WATCHDAWG

REEFSCAPE℠

User Manual

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OVERVIEW

- Dawgma's scouting system provides a front end data collection application (*WatchDawg*) on Android Amazon Fire 7 tablets, as well as back-end Microsoft Excel driven data analysis
- *WatchDawg* allows teams to record quantitative robot data during competition as well as qualitative pit scouting and export that data as a csv file and/or a QR code
- The spreadsheet allows teams to store data of all teams in one location, easily view that data for match strategy insights, and compare teams across various metrics with visualization
- Teams can transfer data from the match strategy worksheet (in the excel spreadsheet) to a physical match strategy sheet, which can then be handed to drive teams

LIST OF MATERIALS

- Laptop that can run Microsoft Excel
  - x1
- 2D Barcode Scanner
  - x1
  - Description: A barcode scanner is an optical scanner that can read printed bar or QR codes, decode them, and print the resulting information. It must be connected either wirelessly or wired to your laptop and must be able to read QR codes, as opposed to just barcodes.
- Amazon Fire 7 Tablets (the Amazon Fire 7 2022 should work as well)
  - x7 (6 for use, 1 for backup)
  - Description: A tablet is a small, touchscreen computing device that is intended to be portable, yet with more processing capabilities than the average smartphone. Amazon Fire tablets were developed in 2011 as a replacement for the Kindle Series. The tablet featured a low price point that was attractive to many consumers. The series is currently in its 7th Edition, which is what our system is designed to use.
- Tablet Cases (optional)
  - x7 (6 for use, 1 for backup)
  - Description: A tablet case is a protective attachable layer designed for a tablet computer. It can provide protection against drops. The tablet case must be able to fit the Amazon Fire 7th series.
- Screen Protectors (optional)
  - x7 (6 for use, 1 for backup)
  - Description: A screen protector is a thin layer of protective material applied to the touchscreen of the tablet. It is not intended to be removed, but must occasionally be replaced after a large incident. The protector must fit the Amazon Fire 7th series screen.
- Portable charger (optional)
  - x3
  - Description: A portable charger is an energy storage device that can transfer electric power into another device. This can be used to recharge the tablets during a competition, without relying on electrical outlets. The tablet's battery life is powerful enough that this is not necessary, but a backup is always smart.

SCOUTING APP

Setting up your tablets

- ➢ Follow set-up instructions given by the tablet
- ➢ Download the app "WatchDawg" from the Amazon Fire Store
  - If that is unavailable, follow github download instructions
  - To download the app from github first download Android Studio
  - Clone the github repository found on the Dawgma 1712 website
  - Enable developer options on your Amazon Fire Tablets
- ➢ Open "Device options"
- ➢ Open "About Fire Tablet"
- ➢ Tap your serial number 7 times
- ➢ A new menu should appear in settings called “Developer Options”
- ➢ Open Developer Options, toggle it on
- ➢ Scroll down and find "USB debugging", toggle it on
- ➢ Plug in Micro-usb to laptop and tablet
- ➢ Click the "Run" button

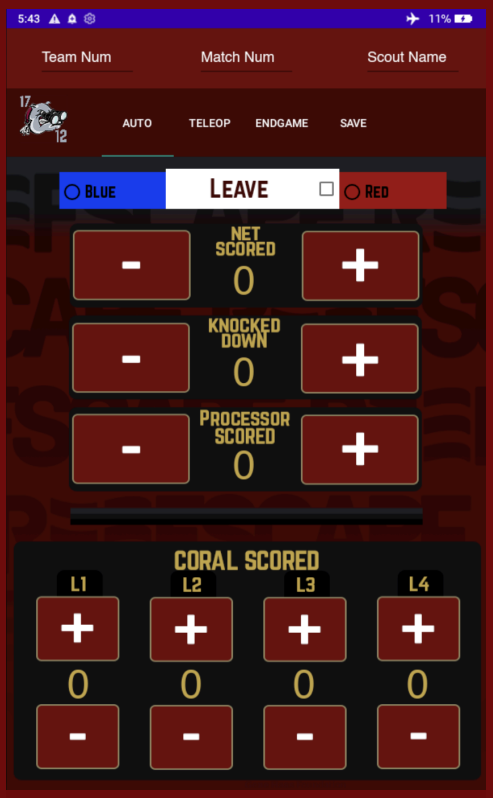
Repeat this process for all tablets

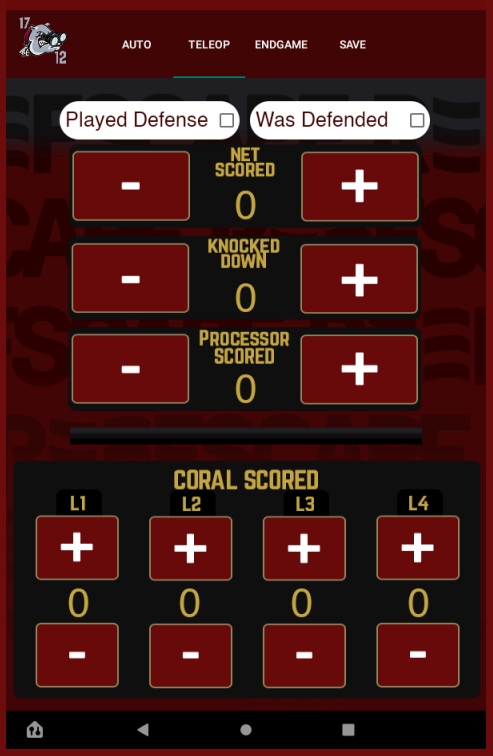
FRONT PAGE

- ➢ First page loaded when the app is opened
- ➢ Gives the option for either Match or Pit Scouting

Match Scouting

- ➢ Once the match scouting layout opens, enter the team number of the robot being scouted, and the match number, and your name
- ➢ To switch between tabs simply swipe right or left, or press the tab that you wish to switch to



