

# Champbot Entry 2015

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## 1 Project Summary

This project will include the design and construction an ROV, closely resembling Champ. This will successfully navigate the course of the Champbot Challenge as well as execute all optional maneuvers. The education of ourselves and others will be a large part of this exercise.

The project will begin with a feature-matrix and a dFMEA (so we don't find ourselves DNF). Since fire and blades are involved, a risk-assessment will be completed during development.

## 2 Objectives

### 2.1 Navigation

Navigation is non-optional and so has priority and will be implemented and tested first. In negotiating the slalom around the five buoys, in the prescribed pattern, it must be reasonably quick. Executing this in a reasonable time will better hold the attention of the spectators.

There will be two drive units providing speed and agility through pirouette turning.

### 2.2 Ignition

The target will be ignited using a gas flame from its mouth. After all, if Champ will be spewing fire, this is where it should emanate.

It's hoped that the flames will be quite visible to the crowd on the shore. The fuel will likely be butane, owing to the low pressure, bright flame and relative safety.

Since this is a wet environment, with submersion, ignition will be electro-thermal rather than arc based.

## **2.3 Accuracy**

Like some of last year's entries, the float should be dropped from Champ's mouth. Also like last-years entries, champs neck will be extended to better center into the target. The mechanics will be a dropping jaw. This must be executed before ignition so that the mouth is clear.

## **2.4 Submersion**

The Submersion for well over 10 seconds will be supported. The dive and rise should be startlingly quick, and repeatable, to impress the crowd.

Since this is a short-term dive, with no forward motion planned, power, rather than ballast, will be used. Downward-force is through the temporary re-purposing of the main-drive assembly as a rotary dive-plane. The pitch control will probably be through thrust reaction and not require another servo.

## **2.5 Spectacle, Technical and Aesthetics**

Since these all have a point-value equal to the more direct tasks, they will figure heavily into the entire project.

# **3 Statement of Work**

There is much to do and many unknowns but the success of this project, in its entirety, is very likely.

The schedule is ordered so that unforeseen delays are unlikely to result in a no-show or disqualification.

### **3.1 Schedule**

Week 23	Main drive/dive units complete; sealed and with mounts.
Week 26	Remote control and power systems complete. Firmware functional.
Week 29	Buoyant structure complete, along with motor control
Week 30	Early lake test, finalize firmware and spring-rates
Week 32	Jaw control added and tested
Week 34	Fire-control hardware and firmware added and tested
Week 36	Skeleton & Skin complete and installed
Week 37	Final lake test to finalize buoyancy and address and handling issues
Week 39	Corrections will be ongoing until the event

### **3.2 Budget**

Money is always a very limited resource. Like many of last years entries, rather than the obvious industrial or hobby parts this project will reuse and re-purpose household appliances and material. Simplicity should also keep costs down.

At this time it appears that the cost could be well under \$500.

### **3.3 Team Composition and Expertise**

Björn is an autodidactic engineer and life-long maker, building his first remote-control device, an optically controlled Automaton, in 1973. Quentin is a brilliant 1<sup>st</sup> grade student at Georgia Elementary & Middle School (GEM), and Björn's son, who loves electronics and chemistry.

## **4 Facilities**

All work will be performed within the home. Github will be use for both source control and documentation at this location: <https://github.com/bjornburton/champbot>