

Self-Balancing Of Two Wheeler Using Gyroscope

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ABSTRACT:-

Today, despite of having a number of preventive safety measures to avoid road accident by two-wheeler, According to surveys, two-wheeler lead in the number of road accidents. Our project is to produce the gyroscope effect on a small prototype. The prototype is a two-wheeler vehicle in which rotating discs imparted act as a gyroscope to produce a counter balancing force when the vehicle prototype loses balance on either side

KEYWORDS: Gyroscopic Disk , crankshaft, universal joint.

I. INTRODUCTION:-

Gyroscope is an instrument, consisting of a wheel mounted into two or three gimbals providing pivoted supports, for allowing the wheel to rotate about a single axis. A set of three gimbals, one mounted on the other with orthogonal pivot axes, may be used to allow a wheel mounted on the innermost gimbal to have an orientation remaining independent of the orientation, in space, of its support.

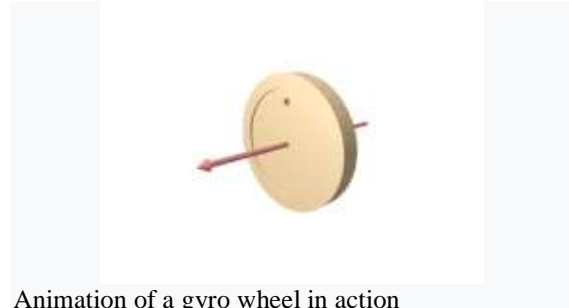
In the case of a gyroscope with two gimbals, the outer gimbal, which is the gyroscope frame, is mounted so as to pivot about an axis in its own plane determined by the support. This outer gimbals possesses one degree of rotational freedom and its axis possesses none. The second gimbal, inner gimbal, is mounted in the gyroscope frame (outer gimbal) so as to pivot about an axis in its own plane that is always perpendicular to the pivotal axis of the gyroscope frame (outer gimbal). This inner gimbal has two degrees of rotational freedom.

The axle of the spinning wheel defines the spin axis. The rotor is constrained to spin about an

axis, which is always perpendicular to the axis of the inner gimbal. So the rotor possesses three degrees of rotational freedom and its axis possesses two. The wheel responds to a force applied to the input axis by a reaction force to the output axis.

The behaviour of a gyroscope can be most easily appreciated by consideration of the front wheel of a bicycle. If the wheel is leaned away from the vertical so that the top of the wheel moves to the left, the forward rim of the wheel also turns to the left. In other words, rotation on one axis of the turning wheel produces rotation of the third axis.

A gyroscope flywheel will roll or resist about the output axis depending upon whether the output gimbals are of a free or fixed configuration. Examples of some free-output-gimbal devices would be the attitude reference gyroscopes used to sense or measure the pitch, roll and yaw attitude angles in a spacecraft or aircraft.



Animation of a gyro wheel in action

The centre of gravity of the rotor can be in a fixed position. The rotor simultaneously spins about one axis and is capable of oscillating about the two other axes, and it is free to turn in any direction about the fixed point (except for its inherent resistance caused by rotor spin). Some gyroscopes have mechanical equivalents

substituted for one or more of the elements. For example, the spinning rotor may be suspended in a fluid, instead of being mounted in gimbals. A control moment gyroscope (CMG) is an example of a fixed-output-gimbal device that is used on spacecraft to hold or maintain a desired attitude angle or pointing direction using the gyroscopic resistance force.

In some special cases, the outer gimbal (or its equivalent) may be omitted so that the rotor has only two degrees of freedom. In other cases, the centre of gravity of the rotor may be offset from the axis of oscillation, and thus the centre of gravity of the rotor and the centre of suspension of the rotor may not coincide.

Bike is one of the most common mode of transportation since the world is focused on urbanisation the cities are going to be much more congested hence bike being a sole best option for driving such a condition. This system will provide an additional safety factor which the traditional bike don't provide you Gyroscopic effect an external couple which acts on the bike to which provides counter force which helps in balancing the bike.

EXPERIMENTAL DESCRIPTION:-

Machine Components:-

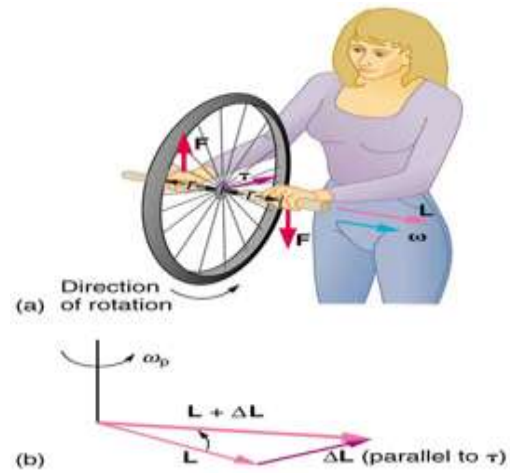
Gyroscope:-

A device consisting of a wheel or disc mounted so that it can spin rapidly about an axis which is itself free to alter in direction. The orientation of the axis is not affected by tilting of the mounting, so gyroscopes can be used to provide stability or maintain a reference direction in navigation systems, automatic pilots, and stabilizers.