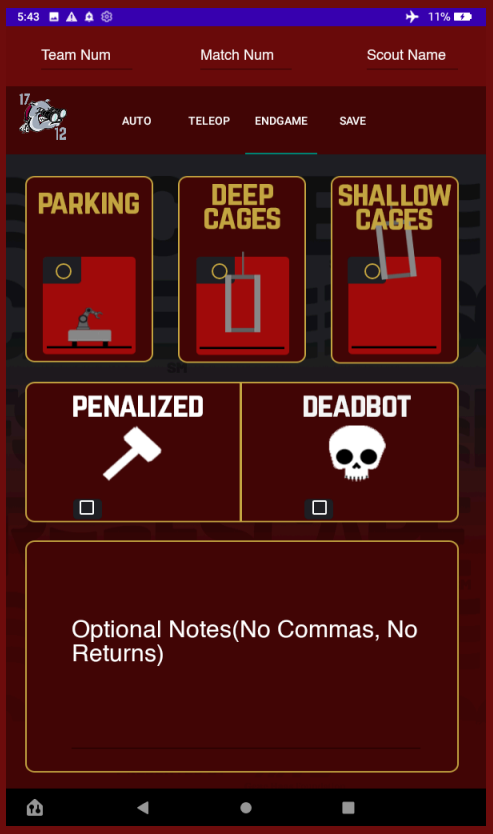


❖ AUTO

- ➢ Note the alliance the robot is on
- ➢ Observe if the robot left the alliance zone
- ➢ Observe how many Algae the robot knocked down from the reef
- ➢ Observe the number of Algae the robot scored in the processor and/or net
- ➢ Observe the number of Coral the robot scored at each level (L1, L2, L3, L4)
- ➢ Press (-) to decrease and (+) to increase
- ➢ Numbers persist after switching tabs

❖ TELEOP

- ➢ Observe the same conditions as auto
- ➢ Also Check for the following conditions:
  - ○ Played Defense
  - ○ Was Defended



❖ ENDGAME

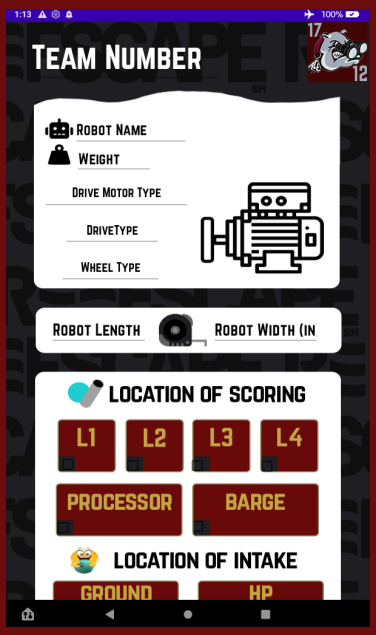
- ➢ Check the box that represents the final state of the robot. If none are applicable: leave them blank.
  - ○ **NOTE: Only press one checkbox**
- ➢ If the robot died at any point during the match, press "**Dead Bot**"
- ➢ If the robot committed a penalty during the match, press "**Penalized**"
- ➢ Write down any additional relevant information

❖ SAVE DATA

- ➢ Press **"SAVE FILE"** to download a csv file of match data (this is just for backup). To access this file, plug the tablet into your computer, open your file explorer, the tablet's hard drive should appear. Open that and the file will be in the downloads folder. The file is automatically named according to the match and team number.
- ➢ Press **"Generate QR"** to generate a QR code for data transfer. This must be created (and scanned) before starting a new match or else the data will not be saved.
- ➢ Press **"New Scout"** to return to the home screen

Pit Scouting

- In Pit Scouting, scouts go to other team's pits and ask questions about the robot. This offers the opportunity for additional information such as weight, auto routines, and drivetrain type to be entered into the system, providing additional information
- Pit Scouting should be done either before the matches start, during breaks, or with additional tablets



❖ Questions to ask

- Weight without bumpers and battery?
- Drive motor type? (Falcon 500s, Neos, etc)
- Number of drive motors?
- Drive type? (Swerve, tank, etc)
- Wheel type? (Mecanum, omni, etc)
- Robot length and width?
- Where does the robot score from?
- Coral or Algae?
  - (Preferences, issues, method, etc)
- Intake method?
- Ability to climb ?
  - (Can fit multiple robots on the chain?)
- Climb features?
- Auto routines?
  - (How many pieces during)
- Any additional special features?
- Robot name?

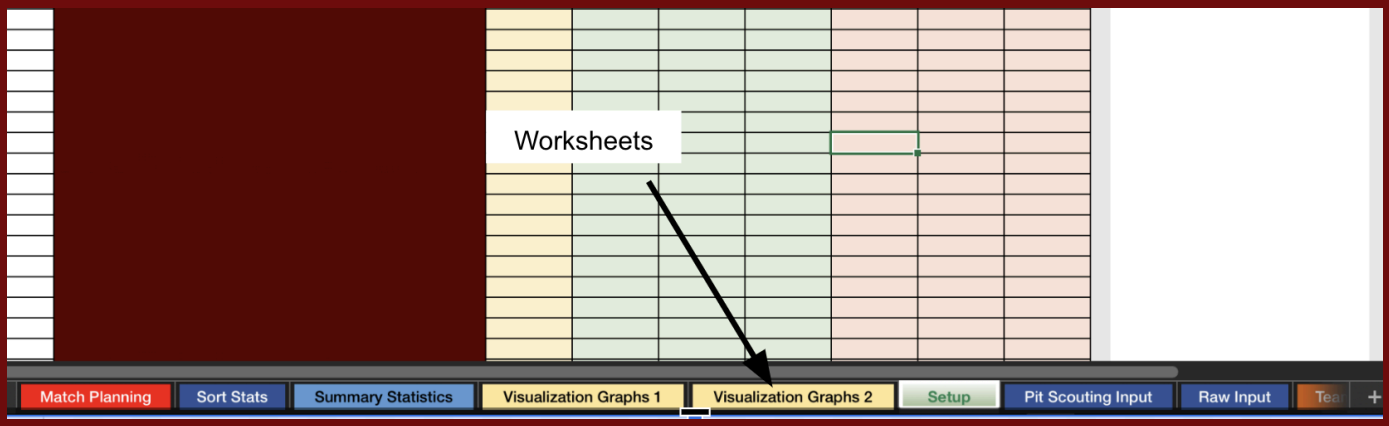
❖ Saving method

- Pressing the save button saves the QR code image file to the tablet Downloads folder. This allows multiple QR codes to be saved at once
- To access, go through the Files app and scan all the saved QR codes.

