

# Gavin and Kayden's Portfolio

Of their robotics notebook



# Before receiving new REV hub, research

- Links

<https://docs.revrobotics.com/rev-control-system/control-system-overview/control-hub-basics>

<https://youtu.be/oQ08AfG99dQ>

<https://youtu.be/UIF0UYBIItk>

<https://youtu.be/YdgaknRQvKQ>

<https://youtu.be/-AFzXnqPH80>

[https://youtu.be/q\\_75hOKq2xs](https://youtu.be/q_75hOKq2xs)



# Summary of research and other discoveries



- Summary

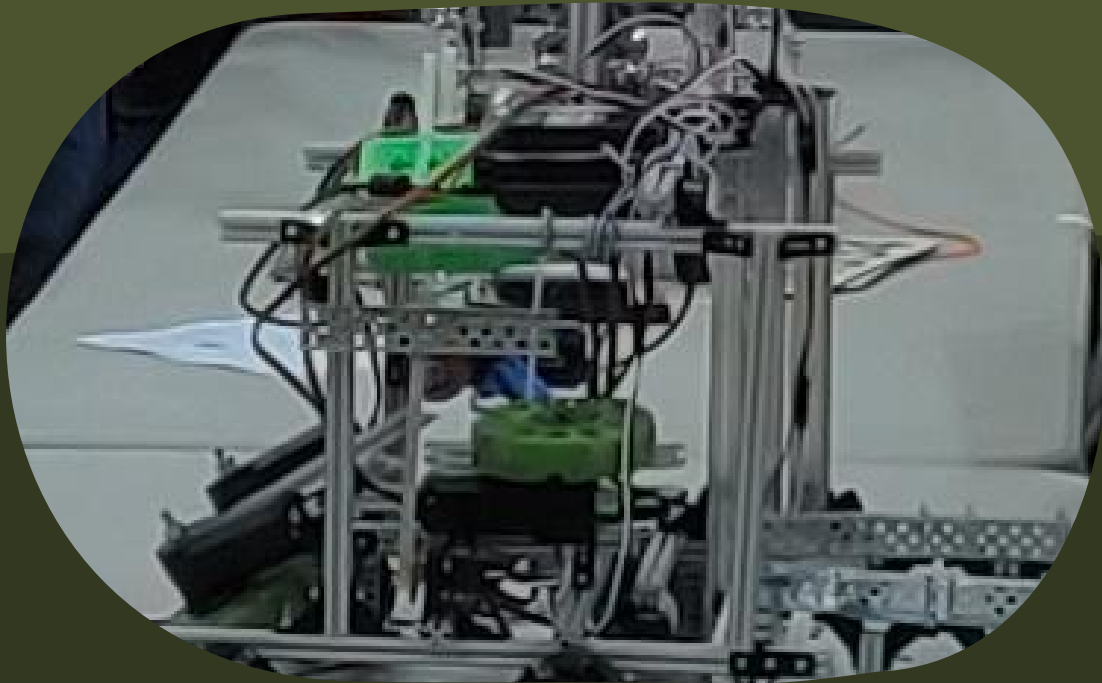
The new FTC Control Hub connects to one phone and has many more ports built-in for new possibilities.

- External USB Camera possibilities
- Built-in Android OS
- Programmed wirelessly or through a USB-C Cable
- Can be daisy chained to other Expansion Hubs

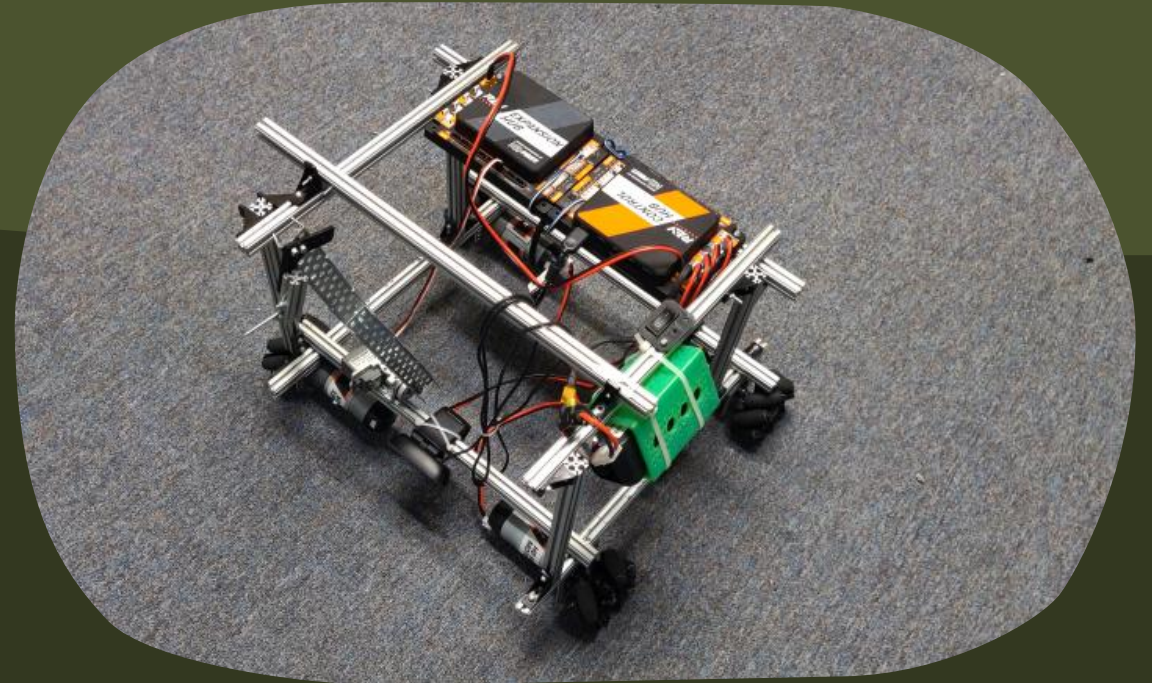
# Attaching Hubs and simplifying old robot

