SuperCar V1.0

System Overview:

The SuperCar is an educational kit that can be used to learn basic mechanical, electrical, and software engineering principles. An enhanced radio controlled car is used for the mechanical platform along with circuit boards interfacing to a simple microcontroller. Basic peripherals included in the kit are light emitting diodes of various colors and a pre-assembled ultrasonic rangefinder. Additional connectors allow the kit builder to experiment with their own designs.

Once assembled, the SuperCar can be programmed to respond to the transmitter as a simple radio controlled car (R/C mode), may be programmed to respond both to the transmitter and the microcontroller (semi-autonomous mode), or operate without any user intervention (autonomous mode). Programming and re-programming of the microcontroller is accomplished via a USB interface to a computer. The USB connection is not required during operation.

The hand-held transmitter is supplied pre-assembled and simply requires attachment of the antenna. Modification of the transmitter is not encouraged.

Circuit Description:

The hand-held transmitter consists of two control sticks. When moved away from their center position, an encoder integrated circuit creates an encoded signal representing control stick position through an RF modulator and amplifier.

The Receiver and Motor Driver PCB contains an RF receive amplifier connected to a decoder integrated circuit. The decoder presents the current control stick positions to a set of connectors. Two h-bridge circuits interface control signals from a set of connectors to provide power to the steer and drive motors. Control stick signals and motor control signals connect to the Microcontroller Breakout and Motor Interface PCB.

The Microcontroller Breakout and Motor Interface PCB contains multiplexing logic circuits that allow either control stick signals or microcontroller signals to provide motor control. Control stick signals are buffered and passed through to the Microcontroller Carrier PCB, and connectors are provided for input/output signals to/from the Microcontroller Carrier PCB.

The Microcontroller Carrier PCB simply provides power filtering and a socket for the Microcontroller Module. The Microcontroller Module (Arduino Nano V3.0) is purchased as a pre-assembled component and provides a USB interface for programming.