SCOUTING SPREADSHEET

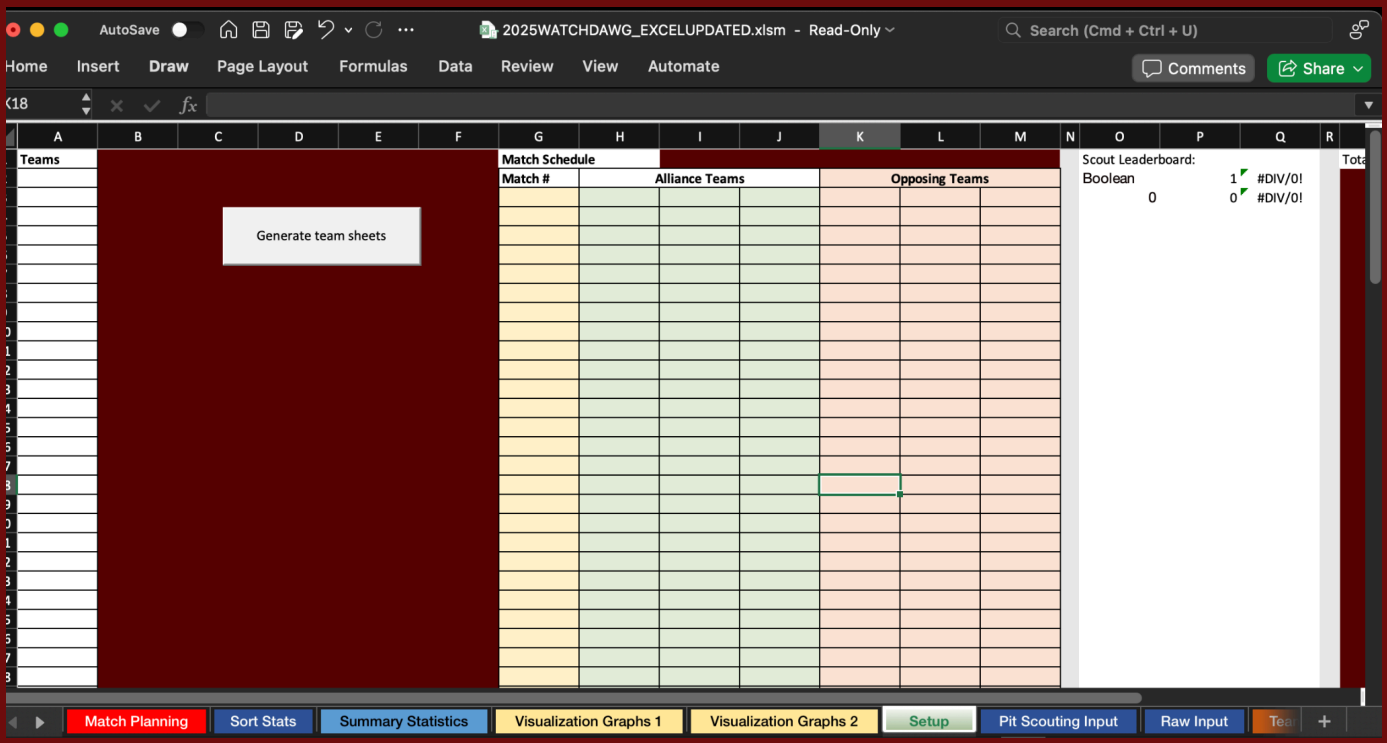
❖ Overview

The spreadsheet is where all collected data is compiled, stored, and analyzed. Data is scanned into the “Raw Input” sheet and is then automatically sorted into individual Team Sheets which analyze the data, and store their analysis in “Summary Statistics.” “Sort Stats” and “Visualization Graphs” give options for comparing teams for picklisting. “Match Planning” gives teams data on a specific match allowing them to strategize accordingly. “Team Finder” brings up data on a specific team



For those unfamiliar with Excel, some important terms:

- ➢ Worksheets are the “pages” of the Spreadsheet
- ➢ Cells are the individual boxes in the spreadsheet
- ➢ Macros are code in Visual Basic that can be run in the spreadsheet
- ➢ Worksheets can be hidden by right clicking on the worksheet and selecting *“Hide”*
- ➢ Right click again to unhide any number of sheets. This can be helpful to decrease the amount of worksheets at the bottom of the page



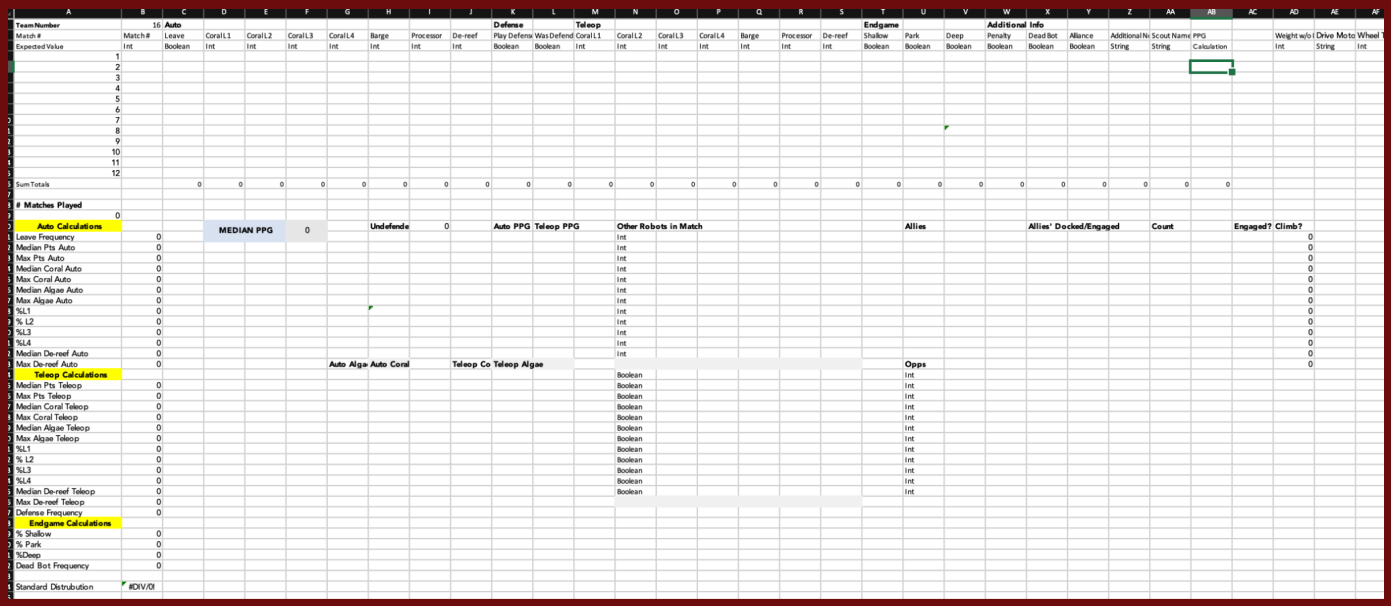
❖ SETUP SHEET

- ➢ In column A, input all teams participating in the competition.
- ➢ Press generate team sheets to create individual sheets
- ➢ Fill out your team's match schedule
- ➢ The Scout Leaderboard keeps track of how much scouts have scouted, and also their accuracy in points off (accuracy coming in a future update)
- ➢ Total accuracy is the average error of the spreadsheet in points (coming in a future update)

