Our Journey Through Virtual Skills

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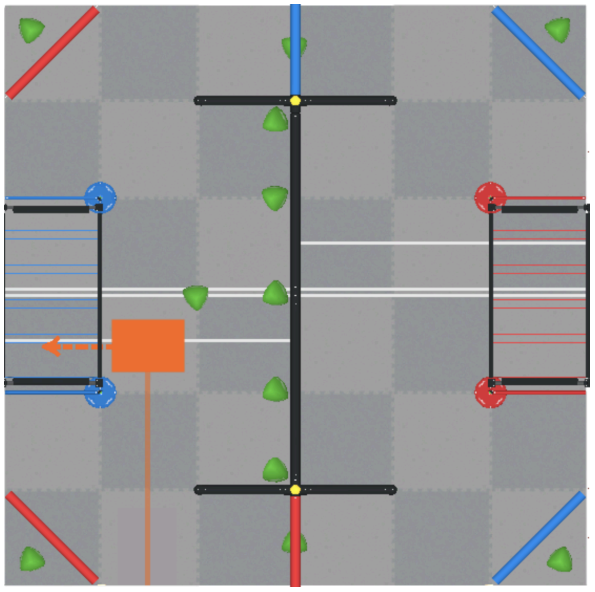
Our Autonomous Skills Routine

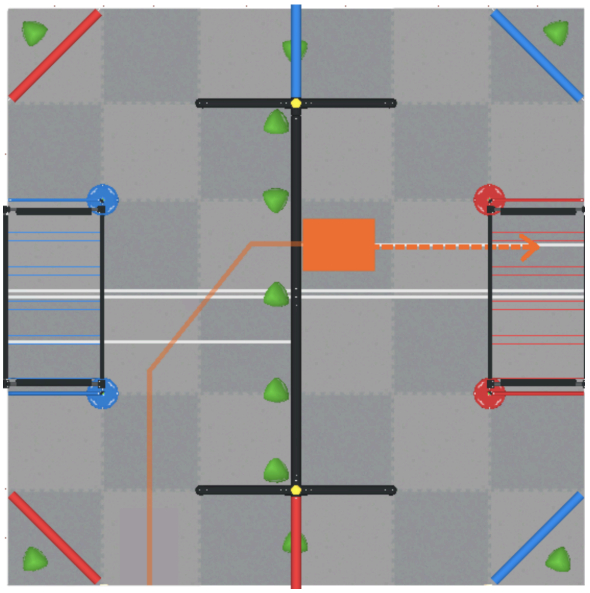
Score Both Red Tribals into the goal by starting with a preload and moving to the location of the second preload and pushing both in simultaneously

```
MoveToPoint -28 -10 false
TurnToAngle -90
ScoreTribal
```



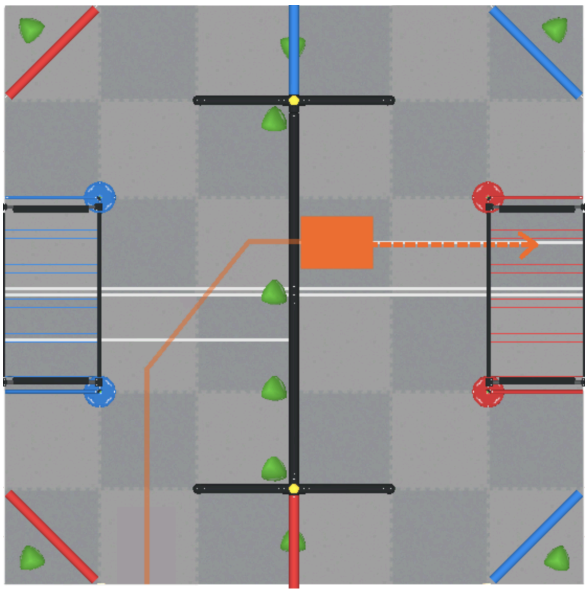
Picks up a tribal and jumps over the bar while outtaking to score the tribal into the net

```
MoveToPoint -12 13.5 false
PickUpTribal
TurnToAngle 90
ScoreTribal
MoveToPoint 12 GPS position Y in inches false
MoveToPoint -14 GPS position Y in inches true
```



