PROJECT REPORT ON

SELF BALANCING PERSONAL TRANSPORTER

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ABSTRACT

The uniqueness of the inverted pendulum system has drawn interest from many researchers due to the unstable nature of the system. The idea of a mobile inverted pendulum vehicle has surfaced in recent years and has attracted interest from control system researchers worldwide. In this project the processes developed and considerations involved in balancing a two-wheeled autonomous vehicle based on the inverted pendulum model. The two wheeled self balancing robot, has become popular due to its responsive yet precise movement.

Presently only one company i.e. Segway Inc. manufactures products using this technology but has failed to cater to a wide market because of their expensive pricing. The robot assists a person to travel indoors or outdoors without any emissions using a microcontroller (ATmega328) to process values from an Inertial Measurement Unit (IMU) that consists of a ADXL335 accelerometer and a LPR530AL gyroscope and drive the motors accordingly.

The problem of controlling an inverted pendulum in this manner is classical to control systems, since the system is inherently unstable – the pendulum will not remain upright without external forces. This type of system is also very difficult to control manually, and therefore requires the use of electronic controls.

In this project, a control algorithm will be developed and implemented digitally, using a microprocessor and sensors, and a working demonstration will be built. Ultimately, this project will show the effectiveness of a digital control system to stabilize an inverted pendulum quickly, and it will demonstrate the robustness of the controlled system to unexpected disturbances.