❖ RAW INPUT SHEET (above) and PIT SCOUTING INPUT (below)

➢ To input data:

- Press team cell (column A)
- Scan QR code on tablet (The information scouted will be automatically loaded into selected column)
- Press expand data while selecting the cell (can also select multiple cells at once)

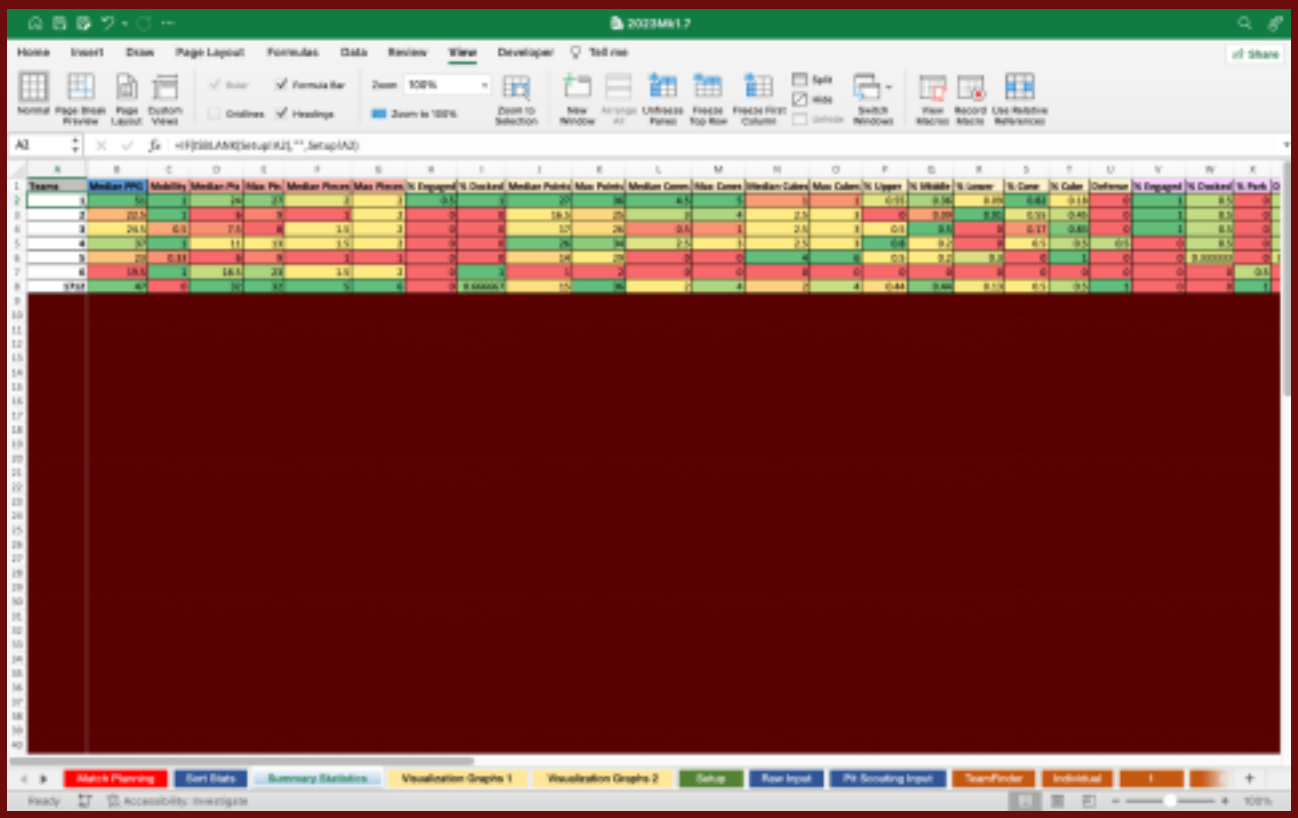


Team Number	16	Auto								Defense		Teleop								Endgame			Additional Info								
Match #	Match #	Leave	Coral L1	Coral L2	Coral L3	Coral L4	Barge	Processor	De-reef	Play Defens	Was Defend	Coral L1	Coral L2	Coral L3	Coral L4	Barge	Processor	De-reef	Shallow	Park	Deep	Penalty	Dead Bot	Alliance	Additional N	Scout Name	PPG		Weight w/o	Drive Mo to	Wheel T
Expected Value	Int	Boolean	Int	Int	Int	Int	Int	Int	Int	Boolean	Boolean	Int	Int	Int	Int	Int	Int	Int	Boolean	Boolean	Boolean	Boolean	Boolean	Boolean	String	String	Calculation		Int	String	Int
1																														
2																														
3																														
4																														
5																														
6																														
7																														
8																														
9																														
10																														
11																														
12																														
Sum Totals		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				

# Matches Played																														
0																														
Auto Calculations			MEDIAN PPG	0		Undefende	0		Auto PPG	Teleop PPG		Other Robots in Match								Allies			Allies' Docked/Engaged			Count		Engaged?	Climb?		
Leave Frequency	0											Int																		0	
Median Pts Auto	0											Int																		0	
Max Pts Auto	0											Int																		0	
Median Coral Auto	0											Int																		0	
Max Coral Auto	0											Int																		0	
Median Algae Auto	0											Int																		0	
Max Algae Auto	0											Int																		0	
%L1	0											Int																		0	
% L2	0											Int																		0	
%L3	0											Int																		0	
%L4	0											Int																		0	
Median De-reef Auto	0											Int																		0	
Max De-reef Auto	0					Auto Alga	Auto Coral		Teleop Co	Teleop Algae										Opps										
Teleop Calculations												Boolean								Int										
Median Pts Teleop	0											Boolean								Int										
Max Pts Teleop	0											Boolean								Int										
Median Coral Teleop	0											Boolean								Int										
Max Coral Teleop	0											Boolean								Int										
Median Algae Teleop	0											Boolean								Int										
Max Algae Teleop	0											Boolean								Int										
%L1	0											Boolean								Int										
% L2	0											Boolean								Int										
%L3	0											Boolean								Int										
%L4	0											Boolean								Int										
Median De-reef Teleop	0											Boolean								Int										
Max De-reef Teleop	0																													
Defense Frequency	0																													
Endgame Calculations																														
% Shallow	0																													
% Park	0																													
%Deep	0																													
Dead Bot Frequency	0																													
Standard Distrubution	#DIV/0!																													