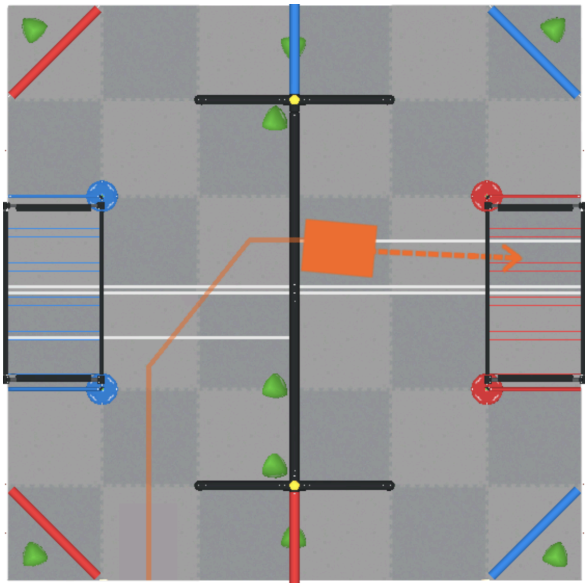
Goes Back To pick up another tribal onto the bar, turns and picks it up, and then faces the goal and jumps over the barrier again while outtaking to score the tribal

```
MoveToPoint 12 GPS position Y in inches false
MoveToPoint -14 GPS position Y in inches true
PickUpTribal
TurnToAngle 15
ScoreTribal
MoveToPoint 12 GPS position Y in inches false
MoveToPoint -12 GPS position Y in inches true
```



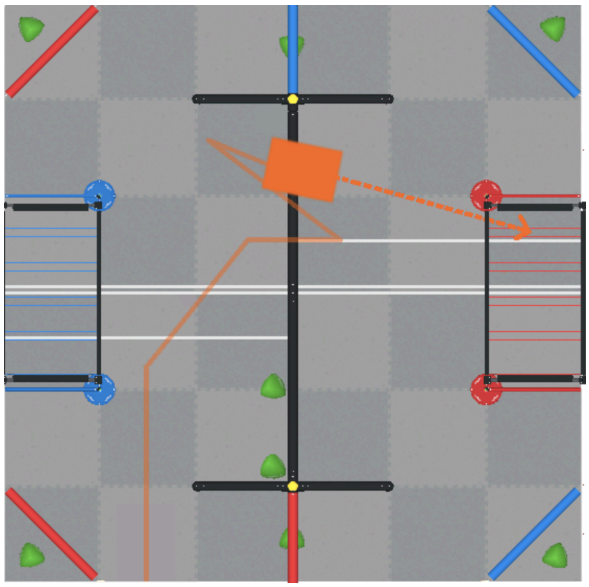
Goes backwards, turns to face tribal while intaking, then turns back to face the goal and scores the tribal while going over the center barrier

```
PickUpTribal
TurnToAngle 165
TurnToAngle 90
TurnToPoint 12 GPS position Y in inches + -2 false
ScoreTribal
MoveToPoint 12 GPS position Y in inches + -2 false
```



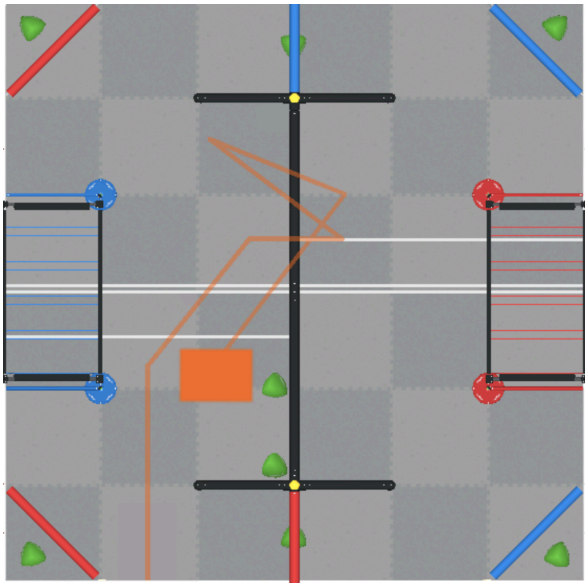
Turns and goes backwards to get closer to corner tribal, then turns to pick up tribal, and turns back to face the goal and score tribal while travelling over the center bar

```
MoveToPoint -16 35 true
PickUpTribal
TurnToAngle 30
TurnToPoint 12 GPS position Y in inches - 10 false
ScoreTribal
MoveToPoint 12 GPS position Y in inches - 10 false
```

