2019 5737 软件组介绍

自动阶段+手动阶段功能介绍

软件组概要 SUMMARY

目标 Objectives

To follow the motto - autonomous > tele operated control

The goal this season is to advance 5737's autonomous control over the season robot to unprecedented levels. Autonomous control of the robot this year is exceedingly important due to the limited field of vision during play. The group firmly believes that a well designed and tested autonomous robot has a higher efficiency and potential than any tele operated controlled robot in field shown. Thus, we hope to achieve the goals below during a period of 4 weeks of programming.

- Elaborate aiming system for ball + plate attachment objectives with minimum human input. Whole procedure to be completed with 2 seconds.
- Comprehensive pickup procedure for both ball and plate, no human input. Whole procedure to be completed within 2 seconds.
- Movement assist for human player. Field oriented control, specified way points and visual aid.
- 2 objective completion during "sandstorm" period
- Fully autonomous level 3 climb procedure. Whole procedure to be done within 15 seconds

If time allows, the team hopes to complete the objectives below

- Cartesian robot positioning system
- Fully autonomous game, with human player acting as obstacle avoidance

在2019赛季，编程组将以自动为主，手动为辅完成游戏目标。今年的比赛视线遮挡对操作的影响较大，因此程序组认为今年一个被完善过的自动程序效率会比手动控制高。因此程序组希望在赛季4周之内完成以下工作：

- 自动发球放盘瞄准+实施，时间控制在两秒以内
- 自动收取系统实施，时间控制在两秒以内
- 手动控制辅助程序（场地定向驾驶等）
- 在"沙暴"阶段完成两个游戏动作
- 全自动爬升，控制在15秒以内

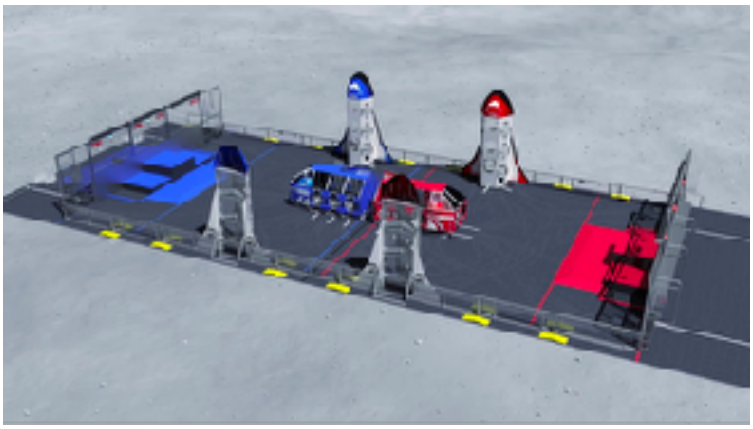
如果时间允许，我们将尝试完成以下功能最大限度优化效率

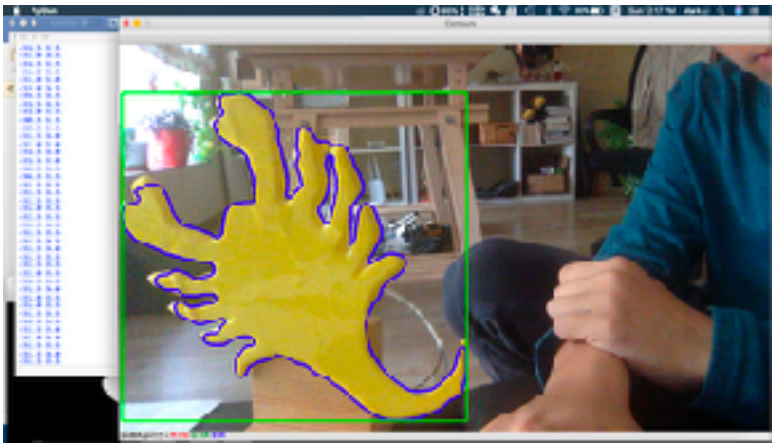
- 全场笛卡尔坐标系
- 全程自动控制，手动控制仅作为躲避障碍物的工具

方案 Method Proposal

The objectives above will be completed with the use of methods and technologies below.
2019目标将以以下的方案实行

1. **Vison processing 图像识别**





使用GRIP（OpenCV) 程序做程序编程，转制Python进行调整和修改，最终在协处理器Rasberry PI 运行，使用PyNetwork Table和RoboRio programming
Program formulated with GRIP, outputted to Python code for final adjustments and any further processing that is required, run on Raspberry PI that acts as a coprocessor to the RoboRio.

Communication will be achieved through PyNetwork Table.

2. 基于命令的OOP编程 Command Based Programming

使用WPILIB官方提供的Command Based 的编程结构，保证程序的整洁度和可读性

Take full advantage of command based programming from WPILIB

3. 运动轨迹计算 Trajectory and movement calculation

今年的重点，最后可延伸至全场x-y系统。在考虑之后帅选出两个方案。

1. 根据输入移动速度和时间猜测距离

难度低，实行快，准确率低，先完成当作备用方案以防万一

2. IMU + 编码器轨迹计算

依据4个轮编码器和IMU提供的角度，进过角度和速率计算最后通过Kalman算法提供精准度。

时间规划

Description	预估完成日期	最晚完成日期
Move Function (Time estimate / Front facing encoder calculated, no strafing)	24.1.2019	25.1.2019
White line detection + calculation	24.1.2019	25.1.2019
Aiming function	26.1.2019	27.1.2019
Advanced position calculation with updated move function	持续进行	持续进行
其他功能将在新机器搭建完成之后测试，可以在之前进行编程		