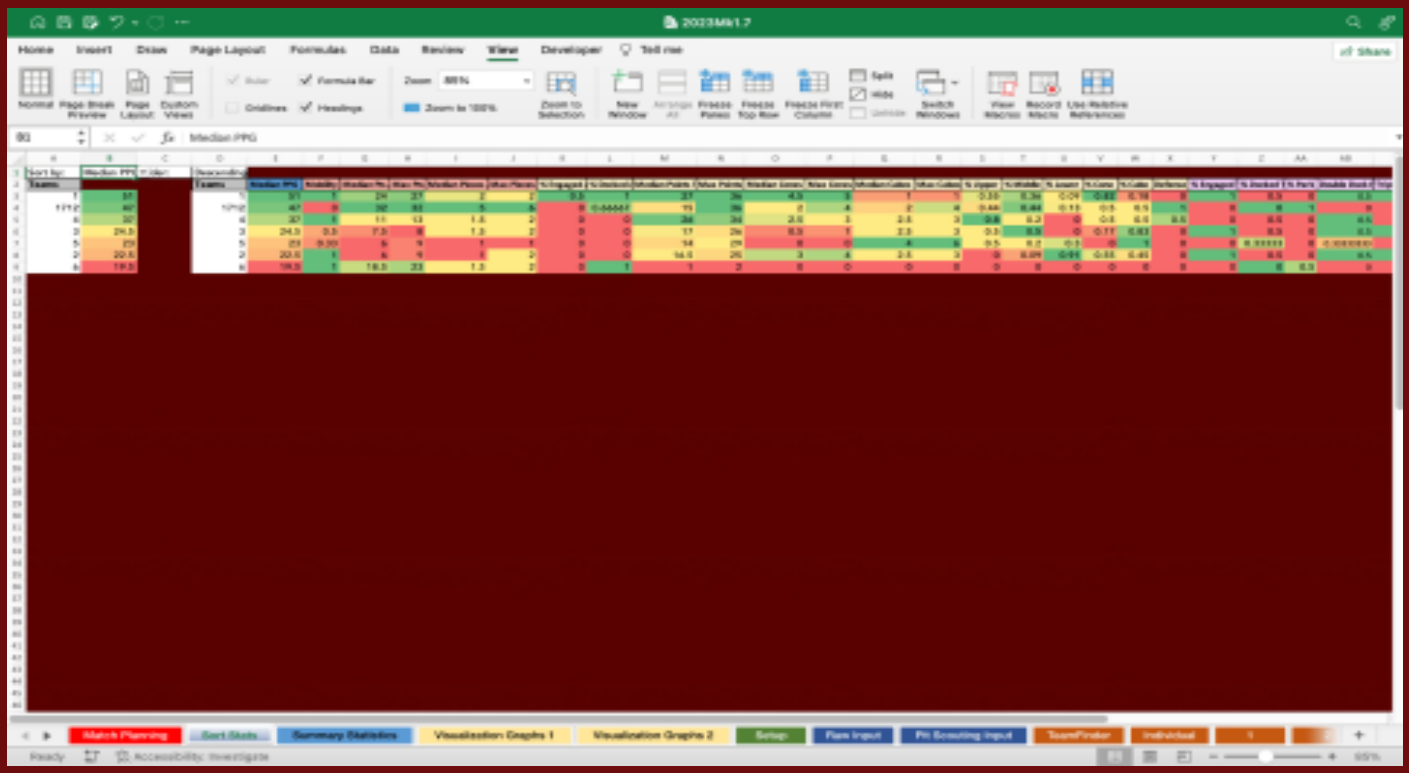
❖ INDIVIDUAL SHEET

- ➢ Template for the team information (The Generate Team Sheets macro copies this sheet as many times as needed and renames them appropriately)
- ➢ Hidden



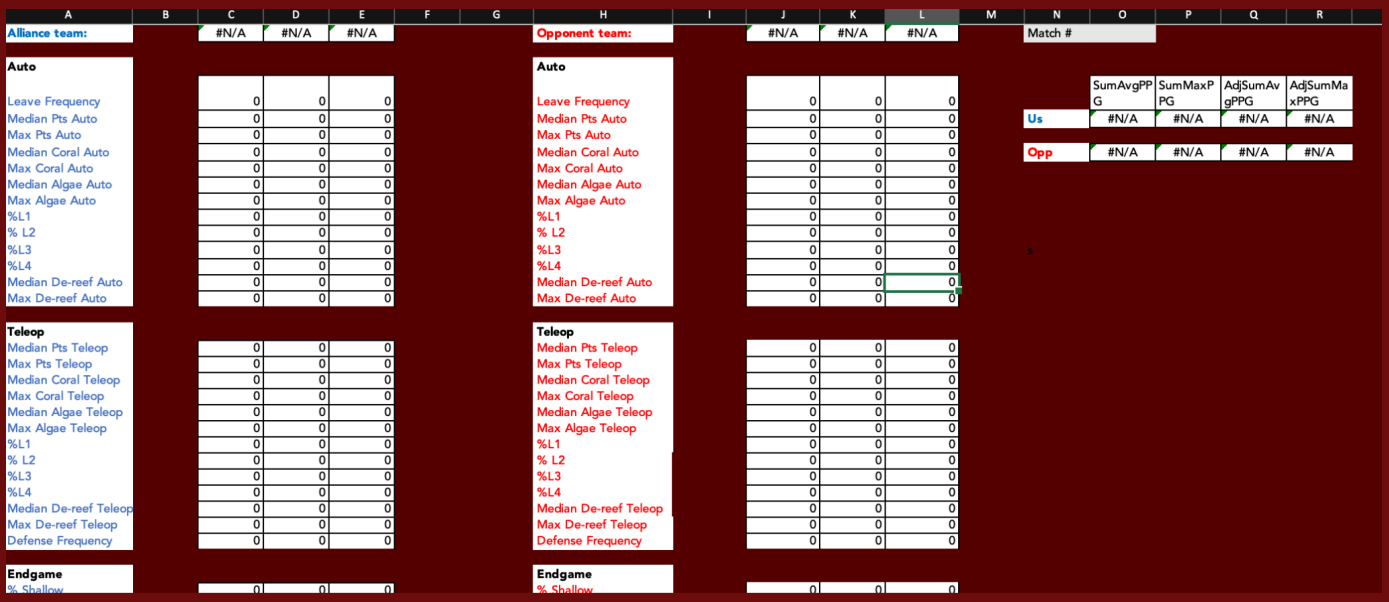
❖ SUMMARY STATISTICS SHEET

➢ Data for all the teams' performance in the competition



❖ SORT STATISTICS SHEET

- ➢ Sorted version of data for all the teams' performance in the competition
- ➢ Select statistic to sort for and ascending or descending order



