

CS 362 - HoverCrafts

Project Description

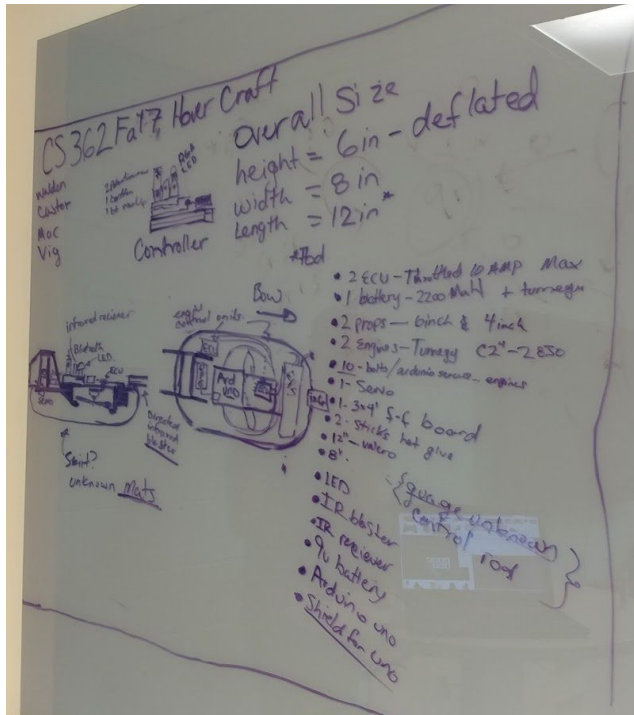
The theme/concept for our project are hovercrafts. We plan to make two sets of hovercrafts. Each hovercraft set will have a hovercraft and a controller for that hovercraft. Using two sets of hovercrafts, a pair of people can play a game along a surface, where each hovercraft will try shooting each other and the last one standing wins.

Each hovercraft will have two engines; one on the bottom to inflate the skirt and give the hovercraft lift, and one on the back of the craft to provide thrust. There will be a servo connected to some rudders to control the direction of the rear engine's thrust. A hovercraft will also feature an IR blaster and an IR receiver. The IR blaster is for "shooting" at other hovercraft and the IR receiver is for registering the shots. There will also be an LED indicator on the hovercraft for all visual indicators (e.g. pairing mode, ready mode, disabled mode, etc.). For communicating between the controller and the hovercraft, we plan to use a HC-06 Bluetooth module. Finally, there will be an Arduino on the hovercraft to properly control all the components as well as two batteries, a model airplane battery for the motors and a 9-volt battery for the Arduino board. For the construction of the hovercraft, we plan to have a board to mount the components onto as well as a light material for the inflatable skirt.

The controller for a hovercraft isn't too fancy. There will be an Arduino board for registering all the inputs and outputs. Connected to the Arduino will be a single analog stick, a buzzer, an RGB LED, a HC-05 Bluetooth module, and a 9-volt battery. The analog stick will provide the directional input as well as the throttle input for the hovercraft. The buzzer and RGB LED will be used together to give both auditory and visual feedback about the current state of the controller and the connection between the controller and the hovercraft. The HC-05 Bluetooth module will be used to send commands to the connected hovercraft. Finally, the 9-volt battery will power the Arduino. The Arduino and battery can be mounted on a small board, and all the other inputs can be mounted on a small breadboard attached to the top of the Arduino or on the small board itself.

The controller will act as a transmitter for all the controls the user inputs, meaning that the HC-05 module will be configured in "master" mode. The hovercraft will be setup to receive these inputs and react accordingly, meaning that the HC-06 module will be configured for "servant" mode.

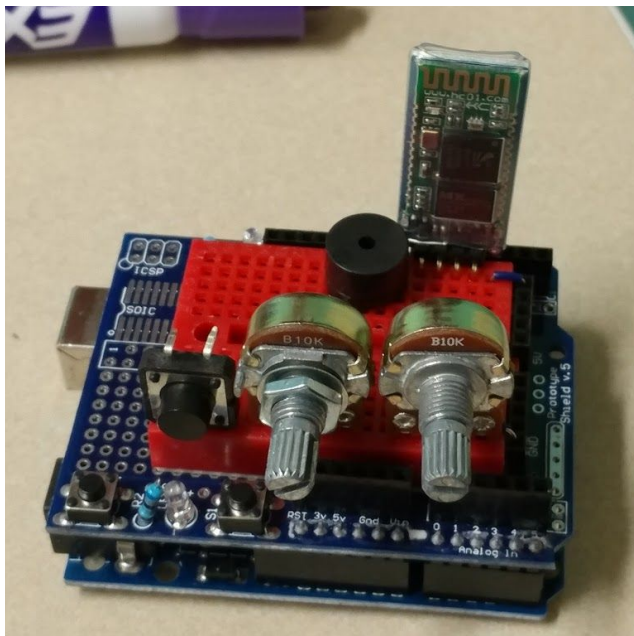
Current Progress



The first thing we did was finalize the general design of the controller and the hovercraft. This included taking inventory of our current parts as well as figuring out what parts need to be ordered.

