

Design and Fabrication of Mobigym

Anant Sonkar
Dep. Mechanical Engineering
S.B.J.I.T.M.R
Nagpur, India.

Dhaval Pawani
Dep. Mechanical Engineering
S.B.J.I.T.M.R
Nagpur, India.

Bhavik Aswani
Dep. Mechanical Engineering
S.B.J.I.T.M.R
Nagpur, India.

Prof. Sarvesh Biyani
Dep. Mechanical Engineering
S.B.J.I.T.M.R
Nagpur, India.

Abstract:- Bicycles were introduced in 19th century and now they have become principle mean of transportation. Bicycle provides numerous benefits including sustained physical exercise, increased manoeuvrability and easy excess to road. Gym is a place where people workout for their body. Working out keeps the body fit and in shape. Hence we tried to put both of these together.

MobiGym is a bicycle that is designed for a full body workout. It is a bicycle that can be paddled both with arms and legs. A traditional rear drivetrain connects foot paddles to the back wheels, while a second drive train connects the front wheel to a hand frame. Unisex equally suitable for men and women.

I. INTRODUCTION

A conventional bicycle is known by almost everyone because everyone must be having one. A simple bicycle can be considered as a good way of exercising. Most people do cycling for daily exercise. It consist of a simple chain drive which is driven with the help of pedal which rotates the driver sprocket that is connected to driven sprocket in the rear wheel which rotates due to the pedal force and cycle moves forward. Now these conventional methods of cycling is changing. An idea that will change thinking of cycling MOBIGYM. Mobigym is a full workout bicycle that will not only workout your legs but also chest arms. Foot pedalling moves the back wheel and hand pedalling moves the front wheel. Co-ordination between hands and foot is required. Basically mobigym is a whole gym on a cycle. Many people these days are so busy that they have no time for daily exercises. Mobigym gives faster and easier and convenient way to do our daily basic exercises on the go. It have various application. Those who cannot afford the expensive gym equipment's can go for mobigym. You can do a workout even while going for work and coming back to home from work. It's very time efficient too and easy to maintain because it's just a cycle.

II. PROBLEMS IDENTIFIED

Working out at same place may be problematic for some people.

- Due to busy work schedule people are not able to workout efficiently.
- Indoor exercises are not much fruitful as green environment exercises.
- Only one person can use gym on a single membership card.

- You have to wait for your turn in gym for working out on a particular equipment.
- Today's reality is that people want a good physique but they don't have sufficient time to give to gym.

III. LITERATURE REVIEW

A. Shaft driven bicycle

Drive shaft carries torque subjected to torsion and shear stress which represent difference of force and load. Shaft need to be strong to sustain stress without creating additional inertia due to weight. It is used to transmit power from differential to the wheel. Author told us drive shaft were introduced and used for transmission a year ago. In recent advancement drive shaft are again we were bevel gear meshes with another gear mounted on the drive shaft.



Fig 3



Fig 4

B. Human control of bicycle

The authors of this paper started a research on such dynamic model of bicycles which is controlled by human being. In this research the objectives are 1) steady or smooth turning behaviour 2) To identify human controls 3) measured all the parameters of all kind of bicycle 4) Developed model for human control which is based on human operator model of

a aircraft. The bicycle for human rider is totally different from aircraft and automobiles because in this bicycle, the most of the mass is in rider not in vehicle. Due to this the safety of rider will be preferred. This research interacts human rider with bicycle.

C. Dynamics equations for balancing bicycle

The above authors presented a equation of motion for a bicycle consisting four rigid laterally symmetric ideally hinged parts consisting of wheels frame and a front assembly. Rider can control the balance by Turing the front wheel in desired direction. And if a bicycle is pushed to about 6 m/s it steadies itself and gradually loses stability as the speed decreases. Not needed in 1980. Bicycle design is based on experiments rather than an equation so more deep study about bicycles is being done.

