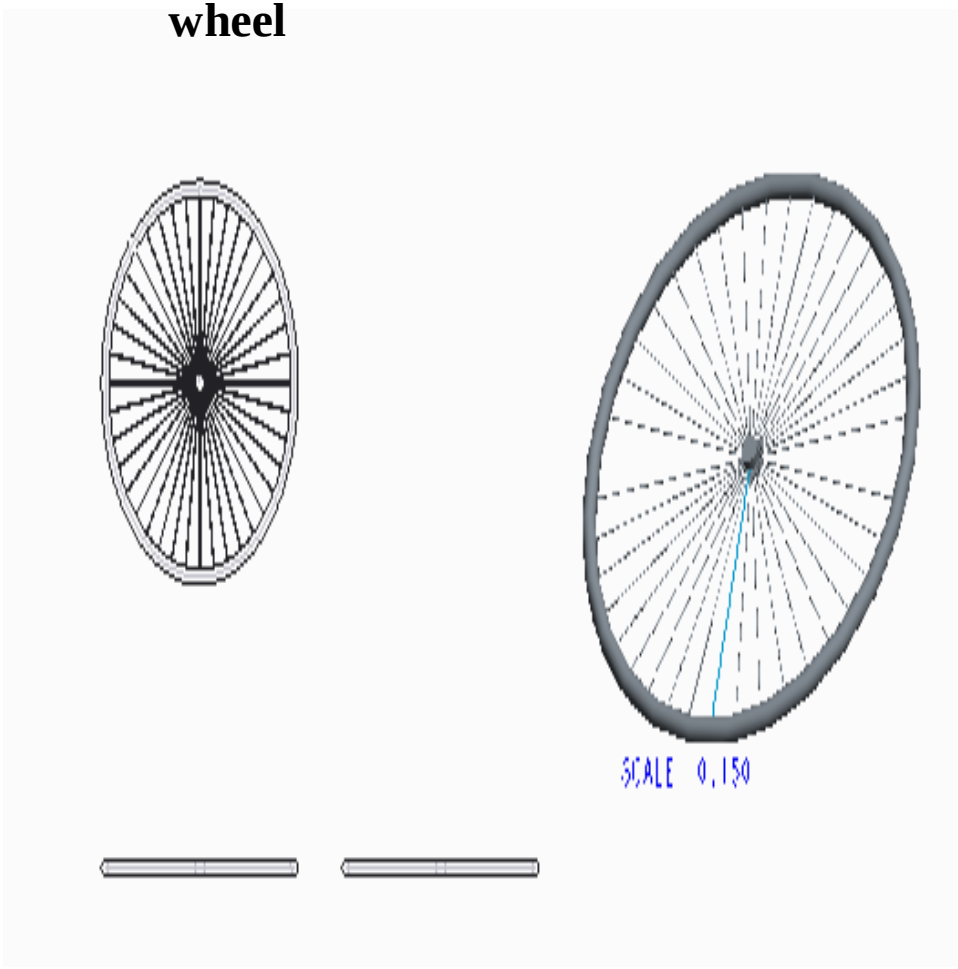
HOLLOW TUBE



padding

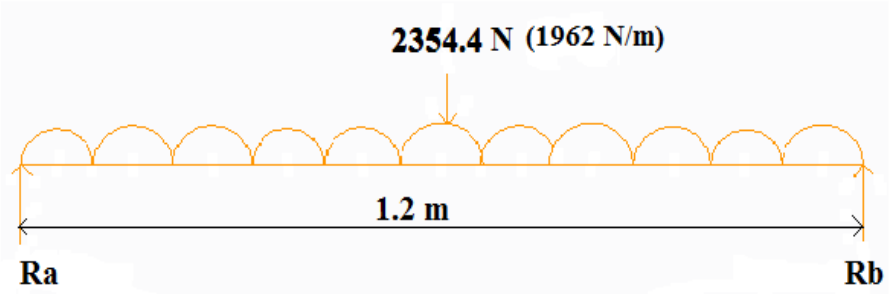


wheel



Calculation

Ra + Rb = 2354.7
Where,
Ra *1.2 =2354.7 *06
Ra =1177.2
So, Rb =2354.7-1177.2
=1177.5



$$\sigma b = [(wl^2/8) * (d/2)]/[(\pi/64)(d^4)]$$

$$= (wl^2 * 4)/(\pi d^3)$$

$$=[(1662 * 1.2^2 * 4 \ / \ \pi * 0.295^4)]$$

σb =140.121 Mpa

Sut of m s bar is 250 Mpa

$$\sigma b < Sut$$

140<250
So, Design of axel is safe.

APPLICATION OF BICYCLE

1. **Ride to Work**
2. **Recreation on Weekends**
3. **Grocery Shopping**
4. **Go to School**
5. **Exercise**
6. **Run Errands**
7. **Deliveries**
8. **Mail**
9. **Taxi**

ADVANTAGES OF BICYCLES

- Zero chance of traffic tickets, expired meters, or parking violations.
- No auto insurance needed.
- No special licensing.
- Store your bicycle in your office or place of work rather than taking a full car space in a parking garage or curb.
- Zero carbon emissions.
- No gasoline budget.
- Reduced pot bellies and couch potatoes.
- Reduced driver anxiety.
- No monthly car payment.

Conclusion

After thinking about fuel saving for next generation and made a four wheel bicycle to use moderator distance .and also for s a point of entertainment for children use this type of bicycle A concept for making this type bicycle is that save to fuel, to reduce pollution of air and also provide eco friendly

Final modal

References

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THANK YOU