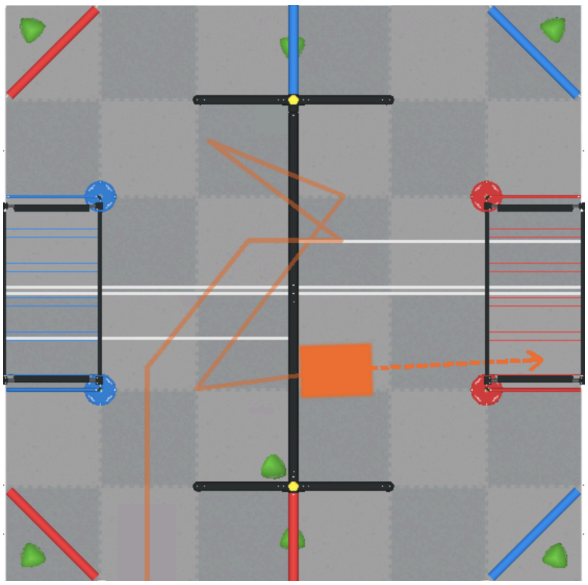


Travels backwards to go towards the last two tribals left on the left side of the center bar.

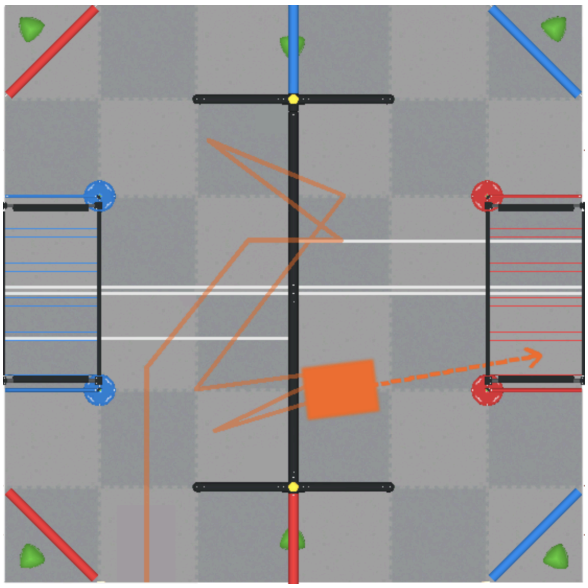
```
MoveToPoint -16 -21 true
PickUpTribal
TurnToAngle 110
```



```
Picks up closest tribal and faces the net to score it while travelling over the center bar
PickUpTribal
TurnToAngle 110
TurnToPoint 12 GPS position Y in inches + 2 false
ScoreTribal
MoveToPoint 14 GPS position Y in inches + 2 false
```

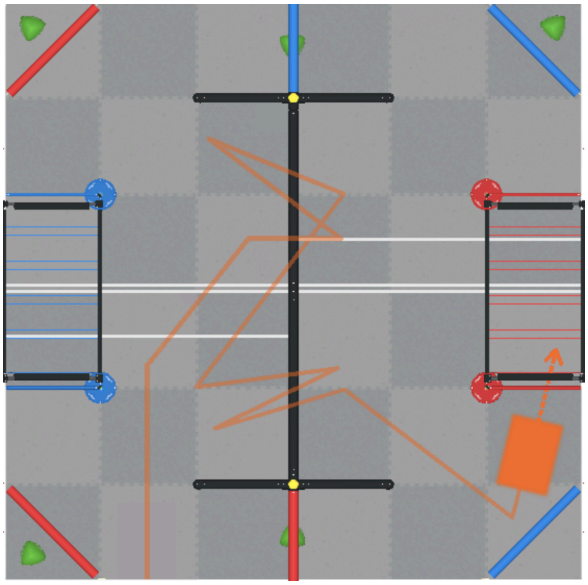


```
Goes back to intake the last tribal and scores it while travelling over the center bar
MoveToPoint -15 -30 true
PickUpTribal
TurnToAngle 135
ScoreTribal
MoveToPoint 14 GPS position Y in inches + 7 false
Done Shooting All tribals
```