Alliance team:	#N/A	#N/A	#N/A
Auto			
Leave Frequency	0	0	0
Median Pts Auto	0	0	0
Max Pts Auto	0	0	0
Median Coral Auto	0	0	0
Max Coral Auto	0	0	0
Median Algae Auto	0	0	0
Max Algae Auto	0	0	0
%L1	0	0	0
% L2	0	0	0
%L3	0	0	0
%L4	0	0	0
Median De-reef Auto	0	0	0
Max De-reef Auto	0	0	0
Teleop			
Median Pts Teleop	0	0	0
Max Pts Teleop	0	0	0
Median Coral Teleop	0	0	0
Max Coral Teleop	0	0	0
Median Algae Teleop	0	0	0
Max Algae Teleop	0	0	0
%L1	0	0	0
% L2	0	0	0
%L3	0	0	0
%L4	0	0	0
Median De-reef Teleop	0	0	0
Max De-reef Teleop	0	0	0
Defense Frequency	0	0	0
Endgame			
% Shallow	0	0	0

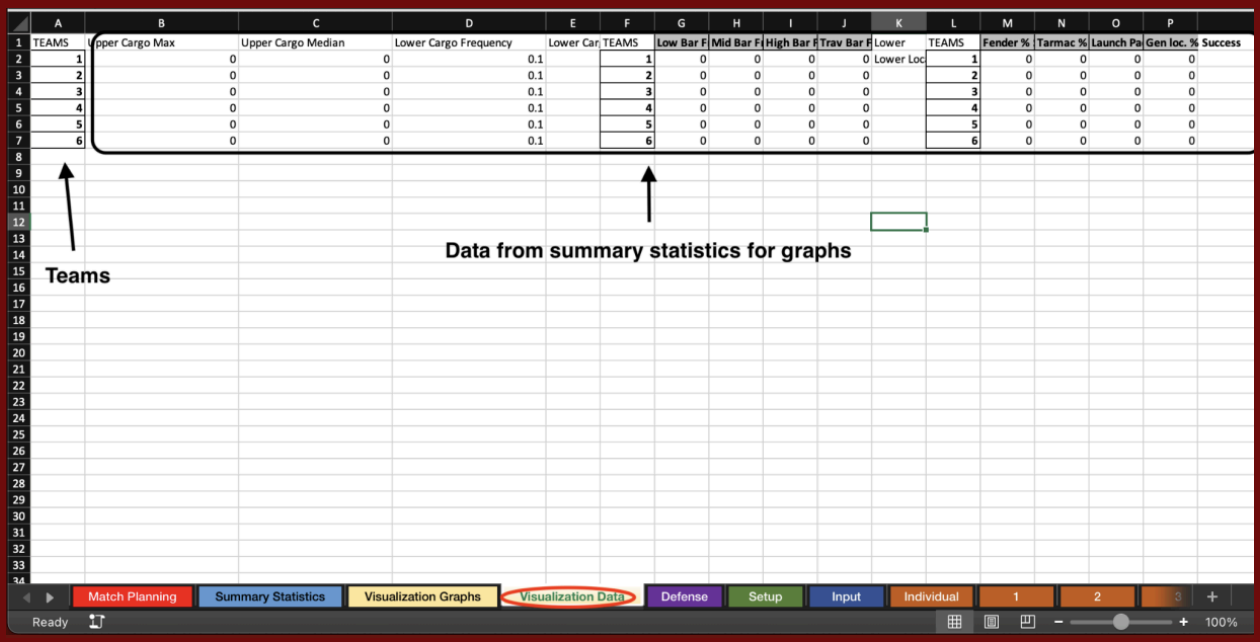
Opponent team:	#N/A	#N/A	#N/A
Auto			
Leave Frequency	0	0	0
Median Pts Auto	0	0	0
Max Pts Auto	0	0	0
Median Coral Auto	0	0	0
Max Coral Auto	0	0	0
Median Algae Auto	0	0	0
Max Algae Auto	0	0	0
%L1	0	0	0
% L2	0	0	0
%L3	0	0	0
%L4	0	0	0
Median De-reef Auto	0	0	0
Max De-reef Auto	0	0	0
Teleop			
Median Pts Teleop	0	0	0
Max Pts Teleop	0	0	0
Median Coral Teleop	0	0	0
Max Coral Teleop	0	0	0
Median Algae Teleop	0	0	0
Max Algae Teleop	0	0	0
%L1	0	0	0
% L2	0	0	0
%L3	0	0	0
%L4	0	0	0
Median De-reef Teleop	0	0	0
Max De-reef Teleop	0	0	0
Defense Frequency	0	0	0
Endgame			
% Shallow	0	0	0

Match #

	SumAvgPPG	SumMaxPPG	AdjSumAvgPPG	AdjSumMaxPPG
Us	#N/A	#N/A	#N/A	#N/A
Opp	#N/A	#N/A	#N/A	#N/A