Gyroscopic effect:-

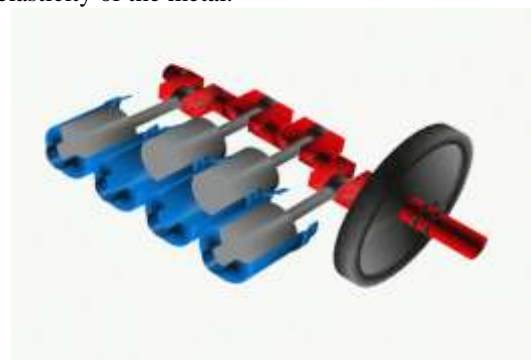
Gyroscopic effect is ability (tendency) of the rotating body to maintain a steady direction of its axis of rotation. The gyroscopes are rotating with respect to the axis of symmetry at high speed.



Crankshaft:-

A crankshaft is a shaft driven by a crank mechanism, consisting of a series of cranks and crankpins to which the connecting rods of an engine is attached. It is a mechanical part able to perform a conversion between reciprocating motion and rotational motion. In a reciprocating engine, it translates reciprocating motion of the piston into rotational motion, whereas in a reciprocating compressor, it converts the rotational motion into reciprocating motion. In order to do the conversion between two motions, the crankshaft has "crank throws" or "crankpins, additional bearing surfaces whose axis is offset from that of the crank, to which the "big ends" of the connecting rods from each cylinder attach.

It is typically connected to a flywheel to reduce the pulsation characteristic of the four-stroke cycle, and sometimes a torsional or vibrational damper at the opposite end, to reduce the torsional vibrations often caused along the length of the crankshaft by the cylinders farthest from the output end acting on the torsional elasticity of the metal.



Universal Joint:-

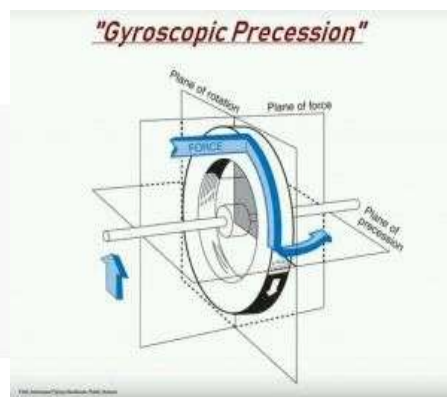
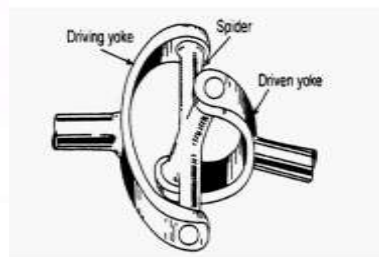
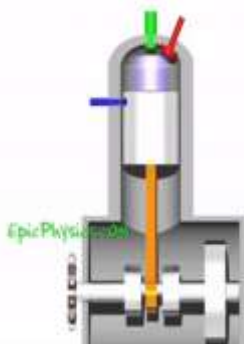
A universal joint (universal coupling, U-joint, Cardan joint, Spicer or Hardy Spicer joint, or

Hooke's joint) is a joint or coupling connecting rigid rods whose axes are inclined to each other and is commonly used in shafts that transmit rotary motion. It consists of a pair of hinges located close together, oriented at 90° to each other, connected by a cross shaft. The universal joint is not a constant-velocity joint. When shafts are connected using a universal joint, each shaft terminates in a revolute joint with its axis perpendicular to the shaft's rotational axis. This allows rotary motion to be transferred between the shafts while allowing misalignment in both remaining rotational degrees of freedom. A single rotational degree of freedom is constrained (the shaft rotation) as well as all relative translations, giving a universal joint two degrees of freedom (2-DOF).



EXPERIMENTAL SETUP:-

1. The crankshaft of the engine is to be extended.
2. Universal joint is fitted to the extended crankshaft.
3. The other end of the joint is attached to gyroscope disc.
4. Hence, the crankshaft drives the gyroscopic disc , thus eliminating the use of battery.



II. CONCLUSIONS:-

- [1]. Weight and cost of battery to run the gyroscope is eliminated.
- [2]. The risk factor of driving the two-wheeler is much more compromised.
- [3]. The accident toll can be reduced to a higher rate.
- [4]. Thus, the vehicle stabilizes itself.

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