- Took apart some of the old robot and moved some things around as a test bot
- Attached new Control Hub and chained expansion hub
- Added temporary arm for programming Auto

Before



After






# Programming

- Attached USB Camera
  - <https://github.com/FIRST-Tech-Challenge/SkyStone/wiki/Using-an-External-Webcam-with-Control-Hub>
- Learned about Vuforia from an FTC team
  - <https://youtu.be/1712u-KmE6I>




# Troubleshooting FTC phone app


- Had some trouble connecting the hubs to each other, contacted a FIRST member on discord.

 **Kayden - FTC 14994** 11/14/2020  
Hi, when I'm trying to connect to a Control Hub and Expansion Hub, I get this error message:

Error: An Expansion Hub is configured with address 173, which is reserved for the Control Hub. You need to change the Expansion Hub's address, and make a new configuration file.

can anyone help?

 **NPE | OpenFTC Developer** 11/14/2020  
**@Kayden - FTC 14994** Well the error message seems to be pretty self explanatory  
Just follow the directions I guess

 **Kayden - FTC 14994** 11/14/2020  
I tried to change the address, and it fails every time

The conversation went on for a while, until we found that resetting both Hub's addresses fixed the issue. Gavin then began to program

 **Noah | Tech Team | OpenFTC** 11/14/2020  
**@Kayden - FTC 14994** what do you mean that's the default address?  
In the REV Hub Interface?

 **Kayden - FTC 14994** 11/14/2020  
Are you talking about the rev client on desktop?

 **Noah | Tech Team | OpenFTC** 11/14/2020  
no, the REV Hardware Client is different

 **Kayden - FTC 14994** 11/14/2020  
I'm not sure what the Hub interface even is


 **Noah | Tech Team | OpenFTC** 11/14/2020  
But the REV Hub Interface is also a desktop app

 **Kayden - FTC 14994** 11/14/2020  
I will install it

 **Noah | Tech Team | OpenFTC** 11/14/2020  
What did you mean when you said 173 was the default address

 **Kayden - FTC 14994** 11/14/2020  
When I scan for hardware on the robot controller app the hub is called expansion hub 173

 **Noah | Tech Team | OpenFTC** 11/14/2020  
Gotcha

 **Noah | Tech Team | OpenFTC** 11/14/2020  
**@Kayden - FTC 14994** also, have you tried just making a new configuration file?

10:05 PM  
Is it possible that you set the address to 173 using the REV Hub Interface?  
That seems unlikely. When I wrote that error message, I didn't expect anyone to actually see it.  
So this may indicate a software bug.

```

useCompetitionFieldTargetLocations false
Set min confidence threshold to 0.7
call TensorFlowObjectDetectionUltimateGoal . initialize
    minimumConfidence 0.7
    useObjectTracker true
    enableCameraMonitoring true
Initialize TFOD before waitForStart.
call Telemetry . addData
    key " > "
    text " Press Play to start "
call Telemetry . update
set TargetHeightRatio to 0.57
Wait for start command from Driver Station.
call asdf . waitForStart
call TensorFlowObjectDetectionUltimateGoal . activate
Enable following block to zoom in on target.
set RingStackFound to false
repeat while
    call asdf . opModelsActive and not RingStackFound
do
    Put loop blocks here.
    call TensorFlowObjectDetectionUltimateGoal . getRecognitions
    call Telemetry . addData
        key " Object Recognized "
        text length of recognitions
    if length of recognitions > 0
    do
        set RingCount to 1
        for each item recognition in list recognitions
        do
            if RingCount = 1
            do
                set ObjectAngle to call Recognition . estimateAngleToObject
                    recognition recognition
                    angleUnit AngleUnit DEGREES
                call Telemetry . addData
                    key " estimate angle "
                    text ObjectAngle
                if ObjectAngle > 0
                do
                    call Telemetry . addData
                        key " Direction "