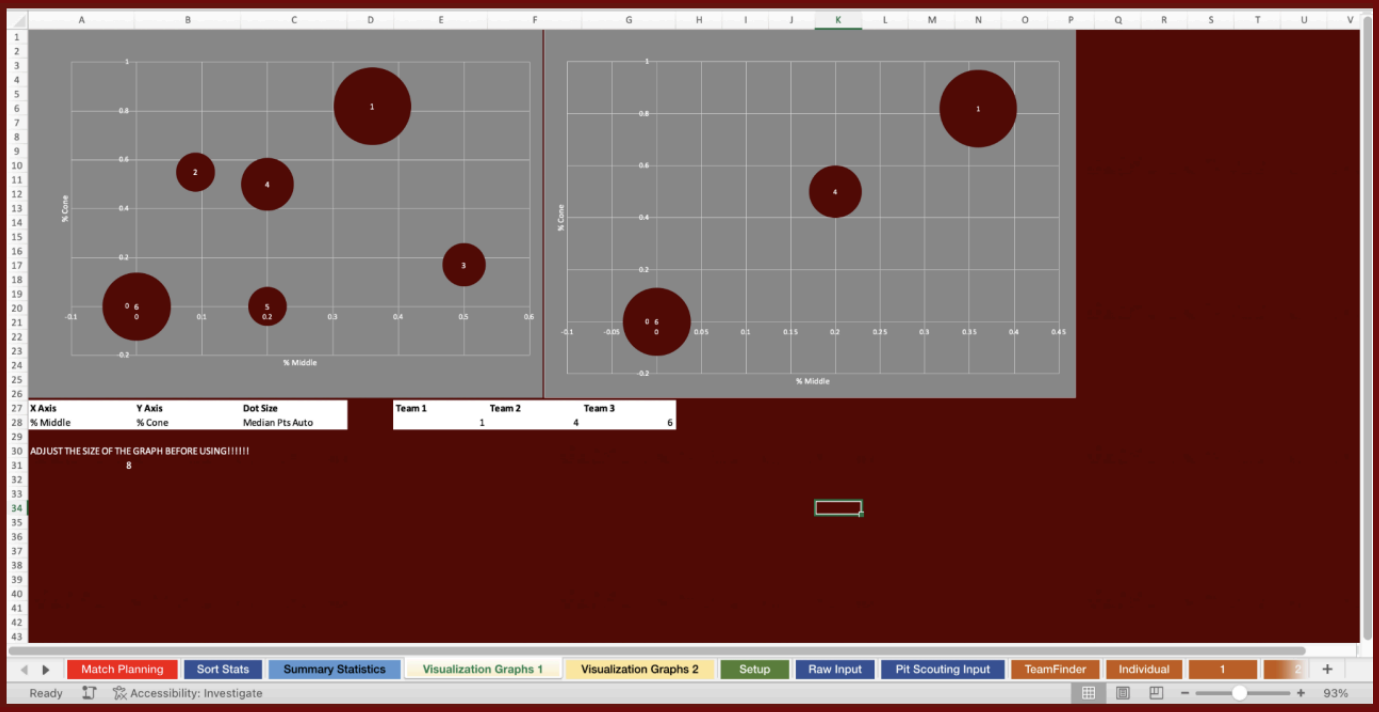
❖ MATCH PLANNING SHEET

- ➢ Data for alliance robots and opponent robots of **YOUR** teams matches
- ➢ Make sure the match schedule is filled out in the “Setup” worksheet
- ➢ In cell B35, select from the dropdown menu the number of your next match
  - ○ For example, you have already played 3 matches at competition and are getting ready for your 4th, select the number 4 in cell B35
- ➢ To make it easier to get this data to the drive team, we have provided a pdf of a physical Match Planning sheet that can be printed out
  - ○ Print out enough sheets to use for all matches **YOUR TEAM** might participate in (including qualifications and playoffs)
  - ○ At competition, copy down data from the “Match Planning” worksheet to the physical Match Planning sheet when you have an upcoming match
  - ○ Hand the physical Match Planning sheet to your drive team.



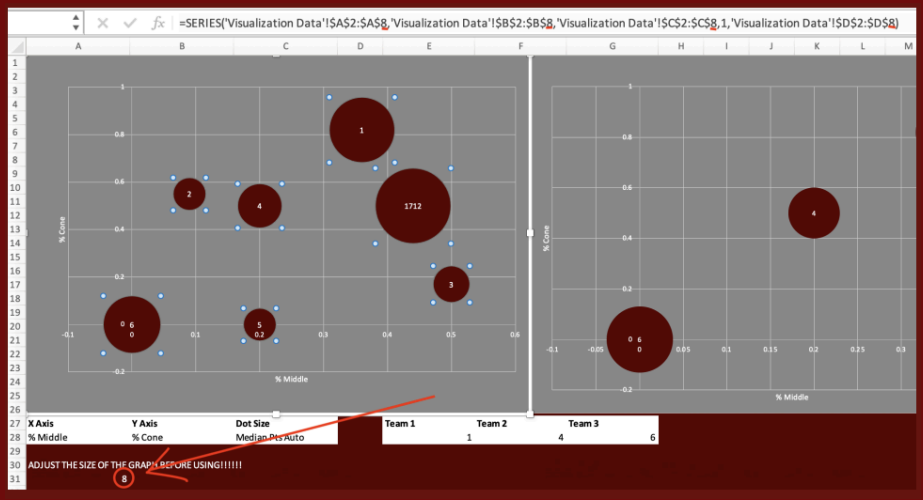
❖ VISUALIZATION DATA SHEET

- ➢ Data that's formatted for Visualization Graphs
- ➢ Hidden



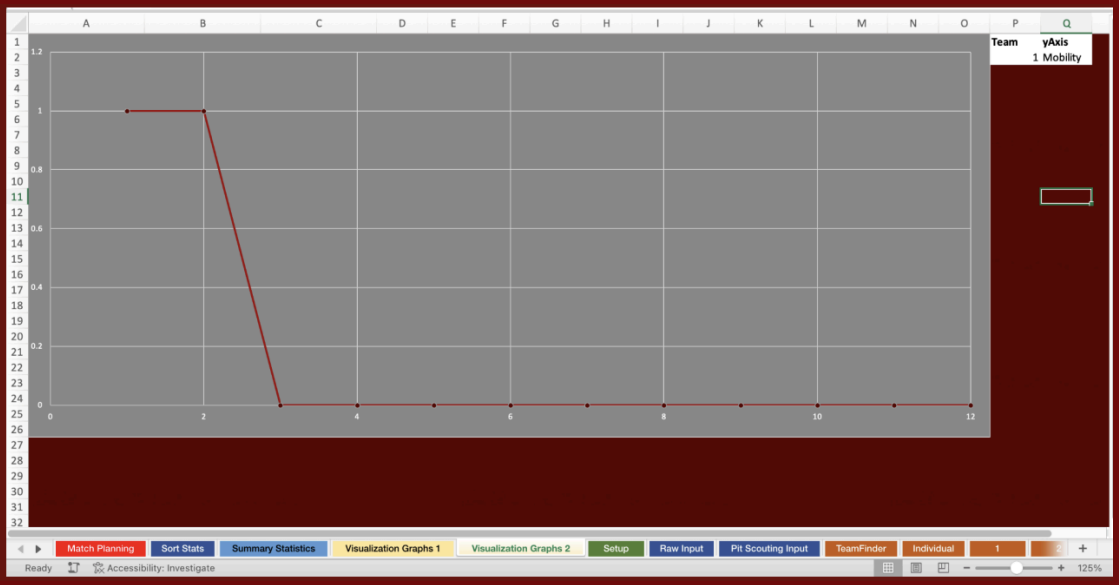
❖ VISUALIZATION GRAPH SHEETS

- ➢ "Visualization Graphs 1" contains two graphs
  - The left graph compares all teams at the competition across 3 different metrics
  - Select metrics using the drop down menus in cells A28, B28, and C28
    - Be aware that the left graph suffers from a clutter issue, in which it's difficult to see team numbers when many data points overlap
    - **The left graph needs to be adjusted! Set all of the limits to the number at the bottom of the sheet:**