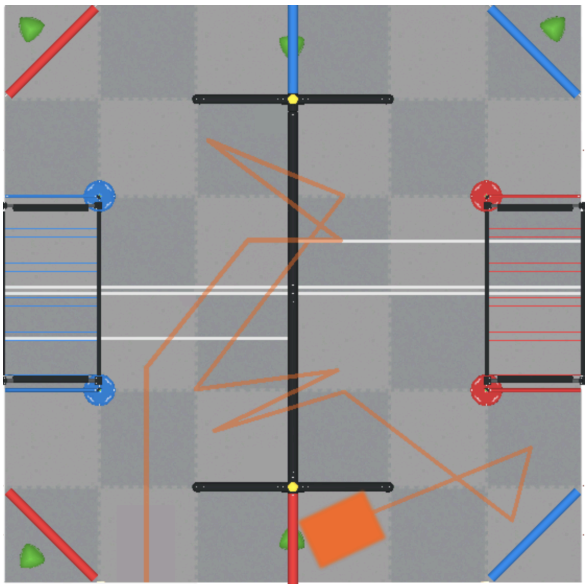
Turns towards the close right corner and picks up a starting tribal from the match load zone. Then faces the net and moves forward while outtaking to score it into the goal.

```
TurnToPoint 55 -55 false
PickUpTribal
MoveToPoint 55 -55 false
TurnToPoint 58 -35 false
ScoreTribal
MoveToPoint 58 -35 false
```



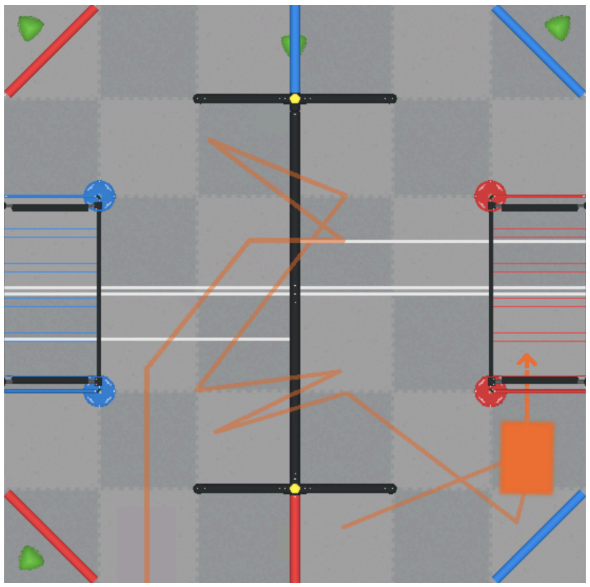
Goes to pick up tribal from under the close horizontal elevation pole

```
TurnToPoint 6 -30 false
PickUpTribal
```



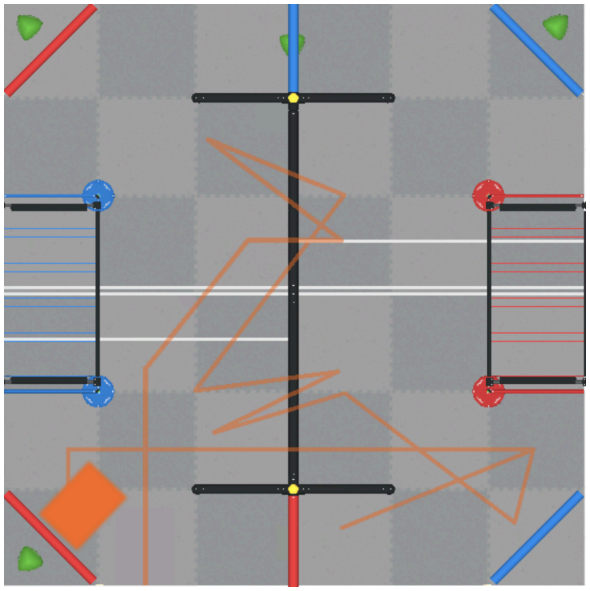
Goes back and scores the tribal from the right side of the goal

```
MoveToPoint 6 -60 false
MoveToPoint 58 -35 true
TurnToAngle 0
ScoreTribal
```



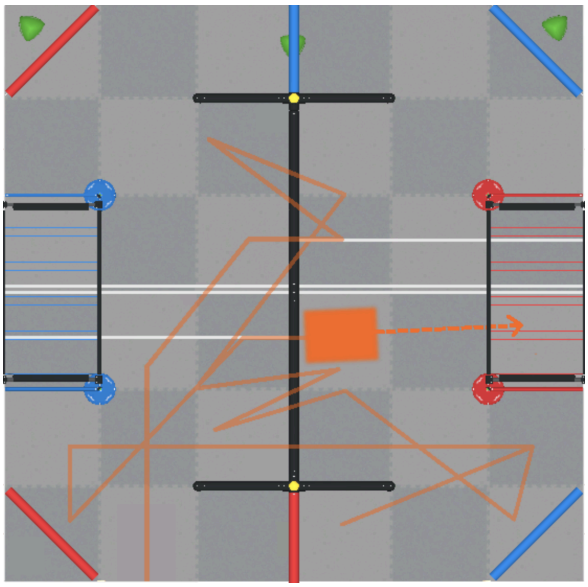
Goes back to the close match load zone to start match loading tribals

```
MoveToPoint -55 -50 true
PickUpTribal
```



