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Development of Prototype of a Remote Guided Segway Robot

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SEGWAY is a Part scooter, part motorcycle, part pure wonder, the electric motorized vehicle moves forward, backward and stops in response to how the driver's body shifts as he or she stands at the controls. There are no brake or accelerator pedals. Instead, the SEGWAY operates through gyroscopes, powerful processing boards, motors and batteries. Such vehicles may also find applications in high maneuverable wheel chairs and rescue robots. Many results on maneuvering an inverted pendulum type mobile vehicle in an upright stable configuration can be found in the robotics literature. The system is an under-actuated, non-holonomic system with high nonlinearities. The desired behavior is inherently unstable. All existing controllers are based on linearized models. In this study we develop a nonlinear energy shaping controller that is based on an inverted pendulum on a cart approximation of the system. The controller implementation only requires that we measure the tilt, tilt rate and the wheel angular velocities. The only parameter that needs to be estimated is the entire mass of the system. We use a complete nonlinear model that considers the translational, tilt, yaw, wheel and DC motor dynamics with control voltage saturation to simulate the performance of the controller. Only wheel in-plane dynamics are neglected. The DC motors are assumed to behave ideally. Back-clash and friction in the geared drive are also neglected. The overview of Design and implementation of remote guided Segway robot is to understand the dynamic modeling, control systems, analog sensing and analog signal control, which are basically categorized under robotic environment.

We used 12v DC motors as our actuators, triple axis accelerometer plus dual axis gyro combo used for tilt and rate sensing & encoders to sense the angular rate of the wheels. 18F4520 microchip PIC is used for DSP & 12V Li/Cad battery as power source.

We develop this up to self balancing two wheel robot. After developing the prototype we also expect to modify the prototype to climb a sloped path.