

## DESIGN AND DEVELOPMENT OF SOLAR POWERED RAILWAY BICYCLE

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### ABSTRACT

Indian Railways is the fifth biggest rail network in the world with 1.3 million employees and it is a massive task to streamline its operations. As the effectiveness of rail inspection depends on the efficiency and accuracy of the inspecting equipments, so here comes an innovative idea of *Rail Bicycle* for quickly travel on rail tracks for *inspection, monitoring & urgent repair of Rail tracks*. It is a novel mechanism of hybrid type Solar Powered Bicycle that can work on either pedaling or on solar powered both. The cycle can be manually placed on tracks by anyone to ride on to the repair location. Any vulnerable emergency locations can be easily reached and inspected by the staff in a short span of time with Rail Bicycle. Our Indian Railway **tracks** is spread across a massive 1,15,000 km, making it the largest rail network in Asia and the world's second largest network operated under a single management. The full **track** length of Indian Railways can circle the equator 1.5 times. And hence, the maintenance of these **tracks** can be done efficiently by our innovative project idea.

**Keywords:** Railway, Solar, Hybrid, Inspection, Tracks, Bicycle, Monitor.

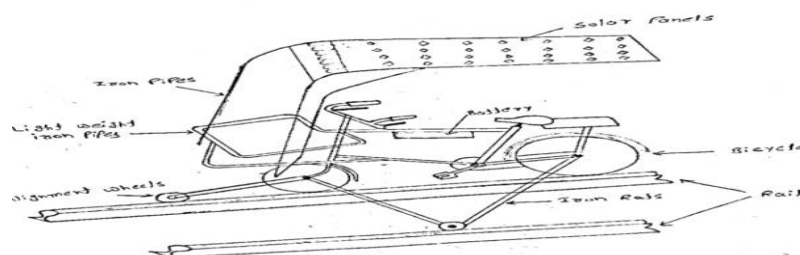
### I. INTRODUCTION

It is a light-weight structure of around 25 kg and can be lifted by just one person. The cycle can be easily assembled and dismantled by one person. The average speed of the Rail Bicycle is 45 km/hr and the maximum speed is 75 km per hour. The Rail Bicycle can carry two persons with the shed and sitting comfort provided to them. In this mechanism, one of the wheels was attached to the front part of the cycle and another one was used for balancing purpose. These parts were connected to the cycle with the help of nuts and bolts, making it easy to assemble and dismantle. When a loco pilot sends out a jerk message, the track man can quickly reach to the said site. THIS ALL LEADS TO ULTIMATE SECURITY AND ENSURING SAFETY OF PASSENGERS. These Rail Bicycles can be easily manufactured at very economical rates and its total cost can be around 20,000 Rs.

### II. METHODOLOGY

It consist of a very simple mechanism to work, in which a regular bicycle is to be powered by a DC motor through sprocket and roller chain to run on the battery which is stored with Solar Energy. And this railway bicycle is assembled with the supporting alignment wheels which are connected through iron pipes. The same is done at the front, creating what looks like a rudimentary triangular structure but which is efficient in its simplicity. E-motor mounted on back seat and powered to rear wheel trellis. Battery also mounted on back seat. Solar Panel can be mounted on roof (for shed) or can be mounted on front wheel of the bicycle also. One of the track wheel is positioned ahead of the cycle and attached to it, and another to the other track line. The front wheel functions for alignment, and second wheel to balance the railway bicycle. In essence, it's a cycle designed to be ridden actually on railway track, quite literally that. The balancing wheel is connected to the cycle by being attached to the frame.

### III. MODELING AND ANALYSIS



Actual Project image on tracks (without solar, motor and battery):-



#### IV. RESULTS AND DISCUSSION

An important issue is management of rail traffic during inspection. Some of the rail routes are so busy that it becomes very difficult to stop train traffic and do rail inspection and maintenance, (then earlier this work have to be managed during night time). Sometimes the situation becomes very difficult because of lengthy time consuming repairing works causing unwanted “Detention of train services”. Also the worker has to wait for a rail cart to be brought on track. It wastes so much time. So now here any vulnerable emergency locations can be easily reached and inspected with the help of our project in a very short span of time before the train passes. Another aspect is that, in some places like hilly regions, tracks made on bridges, the employees have to reach an inspection site by travelling through another route by the use of petrol/diesel vehicles, which leads to unnecessary use of costly fuel and which results in unnecessary pollution. Hence, we are using Natural Energy Resource which is a Renewable Energy Resource for the purpose of reducing unnecessary pollution. The use of costlier fuel for inspection vehicle (engine powered) is also eliminated. Next aspect is that the Simple mechanism of the Project needs very low maintenance and saves our overall Project cost. And last aspect is that, as it is the hybrid type bicycle, whenever an employee gets tired of pedaling, then he can ride this bicycle on a solar powered E bike Motor, hence saves human effort.

#### V. CONCLUSION

- Ensuring Safety and Security of the passengers.
- This project is Environmentally Eco friendly and Cheap.
- This Rail Bicycle reduces the major problem of fuel prices expenditure.
- It ensures Easy utilization of Renewable Energy Resource.
- Eliminates Pollution.
- This project helps in minimizing Human fatigue and lessens the efforts.
- Indian Railways can assure such provisions to all the track workers which ultimately bring out interest in doing work.

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