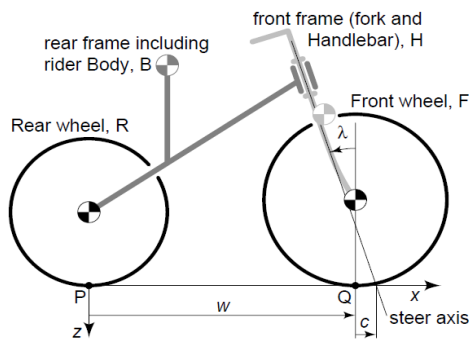


Fig 5

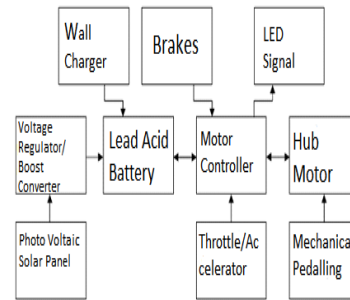
D. Urban transit rowing bike

The main objective of this project was to create a human power vehicle using it as mode of urban transport as well as complete exercise system. Earlier the system was more complex it was relieved by combine use of cable and pulley drive train simplified tilting linkage and electric power assist and they helped in replacing vintage processes of using variable gears in this project it is successfully demonstrated that rowing can be the basis for effective human powered urban transport and also healthfully profitable.

E. Solar assisted bike

In these days lifestyle of people are getting affected due to some or other reasons, from which one of them is travelling from one place to another, which is solved by providing them vehicles, again a particular vehicle requires some source to move from one place to another. So the fuel used is either diesel or either petrol and now a days the prices of these fuel is getting higher and higher day by and is not even affordable for a particular class of family, so some of the people found some new ways to replace these fuel consuming vehicles for travelling, from batteries or either it can also run from solar energy as per the weather condition. So as to modify these kind of technology from the solar energy it requires some kind of equipment which as per the research is found to be

1. Hub motor
2. Solar panel
3. Voltage regulator
4. Lead acid battery
5. Motor controller
6. Accelerator
7. Bicycle



IV. CONCLUDING REMARK FROM LITERATURE REVIEW

The idea of mobigym can be evaluated by the above literature review and following are the conclusions we made from that

1. Safety of the rider is an important aspect in the human machine relationship.
2. Chain drives are more efficient than the shaft driven bicycle as the initial torque in chain driven cycles is more.
3. An understanding between humans and bicycle is very important because it will help for making bicycles which are more suited for humans.
4. Bicycle can control themselves if given enough push of about 6m/s, then the bicycle steadies itself and stably moves until the speed gets too low. The torque requires for self-steading of a bicycles can come from various features of the bicycle.
5. Mobigym can provide better lower and upper body exercise than conventional cycling which is more
6. Efficient and more effective way to stay fit.

V. SOLUTION FOR PROBLEMS IDENTIFIED

1. Mobigym avoids the problem of working in the same place as we can ride it anywhere.
2. Mobigym can be used efficiently as it can be used while going for the work and also it can be used for exercising at the same time.
3. As we can use mobigym in the outside green environment the study shows that our body is more likely to grow more in natural environment.
4. Mobigym can be used by everyone due to its bicycle based structure.
5. Mobigym can consume our time and can help us maintain good physique simultaneously.

VI. PROPOSED DESIGN

A. Introduction

Our project deals with the day to day problem of people who are not able to do work out on a daily basis. This project of ours will help to maintain the fitness of the people very easily. Going to the gym paying the fees for a trainer which is very costly and can only be applicable to the one person who has given the money, but by mobigym it can be used by everyone once purchased it is a one-time investment. Since the people are nowadays so busy that they totally forget about their health, mobigym can help them in their daily basic exercises. They can ride mobigym while going to work too which is the best way to utilize the time. In order to do workout as well as reach to your work. It is said that the human body can grow best in the nature so mobigym is the best alternative to gym. Mobigym helps you to work on your chest, biceps, triceps, arms, legs, thighs, back, shoulders at the same time. It is very time efficient and gives result very fast. It consist of a handle bar which can rotate in 360 degrees about a single pivot point. It is connected to the front wheel of the mobigym with the help of a chain and sprocket which are designed suitably. The front movement of the hand provides power in the front wheel. The rear wheel is connected to the pedal which is operated by foot again with the help of chain and sprocket. The foot movement helps to provide power in the rear wheel of mobigym. Once with the help of pedalling the initial torque is generated we can use the hand movement too. As a result of combination of movements of hands and foot the cycle moves and it works on our body. The old cycles in the gym only works on the lower body but mobigym can work on lower body as well as upper body at the same time.

