# 2019 Custom Team Plan

You need to prepare a written plan for 2019 with your current team, until such time as your team changes. Please work on this document in Dropbox so the coaches can check as you go along. Note that this plan may be used as documentation for international teams.

## Report

Each team must prepare the following items in a single report. Your report should be as detailed as possible.

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| **Section** | **Your report should cover:** | **Due Date for 1st Draft** |
| Design overview | List of major parts, including what specific component you intend to use  Per Robot   * 3 Plates and handle * 4 sets of GTF Wheels * 4 Maxons * 24 TSSPs * 24 Light Sensors on PCB (multiplexed 24 sensors to 1) * 1 IMU * 1 Teensy 3.5 * 1 Pixy 2 / Open MV * 1 Motor Controller PCB * 1 Battery * 1 Logic and TSSP mainboard PCB * 24 Individual TSSP PCB’s * 1 Power supply PCB * 4 LRF’s * LRF PCB on top of cone mirror   Robot structure and plate design  The robot will have a three plate design (3 plates and a handle for internationals to save weight). The light sensors, motors and motor controllers will be attached to the bottom plate. The battery will be stored between the middle and the bottom plate. The main PCB, TSSPs, IMU, Camera and Microcontroller will be secured on the middle plate. The top plate will hole our switches and handle (Handles will hold switches in ints robot).  Motor angles  45, 135, 225, 315  PCB plan  We will have one main PCB with all the components connected to it. This PCB will connect to the motors and sensors. It will be located in the centre of the robot so it is similar distance from all the sensors and motors.  Dribbler and kicker  We will aim to have a dribbler mounted at the front of the robot. It will be located inside the capture zone. This will result in a more reliable control of the ball.  Camera plan  We will have a cone mirror mounted above the camera. This will allow it to have a full 360 degree view. This will enable us to see both goals at the same time. This opens up opportunities for switching roles between attacker and defender.  Cartesian co-ordinate plan  We will use 4 distance measurement sensors on top of the 360 mirror to receive an exact x,y co-ordinate on the field. This will allow us to do some extra tactics to get past enemy goalies. This could also be used to allow the robots to avoid each other during a switch, potentially prioritising the path of the robot becoming an attacker or vice versa in different scenarios.  Materials  The materials we will be using are poly carbonate for the plates, some carbon fibre for the dribbler, carbon fibre rods with titanium nuts epoxied as standoffs, nylon nuts and bolts and metal nuts and bolts.  Wheels  We will use GTF wheels to allow full omnidirectional movement. This means that we are able to orbit the ball more efficiently and always face the direction of the goal.  Other | Thursday 18-Oct |
| Software plan | Changes and additional functionality to be made to 2018 software  We will develop Bluetooth communication between the robots to allow for in-game strategy. This means that we are able to have the robots switch roles during the game and always have a robot protecting the goal. In a game, there will be an attacker and a defender. If one robot gets taken off for damaged the Bluetooth modules will be disconnected. If this happens then the other robot will be told to become a defender if it isn’t already. Another way the Bluetooth will be useful, is when the defender has the ball in its capture zone, it will automatically become the attacker. This means that the attacker will become the defender, completing a ‘switch’. Another condition for a switch is if the attacker is behind the defender then it will become the defender and the other robot will become the attacker.  Another aim is to add a co-ordinate system of the field. This means that the robots will be able to be told a co-ordinate on the field and move to it. This means that if none of the robots can see the ball, it moves into a defensive formation to stop the other team from scoring a goal.  Code simplification and clean-up required  Not too much code simplification is required. This is because the code is very efficient and works reliably and accurately. Only fine tuning different PID values and orbiting values are required to make the robot even more accurate.  Other  We will also switch to using Visual Studio Code as a text editor rather than atom. We will also start to use the version controller Git so we are able to revert back to an older code if necessary.  I will also try and have as many functions that I can in libraries rather than the main.cpp. This means that all the code is more separated and spread throughout all the folders, rather than being in one file. | Thursday 18-Oct |
| R&D plan | Identify things that need further research  We need to research different types of distance sensors to use on our robots. We need to find a distance sensor that does not interfere with IR sensors and is accurate and reliable.  List items you would like to test and try – hardware and software  We would need to test the different types of distance sensors to make sure that they are accurate and do not interfere with IR sensors. We will need to test different types of cameras so we can find the fastest and most accurate camera. We would need to test the different types of dribbler rollers and see which one held the ball the best (this could be simplified by making all dribbler rollers fit the same assembly). | Thursday 18-Oct |
| Risk management | Identify the greatest risks to your project. What is most likely to fail?  The thing that is most likely to fail is the main PCB. This is because it has most of the components of the robot and if one thing is slightly wrong, the whole robot will break.  Identify steps you will take to manage these risks and make your robots more reliable  To fix this issue we will need to make everything as simple as possible and even consider moving some of the components of the main PCB and onto other, smaller PCBs. | Thursday 18-Oct |
| LW to Open Transition Plan (team TBC) | Explain how you will modify or rebuild LW international robots in time for states and nationals.  We wouldn’t really need to rebuild the robot to transition into open. All we would need to do is rebuild the mirror and remove the TSSPs.  For the software side, the ball angle calculations would change. This is because the camera is only used to calculate the ball direction. This will mean that a more accurate co-ordinate system will be required because the robot will not always see the ball. | Thursday 25-Oct |

## Project Management Plan

Each team must create a project management plan. This can be done in either GanttProject or with the existing Excel *Task Management* sheet.

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| **Section** | **Your plan should cover:** | **Due Date** |
| Project management plan | Job allocation – leave this blank until teams are announced  We would try and split the jobs in the team to software, testing, design, hardware and electronic. We would try and split the work load evenly between the team members.  Create a project timeline   1. We need to make a list of all the parts that we will definitely be using on our robots and make sure that there are enough of them for us to use. If not we will need to order them before the end of term 4. 2. We then have to design the robot and the electronics before the end of 2018. 3. We will then order all the parts that we haven’t already ordered at the start of 2019. 4. After our parts arrive, we will aim to have the robot built by the middle of March, preferably middle of February. 5. This leaves us over two months to test the robot and to solve and hardware or software issues that may arise. | Monday 22-Oct |

## Draft Parts List

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| **Section** | **Explanation** | **Due Date** |
| Parts list with cost and weight estimates | Complete a parts list using the 2019 order sheet template. A weight estimate should be included, including for Open div. and except for maze   * Handle   + Switches (Button switches) * Middle Plate   + Logic Board     - Connectors (Flat Flex Ribbon cable)       * Light sensor       * TSSP’s       * Quad distance sensors       * Motor controller     - Camera (Pixy 2 / Open MV)     - Micro-controller (Teensy 3.5)     - IMU (MPU9250)     - Bluetooth module (HC05)   + TSSP PCB x 24     - TSSP (TSSP 58038)     - Connector (Flat Flex Ribbon cable) * Base Plate   + Base Plate PCB     - 4 x Motor controllers (probably VNH7100BASTR)     - Connector (Flat Flex Ribbon cable)     - 24 LED’s     - 24 Light Dependant Transistors       * Multiplexer to convert 24 sensors to 1 analogue port     - Connector (Flat Flex Ribbon cable)   + 4 x Maxon DCX 19 12V 16:1 | You decide this in your project management plan |