As shown in the image to the left, the hovercraft will have a rounded rectangular shape with the Arduino, batteries, rudder assembly, IR blaster, and IR receiver mounted on the top of the deck; it will have the skirt fan mounted on the bottom of the deck in order to inflate the skirt.

For the controller, we were first thinking of having the design similar to image shown to the lower left. There would be a small breadboard mounted on top of the Arduino where all of the controls would be placed. There would be a button for controlling the IR blaster, two potentiometers for controlling thrust and direction, a bluetooth module for communicating with the hovercraft, and a buzzer to indicate whether or not your hovercraft was hit. This design is not final, however; we were thinking of replacing the two potentiometers with an analog control stick and using an RGB LED for troubleshooting and indicating status.

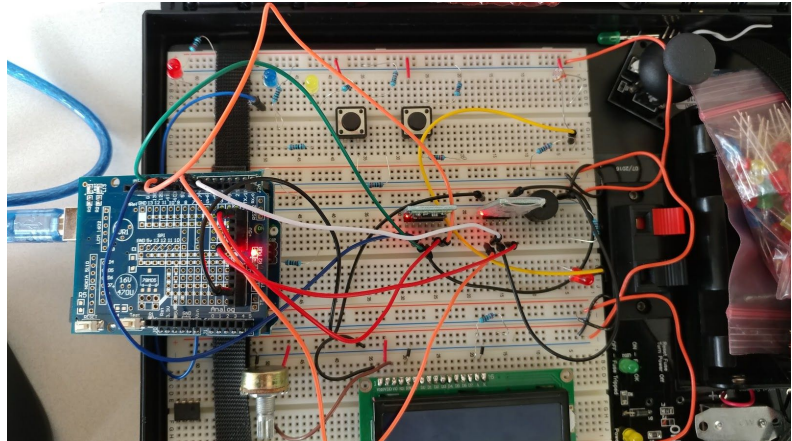


The Hovercraft frame will consist of foam-board, final thickness unknown at this point. It will be $8\frac{1}{4}$ - $8\frac{1}{2}$ inches wide, and at least 14 inches long. There will be two mounted engines, one facing down with a diameter of 6 inches, and one facing the stern

with a diameter of 4 inches. There will be two rudders that are mechanically linked facing behind the stern engine in order to provide directed yaw control. The Arduino will be placed in between the vertical engine and the horizontal engine, and will provide control inputs to the different

hovercraft components. The battery will be positioned towards the bow of the hovercraft. The first prototype was built last week by Walden, however he miscalculated the overall length and thus only has a rough idea of the length and positions of different components. He is currently working on draft 2 of the frame, but has not committed to cutting further foam materials

As for the controller setup, not too much progress has been made as of yet. We encountered difficulties in pairing the Bluetooth modules, which took about a week to figure out. Josh was eventually able to have them pair automatically after looking through multiple tutorials (described in the resource section below). The circuit setup just for pairing an HC-06 module (servant) and an HC-05 module (master) is shown to the right; there is an Arduino on the left, an HC-05 module to its immediate right, and an HC-06 module to the right of the HC-05 module.



Remaining Progress

First and foremost we need to start by soldering together the primary components. The electronic speed controller (ESC) requires external power and as such needs to be soldered to a Deans plug. There are going to be two ESC's that will be Y-harnessed together before connecting with an external powerpack. These ESC's will be what drives the motors. The motor's will also need to be soldered to 3.5mm Bullet Connectors

Additionally, we need to start wiring up the controller (can be done next) as well as the hovercraft. After building them both, we can move ahead to testing.

If all goes well, we can finish building by Nov. 17, with Nov. 20 at the latest. Once the building is finished, we can move

Resources

- Bluetooth Modules
 - Pairing
 - [Sending a series of commands to the HC-05 Module via .ino](#)
 - [Sending a series of commands to the HC-06 module via .ino](#)
 - [Commands to pair HC-06 and HC-05 together](#)

- The three links were used to figure out the information needed about the two bluetooth modules and manually pair them together
- [Usage](#)
 - [HC06 Connection Tutorial](#)
 - [HC05 Connection Tutorial](#)
 - The two links are used to figure out usage and communication between the two modules
- Mechanical pieces
 - [Amazon.com Dean's Style Connectors](#)
 - Used to connect the external battery to the ESC's
 - [Jet.com ESC's](#)
 - Used to connect external battery to brushless motors.
 - [Hobbyking.com Engines](#)
 - 6 inch and 4 inch diameter propellers.
 - [Forum for skirt research](#)
 - [Amazon.com Skirt Material](#)