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Functionality:

The LowLevel is a printed circuit board (PCB) designed for land vehicle control. It acts as a daughter board (shield) for an Arduino Mega microcontroller. It is a dual-mode controller, which selects manual drive-by-wire control or autonomous computer control of the following:

* Control of the hub motor.
* Control of the turning servo.
* Control of the braking servo.

Input for drive-by-wire control comes in from either a joystick or an RC receiver. Autonomous control is provided by a stack of three additional microcontrollers (High Level Control):

* C3 (Pilot): Senses dynamic obstacles and sends near-term path and speed to C2.
* C4 (Path Planner): Computes optimum path from current position to destination, disregarding dynamic obstacles.
* C6 (Navigator): fuses instruments to give the best current estimate of position.

The connectors on the LowLevel are:

* X2 Cruise (DB25F) - Autonomous control signals from High Level.
* X3 Motor (DB15M): Signals for motor and drive-by-wire
* X1/X5 Turn Sensors (RJ45): SPI turn sensor digital inputs.
* X4 (ODO): Cyclometer (reed switch) input jack.
* JP9 (8 pin): Joystick analog input signals.
* JP12 (3 pin): PWM output signal to steer.
* JP11 (3 pin): PWM output signal to apply main brakes.
* JP5 (4 pin): Left steer turn sensor analog input.
* JP6 (4 pin): Right steer turn sensor analog input.

The LowLevel runs on 5V power, which it provides to sensors and servos on JP9, JP12, JP11, JP5 and JP6. A 9.6V battery supplies Vin to the Arduino, which regulates it to 5V and 3.3V. The RJ45 connectors send Vin, which must be regulated on the other end to 5V. Our trike uses a 36V battery to drive the hub motor and a 12V battery to drive the steering and brake servos. Each of these three actuators has a separate electronic subsystem, which generates 5V, but are not used by LowLevel. The 5V supply from the motor is used as an indication of whether 36V power is switched on.