



# CONCEPT OF SPHERICAL WHEEL DRIVE

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## ABSTRACT

The Track Sphere Wheel Assembly is a new and useful automotive product. This invention offers a spherical wheel and tire combination for the 21st Century. But why it is so that the traditional cylindrical tire system has not been replaced by this system? Well, every innovation or an introduction of alternate system for the conventional ones often tends to possess lot of pros and cons. This paper will describe the possibilities of using this system, will answer the above question and will also provide certain solutions to the cons the idea faced.

## General Terms

Frictional surfaces, contact patch, power provision, mobility, spinning, wear and tear.

## 1. Introduction

If a simple sphere can be used in our daily life so frequently like in chairs, rear view mirrors of vehicle, television stand and many more then why it is so that the same sphere's use in the automotive is declined? It provides us the convenience of mobility for the products used in day to day life. From our own eyes to celestial bodies, everything is considered to be spherical only because the mobility factor it provides, no other geometry can. Ever wondered of playing cricket, basketball with cylindrical or square geometry! And if the concept of spherical wheels is termed as stupid why would a company like Audi will incorporate in one of its beauty, RSQ featured in the movie I-Robot.

## 2. Looking into real scenario

Below mentioned are the criteria which have been a major concern while promoting this concept:

1. Grip and traction
2. Provision of power
3. Wear and tear
4. Maintenance of a spherical tire
5. Establishment of a new system
6. Controlled motion



Fig1. Audi RSQ featured in I-Robot

## 3. Discussing the challenges to this concept

1. It is true for the fact that a spherical ball like wheel will have less friction than the conventional cylindrical ones simply because at a time its area of contact with the road will somehow be lesser than that of cylindrical tires. And therefore it is obvious with lesser area in contact the proposed system will face lack of traction which is not at all a positive point in regards with safe driving.
2. The question arises on how do we give the rotating power to the tires? Currently its shaft driven, so it's easy to rotate the existing tires. If the tires are made spherical, then the way to give power is to have a rotating small wheel on above the bigger wheel which gives the power to the wheel.
3. It's known to have wear and tear in cylindrical tires also but whatever might be scenario they'll behave the way they normally do with little wear and tear. Whereas in spherical tires slightest wear tear of tire will make it look uneven and the cause a difficult ride.
4. The vehicle dynamics would change when compared to a normal wheel design for which it will be required to change the current technology. And if implemented, todays systems worth billions will turn obsolete.
5. Its main drawback is our current level of technology is backward in terms of feasibly implementing it and for others its either too complicated or impossible to create such structures by replacing their whole existing production system.
6. Spherical wheel's attachment and then motion could also be troublesome

#### **4. Proposed Solutions**

1. Solution for fitting: Setup should include batteries which can generate electric current. Wheels should be made of superconducting material and three electromagnetic coils are attached perpendicularly to each other in such a way that when the current is passed through it a stable electromagnetic field is established providing the wheel proper balance and not allowing it to move unnecessarily.
2. Solution to lack of friction: If the wheels are coated with hydrophobic nanotubes material, it will drastically increase the surface friction even on a very smooth road. It definitely is better than the conventional rubber although costlier too but to overcome the drawback, this probably is the finest solution because it repels both dirt and water effectively and therefore providing dry as well as wet grip over any kind of surface.
3. Another means of increasing surface friction is to increase contact patch which can be done in two ways: either decrease the pressure slightly from what is being filled in a conventional tire or as suggested by a Canadian engineer, they can be filled by liquid polymer foam which will respond in density to the electromagnetic field created in spherical carcass under control and sensors.
4. Solution to braking: Technically it can be a simple extension of the braking system which exists in today's system. There can be three brake pads installed perpendicularly in such a way that just by push of a button the three pads acts in three different direction and making the wheel to slow down gradually as in some conventional automotive.
5. Solution to power provision: The vehicle can be operated completely on electronic onboard systems using batteries (LiPo) to distribute power to various components such as motors, controllers and sensors. In addition to this it can also provide an internal feedback for its own fault and errors occurring. It surely will be the “heart” of this project and will take tremendous efforts to design so.

#### **5. Advantages if such system turns to reality**

1. This system will eventually be an absolute electrical one and therefore will be an environment friendly concept to introduce.
2. The vehicle can be controlled in a better way in scenario of potholes or uneven bumps.
3. If proximity sensors (motion sensors) are installed on either side of the vehicle, it will enhance safety, will reduce chances of road accidents and will take this concept one step ahead to being an autonomous one.
4. Balancing and maneuvering at low speeds (especially in two wheelers) will become an ease.
5. As in conventional tires, it unintentionally requires scrubbing of the cylindrical tire to make a turn whereas such a parameter will be eliminated if spherical wheels are incorporated as it indirectly inherent the ability to spin about two axis at same time.

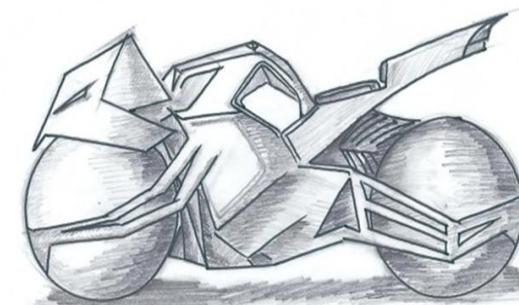


Fig2. Hand drawing of the proposed concept (side view)



Fig3.Hand drawing of the proposed concept (front view)

#### **6. Certain claims made by the experts over this concept**

1. A means of moving a transportation vehicle in any 360-degree direction along a roadway.
2. A means to directly move left or right from vehicle center for lateral parking of a vehicle.
3. A means to replace heavy drivetrains with light weight computer controlled drive-by-wire Track Spheres that use electric motors and cables to maneuver a vehicle.
4. An automotive wheel and tire combination for replacement of separate vehicle wheels and tires.
5. A ground transit Track Sphere Assembly that does not go flat when punctured.
6. A chassis assembly which holds the Track Sphere in place and allows motion in all directions of claim (in reference with first point).

#### **7. REFERENCES**

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