B. Layout of Proposed Model:



This is a cad model of our proposed design of mobigym. This is made with the help of AutoCAD. This model is the resemblance of the actual design.

VII. DESIGN FOR MOBIGYM

A. Proposed Design

Mobigym consist of following main components.

1. Handle bar
2. Chain and sprockets
3. Adjustable Seat
4. Wheels
5. Braking system

B. Handle bar

Handle bar in Mobigym is a bit different than the other bicycles used in day to day life it consist of a sprocket in the middle of the bar and it can rotate in 360 degrees giving our hands movement through which we can perform exercises.

C. Chain and sprockets

Mobigym has a chain and sprocket type of power transmission. It consist of two sets of chain sprocket transmission one in the front and one in the back. One is used with the help of our arms and other one is used with the help of legs. Co-ordination of hand and foot is required in order to proper use the mobigym.

D. Adjustable seat

The seat of the mobigym can be adjusted according to the required height of a particular Individual. Mobigym can be used by any individual within the height range of the bicycle.

VIII. CONCLUSION

From the study of literature and research work done till now we came to certain conclusion which are as follows:-

1. Chain Drive is more efficient than the shaft drive. It provides more starting torque.
2. Safety of the rider is an important aspect in th human machine relationship.
3. Use of Mobigym is open to every one.
4. Mobigym can provide better lower and upper body exercise than conventional cycling which is more efficient and more effective way to stay fit.
5. Bicycle can control themselves if given enough push of about 6m/s, then the bicycle steadies itself and stably moves until the speed gets too low. The torque requires for self-steading of a bicycles can come from various features of the bicycle.

IX. REFERENCES

- [1] Ashish S. Gawande, Avinash E. Gedam, Prof. A. A. Khond, Aniket G. Pipre, Nitesh C.Bajait. Design and Fabrication of Shaft Driven Bicycle IJSRD - International Journal for Scientific Research & Development| Vol. 3, Issue 02, 2015 | ISSN (online): 2321-0613
- [2] G. Hari Prasad, S.Marurthi , R.Ganapathi , M.Janardhan, M.P.Madhu sudhan. Design and Fabrication of Shaft Driven Bicycle.International Journal of Emerging Engineering Research and Technology Volume 2, Issue 2, May 2014, PP 43-49.
- [3] David Weldon. Mountain Bike Rear Suspension design optimization http://www.cs.bath.ac.uk/~mdv/courses/CM30082/projects.bho/2005-6/weldon_dm_dissertation_2005-06.pdf
- [4] Ronald Hess, Jason K. Moore, and Dale L. Peterson. Human Control of Bicycle Dynamics with Experimental Validation and Implications for Bike Handling and Design. NSF GRANT # 0928339 NSF PROGRAM NAME: Civil, Mechanical and Manufacturing Innovation
- [5] J. P. Meijaard, Jim M. Papadopoulos, Andy Ruina and A. L. Schwab. Linearized dynamics equations for the balance and steer of a bicycle.
- [6] Zebediah Tracy Claudio X. Salazar. Design of Urban Transit Rowing Bike (UTRB).

- A Major Qualifying Project Report Submitted to the Faculty of the WORCESTER POLYTECHNIC INSTITUTE. Issued on august 2010.
- [7] Lynn Weigand. The Economic Benefits of Bicycling. June 2008 CUS-CTS-08-03.
<https://www.pdx.edu/ibpi/sites/www.pdx.edu/ibpi/files/Economic%20Benefits%20of%20Bicycling.pdf>
- [8] M. Reddi Sankar, T. Pushpaveni, V. Bhanu Prakash Reddy. Design and Development of Solar Assisted Bicycle. International Journal of Scientific and Research Publications, Volume 3, Issue 3, March 2013 SSN 2250-3153
- [9] V. Lohit, A. Imran Mohideen. Pneumatic Bike: A Step to Future International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 Impact Factor (2012): 3.358