```

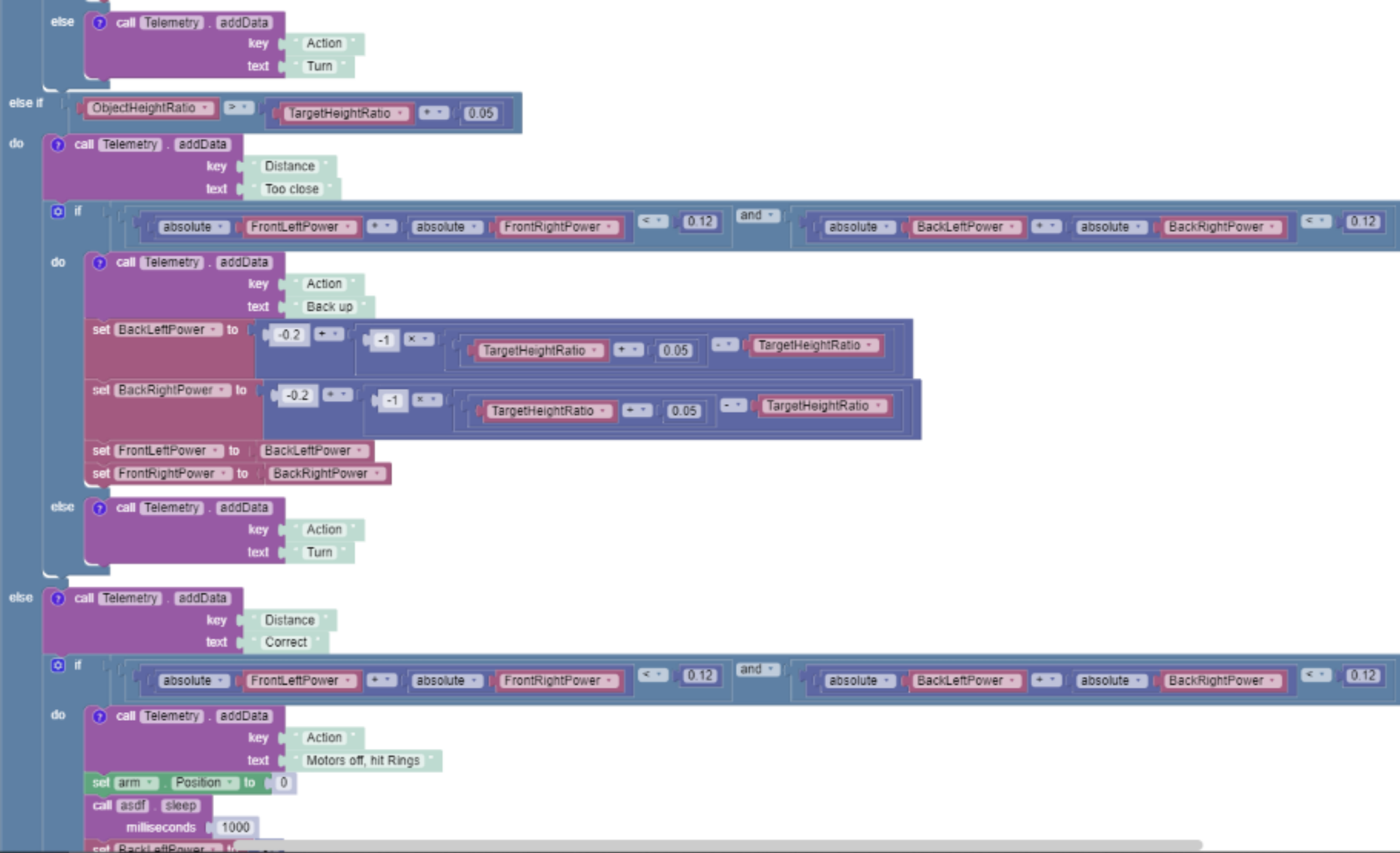
Gavin made the program. Before this autonomous one, he programmed the mecanum drive.

