## Preliminary Design for Robot Racing 2009

The goal of this project is to design an autonomous vehicle with the primary objective to become a platform for intelligent robotics experiments and a secondary objective of participating in the robot racing competition (http://www.eng.uwaterloo.ca/~rracing/. As of now the robot has been designed for optimal performance at the aforementioned competition.

A summary of the competition requirements are as follows. The robot has to:

* follow a figure-8 circuit as outlined by orange pylons
* follow road signs and traffic lights (two stop signs and one traffic lights at the starting position)
* take part in a straightaway drag race

Also note that the white lines on the road are located wherever there are stop signs on the road.

With the above mentioned requirements, the robot was designed to have the following sensors:

* CMU Camera for blob detection of traffic signs and lights
* Ultrasonic rangefinders for pylon and obstacle detection
* IR Line followers for line detection
* GPS for macro-localization

With research it was found that the best ultrasonic range finders used I2C for communication and the robot design would require multiple range finders for a proper localization on the pathway. This implies that a I2C bus be constructed. However, it was decided that handling the I2C bus , serial interfacing and analog interfacing would be hard for a microcontroller to do especially because it would be conducting a fair amount of computation heavy processes to control the robot. With this in mind a secondary microcontroller was added to handle the I2C bus and analog interfacing, while the primary would take care of serial interfacing, motor control and computation.

The above design is shown laid out in Figure 1. For the mechanical platform a remote control vehicle was dismantled, and its motor control system stripped out.

An itemized list of parts is shown in Table.



Figure 1 : Design Layout

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