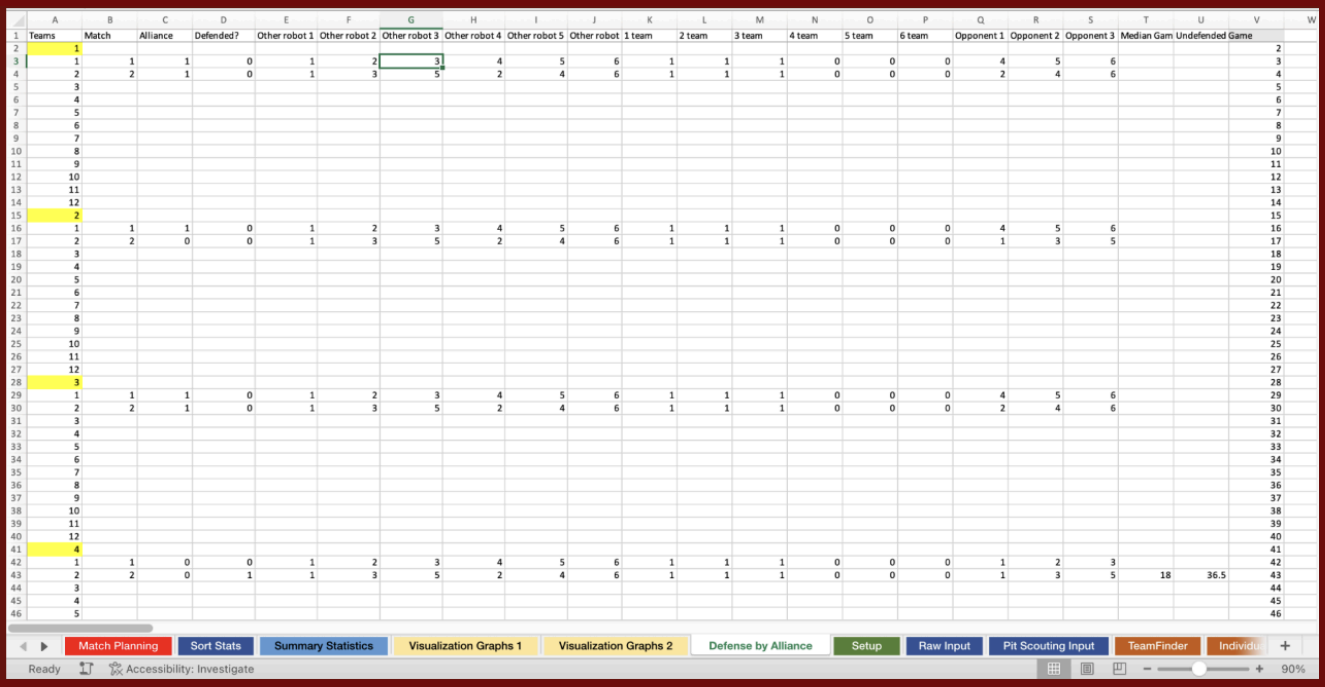
- ➢ The right graph compares 3 select teams at the competition across 3 different metrics
  - Metrics [a]are selected using the same dropdowns as in the left graph
  - Teams are selected using the drop down menus in cells E28, F28, G28

Visualization Graphs 2 contains one graph:



- This graph allows you to easily see a team's performance over the course of their 12 matches
  - Use drop down menu A15 to select a team
  - Use drop down menu B15 to select a metric

❖ ALLIANCE DEFENSE SHEET



Teams	Match	Alliance	Defended?	Other robot 1	Other robot 2	Other robot 3	Other robot 4	Other robot 5	Other robot	1 team	2 team	3 team	4 team	5 team	6 team	Opponent 1	Opponent 2	Opponent 3	Median Gam	Undefended Game	
1																					2
1	1	1	0	1	2	3	4	5	6	1	1	1	0	0	0	4	5	6			3
2	2	1	0	1	3	5	2	4	6	1	1	1	0	0	0	2	4	6			4
3																					5
4																					6
5																					7
6																					8
7																					9
8																					10
9																					11
10																					12
11																					13
12																					14
2																					15
1	1	1	0	1	2	3	4	5	6	1	1	1	0	0	0	4	5	6			16
2	2	0	0	1	3	5	2	4	6	1	1	1	0	0	0	1	3	5			17
3																					18
4																					19
5																					20
6																					21
7																					22
8																					23
9																					24
10																					25
11																					26
12																					27
3																					28
1	1	1	0	1	2	3	4	5	6	1	1	1	0	0	0	4	5	6			29
2	2	1	0	1	3	5	2	4	6	1	1	1	0	0	0	2	4	6			30
3																					31
4																					32
5																					33
6																					34
7																					35
8																					36
9																					37
10																					38
11																					39
12																					40
4																					41
1	1	0	0	1	2	3	4	5	6	1	1	1	0	0	0	1	2	3			42
2	2	0	1	1	3	5	2	4	6	1	1	1	0	0	0	1	3	5	18	36.5	43
3																					44
4																					45
5																					46

- ➢ Compares the effect a team's defense has on the score of the opposing alliance
  - ○ To do this, it calculates an alliance's median score, and that team's score when defended by a given bot
  - ○ It figures out the difference between those values, and takes a median of all the differences over the competition
- ➢ Results are in a relatively inaccessible form, so find the numbers in SumStat or SortStat instead

Notes and Acknowledgements

WATCHDAWG has been in various stages of development for several years now. The oldest versions of the spreadsheet we can find date back to 2017, and the app began development in 2020. Given how many times he has embedded his name in our macro code, we assume Gabriel would be delighted for us to acknowledge the work he did to establish the scouting spreadsheet in a form we still use today. Guanjie significantly improved the layout of the spreadsheet in 2019. The scouting app was spearheaded by Michael and Mark L, with help from their mentor, Kimee. Pit scouting digitally was finished in 2023 by Andy. In 2023 WatchDawg saw its first visual improvement worked on by Simon, Mason, and Ivan. We are all excited for years of work to culminate in this public release.

WATCHDAWG 2025 was created by Officer Simon, Ivan, and Mason. The Code for the app was done by Simon. Ivan created the spreadsheet. The beautiful new UI was spearheaded by Mason. Ivan also edited this user manual you are reading right now. Last but not least, Ivan created the scouting awards. We would all like to thank our mentor, Yuval, for his assistance in getting Android Studio up to date. We would like to thank Terrance for his help with Git, Ada and Emily for UI feedback, Conor for the logo, and Lucas for promotional material and video production. Finally, we would like to thank our lead mentor, Sean, for his long-time support for a publicly released scouting system. Without him, none of this would be possible.

On another note, we would like to thank the rest of Dawgma for providing us with different music to listen to, and not the repetition of just 5 songs.

We would like to thank everyone for reading this and using our app.

- Simon
DAWGMA Scouting and Strategy Officer 2023-2025