**Yukon Project Proposal**

Team 6343

July 10, 2017

During the 2017 FRC competition season, our team successfully implemented and utilized an autonomous mode that piloted the robot across the baseline for an extra five points. However, many of the teams that performed in the elimination rounds at the Pacific Northwest Championship were able to successfully deliver a gear to the airship during the autonomous period. This provided their alliance with an extra 15 point bonus. To improve our effectiveness as alliance partner, the Yukon project aims to add this capability to our robot in time for the Peak Performance off-season event in late September.

**Goals**

The overall goal of the project is to add an autonomous gear delivery feature to EventBot before the Peak Performance event. As a minimum performance goal, at least 50% of attempts must successfully deliver a gear to the airship from the #2 alliance wall position. As an aspirational goal, the robot can deliver from the #2 alliance position with a 90% success rate. As a second aspirational goal, the new feature can also deliver a gear to the airship from the #1 and #3 alliance wall positions with a 50% success rate. In all cases, the gear must be delivered within 8 seconds after the start of the autonomous period.

In addition, to the primary goal of the project, several secondary goals target the development of specific skills to strengthen the capabilities of the team.

* Establishment of a standard Git workflow to improve software collaboration and quality.
* A CAD model of the drivetrain showing all changes required to support the new autonomous mode feature.
* Utilize a standard product develop process workflow with distinct design, fabrication and test phases.
* Others?

The project will be divided into several intermediate goals…

Phase 1 - Practice Bot teleop propulsion operational using Talon SRX controllers

Phase 2 - Practice Bot teleop propulsion using velocity feedback control

Phase 3 - Practice Bot autonomous propulsion along a straight line

Phase 4 - Practice Bot autonomous propulsion along a curved trajectory

**Hardware Plan**

The hardware plan involves upgrading Practice Bot with the hardware changes required for autonomous operation. After the design elements have been proven effective, Event Bot will be upgraded with the same changes. This upgrade will either reuse parts from Practice Bot or utilize newly purchased hardware. Specific changes include…

* Change the propulsion motor speed controls from the Victor SP type to the Talon SRX type.
* Replace the climber motor speed control from the Talon SRX type to the Victor SP type.
* Add CIMcoder type rotary encoders to each side of the propulsion system.
* Add an ultrasonic range finder from the KOP on the gear handling side of the robot.
* Add an airship docking sensor to the gear handler system. This is tentatively intended to be a beam break sensor.

**Software Plan**

The software development will initially follow the following plan…

* Establish a GIT-based software development workflow.
* Switch from Victor SP motor control (over PWM) to Talon SRX motor control (over CAN bus).
* Use encoder-based velocity control using the game controller as a direct control input.
* Next?

**Team**

The proposed team would consist of 3 mentors and 2-4 students.

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| Software #1 | Eli Holter | Software Mentor | Steve Rinard |
| Software #2 | Davin Tija | Controls Mentor | Chad Stryker |
| Controls | Max Recker | Mechanicals Mentor | Kris Holter |

**Materials**

The following materials will be required to support the autonomous gear delivery feature. This list may have to be adjusted as the feasibility of specific design ideas are determined.

* Qty 4 - TalonSRX motor speed controllers. These will be taken from stock, Event Bot and Practice Bot.
* Qty 1 - Victor SP motor speed controller. These will be taken from Practice Bot.
* Qty 2 - CIMcoders. These were donated by the Recker family..
* Qty 1 - Ultrasonic range finder. This is a KOP item that the team already has in stock.
* Qty 1 - Beam break sensor. Adafruit carries a model that might work for $7.
* A quantity of wiring, connectors and miscellaneous mounting hardware.

**Milestones**

A project schedule is TBD. However, initial hardware changes to Practice Bot are already in progress. Some key milestones include...

* Project kick off meeting - TBD
* Phase 1 Complete: Practice Bot propulsion operational using Talon SRX controllers - TBD
* Phase 2 Complete: Practice Bot propulsion using velocity feedback control - TBD
* Event Bot ready for Peak Performance - September 12th