else  
    call Telemetry . addData  
        key    Direction  
        text   Left  
  
set FrontLeftPower to 1 \* ObjectAngle - 35  
set BackLeftPower to 1 \* ObjectAngle + 35  
set FrontRightPower to -1 \* ObjectAngle + 35  
set BackRightPower to -1 \* ObjectAngle + 35  
  
set PixelHeight to Recognition . ImageHeight  
                  recognition  
set ObjectHeight to Recognition . Height  
                      recognition  
set ObjectHeightRatio to ObjectHeight + PixelHeight  
  
call Telemetry . addData  
    key    HeightRatio  
    number ObjectHeightRatio  
  
if ObjectHeightRatio < TargetHeightRatio - 0.05

do  
    call Telemetry . addData  
        key    Distance  
        text   Not close enough  
  
    if  
        absolute FrontLeftPower + absolute FrontRightPower < 0.2 and absolute BackLeftPower + absolute BackRightPower < 0.2  
    do  
        call Telemetry . addData  
            key    Action  
            text   Forward  
  
        set BackLeftPower to 0.2 + 1 \* TargetHeightRatio - 0.05 - ObjectHeightRatio  
        set BackRightPower to 0.2 + 1 \* TargetHeightRatio - 0.05 - ObjectHeightRatio  
  
        set FrontLeftPower to BackLeftPower  
        set FrontRightPower to BackRightPower

recognition  
create text with  
Recognition . Bottom  
recognition recognit





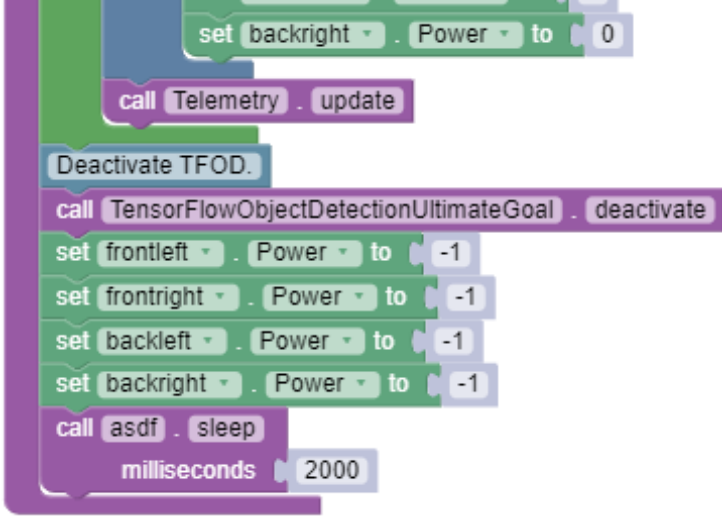
set BackLeftPower to -1  
set BackRightPower to -1  
set FrontLeftPower to -1  
set FrontRightPower to -1  
set RingStackFound to true

else  
call Telemetry . addData  
key " Action "  
text " Turn "

call Telemetry . addData  
key " Back Left Power "  
text BackLeftPower  
call Telemetry . addData  
key " Back Right Power "  
text BackRightPower  
call Telemetry . addData  
key " Front Left Power "  
text FrontLeftPower  
call Telemetry . addData  
key " Front Right Power "  
text FrontRightPower  
set frontleft . Power to FrontLeftPower  
set frontright . Power to FrontRightPower  
set backleft . Power to BackLeftPower  
set backright . Power to BackRightPower  
break out of loop

if RingStackFound = false

do  
call Telemetry . addData  
key " Status "  
text " No Rings "  
call Telemetry . addData  
key " Action "  
text " Back up "  
set frontleft . Power to 0  
set frontright . Power to 0  
set backleft . Power to 0



# Program

- The following slides explain the program and this line specifically:



A Scratch code block with a pink background and a notch at the top. It contains the text "set TargetHeightRatio" in a light pink rounded rectangle, followed by "to" in white, and a blue rounded rectangle containing the value "0.57".

```
set TargetHeightRatio to 0.57
```

# Explanation of TargetHeightRatio

- TargetHeightRatio is the ratio of actual Rings to the Image displayed through the camera. Tweaking this and moving the USB camera's location on the robot solved our issue.
- Below are some videos of the robot driving to the rings
- [https://careeracademysb-my.sharepoint.com/:v:/p/s\\_kayden\\_howard/EYemhQjLqllDpO0JueXbw-UBE1oL7kvwi5LPDvTy-6pubg](https://careeracademysb-my.sharepoint.com/:v:/p/s_kayden_howard/EYemhQjLqllDpO0JueXbw-UBE1oL7kvwi5LPDvTy-6pubg)
- [https://careeracademysb-my.sharepoint.com/:v:/p/s\\_kayden\\_howard/EW\\_VY0llnzpPvvtq1qLbE1wBuXM4jo0EHs6a6wYPqk9CWA](https://careeracademysb-my.sharepoint.com/:v:/p/s_kayden_howard/EW_VY0llnzpPvvtq1qLbE1wBuXM4jo0EHs6a6wYPqk9CWA)





# Next things to-do

- Program arm for simple ring pick-up
- Create a mount for the USB camera
- Make a final decision on the location of the camera on the robot
- Make a similar program for the Wobble game piece.