

# **Accelerometer Controlled R/C Tank**

A final project proposal for CMPEN 352W

by

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April 6, 2009

## **Need Statement**

The project will provide the user with an interactive method of controlling a R/C tank via a three vector accelerometer.

A central theme to this project is to provide a intuitive interface to the user.<sup>1</sup> This interface has a specific application of driving a R/C tank in our prototype; however, if we focus on the actual human computer interaction barrier more advanced applications may be developed upon from this platform. Such applications include life-critical systems that could operate motorized wheel chairs for the handicapped.

## **Marketing Requirements**

A modified R/C tank is fitted with two ultrasonic range sensors (front and back) and a wireless communication protocol. The user will be able to read sensor data from the tank on the LCD presented in either centimeters or inches. When a distance threshold is met, a klaxon will sound with escalating frequency based on the distance from an object.

The user will hold a remote control to tilt at various angles corresponding to directions of the tank. On startup, the remote will calibrate to the users preferred orientation allowing them to have an intuitive sense of control.

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<sup>1</sup>The video on our development blog shows that calibration is required for the user to have an intuitive control with the machine "<http://352w.blogspot.com/2009/04/accelerometer-calibration.html>"

## Level-0 Description

Module	R/C Tank
Inputs	Two ultrasonic range sensors, Xbee wireless interface
Outputs	Two independent motors to control drive, Xbee wireless interface
Behavior	<pre>get direction data  parse motor velocity as pulse width and direction  assign pulse width to PR2 register (PR2 has interrupt to motor speed)  assign motor direction to H-bridge  get ultrasonic sensor data send ultrasonic sensor data to user's transmitter</pre>

Table 1: Level-0 Description for R/C Tank

Module	Transmitter
Inputs	User motion, Xbee wireless interface
Translator	MMA7260 Accelerometer
Outputs	Xbee wireless interface
Behavior	<pre>only on startup     calibrate to user relative position (sample accelerometer)  get ultrasonic sensor data get accelerometer data  compute distance display distance on LCD if (within a distance threshold)     sound the alarm! (proportional to distance)  get sensor data send sensor data to user's transmitter</pre>

Table 2: Level-0 Description for Transmitter

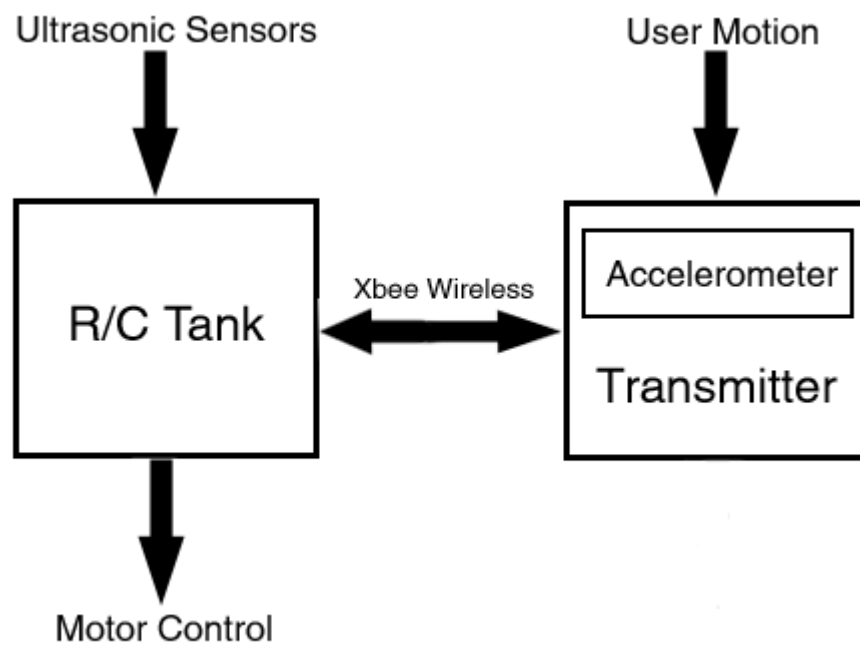


Figure 1: Level-0 Graphical Description