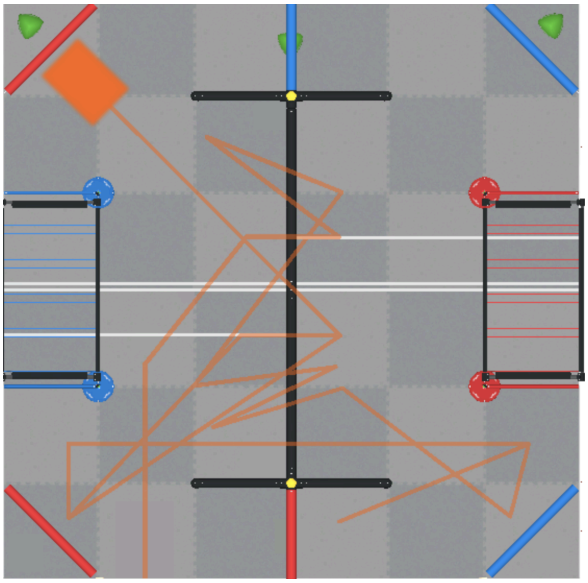
Picks up a tribal from the match load zone, then goes towards the center bar and outtakes while travelling over. This "shoots" the tribals into the net. It repeats this three times

```
repeat 3
    TurnToPoint -55 -55 false
    PickUpTribal
    MoveToPoint -55 -55 false
    MoveToPoint -14 -10 true
    TurnToPoint 14 GPS position Y in inches false
    ScoreTribal
    MoveToPoint 14 GPS position Y in inches + 0 false
Done Match Loading
```



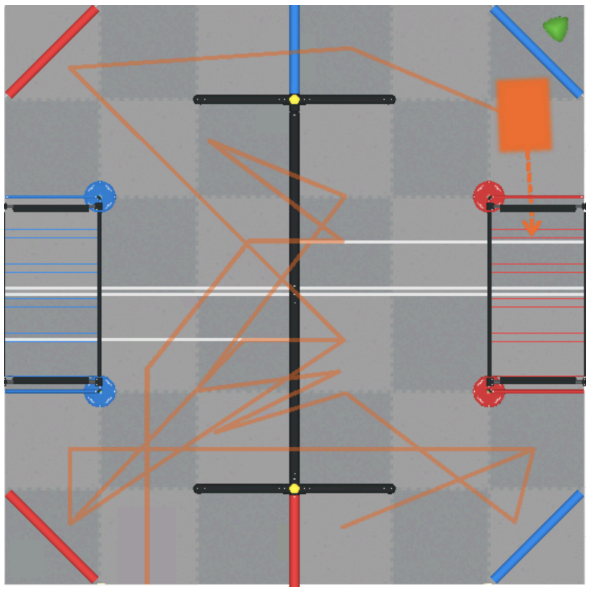
Goes towards the far match load zone and intakes one tribal

```
TurnToPoint -55 55 false
PickUpTribal
```



Goes under the far horizontal elevation pole, while carrying a tribal. It pushes one tribal into the red offensive zone, and the scores the tribal it's carrying into the left side of the red goal.

```
MoveToPoint -55 55 false
MoveToPoint 10 60 true
MoveToPoint 56 40 true
TurnToAngle 179
ScoreTribal
```



It then finally moves backwards, turns, and picks up a starting tribal from the far match load area. It then turns around, and scores the last tribal

```
MoveToPoint 55 55 true
PickUpTribal
TurnToAngle 45
MoveToPoint 56 35 false
TurnToAngle 180
ScoreTribal
```

