5/2/2024

David Anderson

[company name]

RoboWheels

A Wheel control system for robots

**RoboWheels -D.L.Anderson 6/2/24**

**A universal Wheel control Platform for Robots**

**Abstract: Robowheels attempts to be a universal control for 2 or 4 wheel DC servo motor robot platforms using microcontrollers. With H-bridge control and Quadrature encoder sensing, the Robowheels software will manage motor speed and position to send the platform in a given direction and speed, with measurable distance. It also supports acceleration control, faults, and wheel slip monitoring. Using Robowheels makes the low level control of the motors much simpler and generic.**

When Designing wheeled robot platforms it is often a challenge to integrate the wheel control algorithms into the main system. Many systems are proprietary, and they place tight real-time constraints on the hardware needed to run them. By moving all lower level time critical motor control tasks to a single real-time OS running on a dedicated microcontroller, Robowheels eliminates much of the timing bottlenecks and design discussions. The motor platform is dealt with at a higher level with much fewer and slower timing constraints. Robowheels solves these issue by handling the fiddly details of motor control and gives a clean and deterministic interface for upper software layers to deal with. It still allows fine grained control of motor parameters but with a higher level of abstraction.

Realtime control requires a software system with dedicated processor resuorces organized to provide deterministic control of motor events. In the industry a RTOS software platform is usually used to provide layers of functionality that can meet the timing goals of the control system. The RTOS manages CPU time and events to insure that all tasks are performed at the exact time required by the control algorithm, Delays are managed by a priority system and pool of tasks that address the control algorithm. Interupts are used where appropriate to handle fast events that must be handled immediately. The RTOS and the application work together to meet all the control challengs and get the work done on time.

Key sections are shown below: PWM/Dir control, H-Bridge ,DC servo-Motor, Quadrature encoder, Geartrain and Wheel. The configuration of these objects can be changed to suit the application. Allowing different gear trains or motors to be tested with minimal code re-write.

Wheel

PWM

GearTrain

Quad Encoder

DC Servo motor

H-Bridge