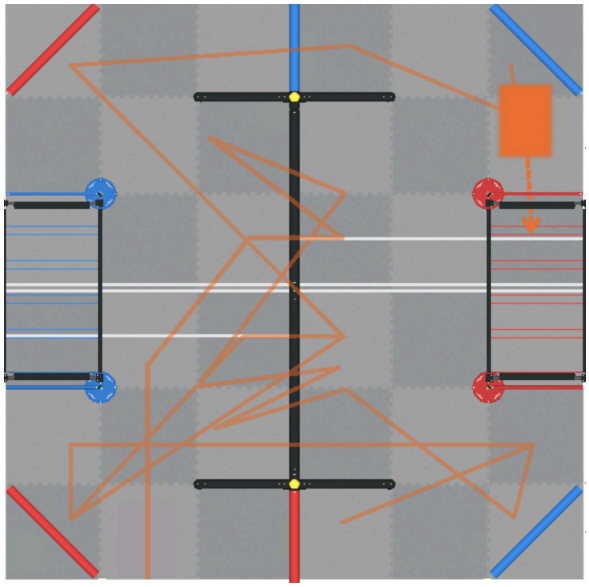
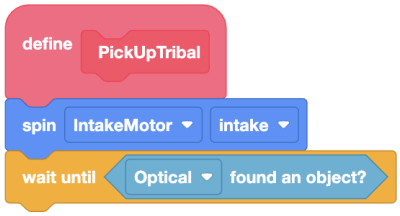
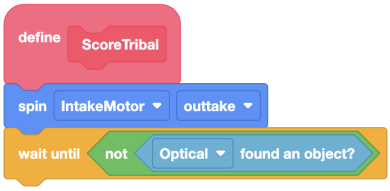
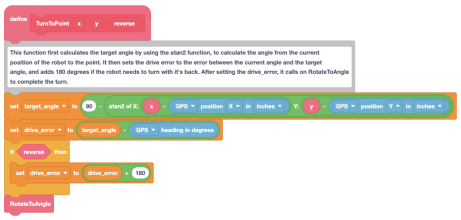
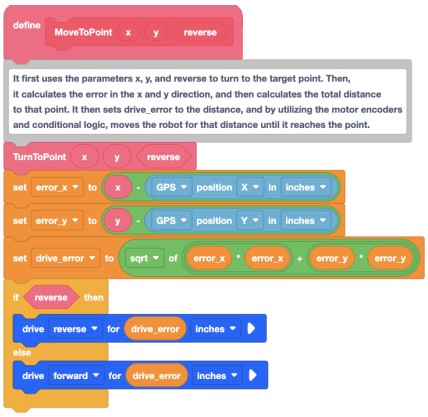


Table of Functions

Function	*Parameters*	*Explanation*
	None	This function is used to pick up a tribal. It starts by spinning the intake, and waiting until the optical sensor finds an object(tribal). It then recognizes that it found a tribal, and returns to the main program to continue the skills routine.
	None	This function is used to score individual tribals into the net. It starts by outtaking the intake, and waiting until the optical sensor no longer sees a tribal, indicating it has been scored.
	None	This function uses no parameters, and instead uses the variable drive_error to determine how far off it's target it is. It then finds the fastest way to it's target using conditional logic, and then either turns left or right until it reaches its goal.
	angle - This is a user given value used to determine the target angle	This function first sets the drive_error to the difference between the target angle, and the current angle given by the gps. It then uses the RotateToAngle which calculates the fastest path to that angle, and executes the drive command.

	X - The X coordinate of the target which the robot should turn towards Y - The y coordinate of the target which the robot should turn towards Reverse - A boolean to determine whether the robot should face the target forwards or backwards.	This function first converts the target (X, Y) coordinate into a target angle by determining the difference in both the x and y axis, and using the ATAN2 function to get the angle of the vector. It then sets the drive_error to the difference between the target_angle and the current angle, and utilizing conditional logic, it determines whether to add 180 degrees to reverse the robot's target angle. It then uses the RotateToAngle command to determine the fastest path there, and executes the drive command.
	X - The X coordinate of the target which the robot should turn and move towards Y - The y coordinate of the target which the robot should turn and move towards Reverse - A boolean to determine whether the robot should arrive at the target forwards or backwards.	This function first runs the TurnToPoint command and gives the X, Y, and reverse parameters to it. It then calculates the distance from its current position to the target position by calculating the error in both axes, and using the pythagorean theorem to find the length of the hypotenuse. After this, it uses conditional logic to determine whether to go backwards or forwards for the distance determined by the drive_error.

Robot Analysis

Robot Functions	
Capable to intake/outtake tribals	Yes, there is one motor dedicated to intaking and outaking tribals!
Capable to drive	Yes, utilizing two motors, we are able to turn the robot, and drive the robot. However, we cannot do both functions in one single motion. The speed is 4 feet every second.
Capable to hang	No, unfortunately this robot is unable to hang.
Sensors	
GPS Sensor	This sensor allows us to determine our position on the field as (x, y) coordinates, and the current heading of the robot in degrees.
Optical Sensor	This sensor allows us to detect whether a tribal is currently in the intake and the color of the tribal.
Rotation Sensor	This sensor allows us to determine the position of the arm. Using this information we can move the arm to any position accurately.