SCOUTING APP
HANDBOOK rev. 001

FRC Team 1100

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Welcome to the Handbook!

Who is Team 1100

The Early Days: Paper Scouting

Team 1100 began scouting in 2005 using a combination of pen, paper and team member eyewitness accounts. This allowed them to convey information to strategy leads and the drive team. While this method was effective, organizing hundreds of sheets of paper and analyzing the recorded data was too time-consuming for a fast-paced event like FRC. In 2017, 1100 switched to electronic scouting, using Kindle Fire 7 tablets to track data.

Benefits of a Scouting App, Related Technology and Efforts

By switching to an electronic system, we rapidly increased our efficiency during and in between matches for both scouting and strategy. Scouters were able to input data easier and data was automatically transferred over the Cloud. 1100 then compiled the data using a scouting app made by another team and analyzed the data using a software analytics tool called Tableau. Team 1100 strategy leads were able to access this data before matches to use for strategizing and coming up with game plans.

Scouting During Competitions

Basics

Scouting is a necessary facet of competitions as without access to match data, offensive and defensive planning for your alliance becomes exponentially difficult. Establishing a clear information flow between strategy and scouting students leads allow for effective communication of qualitative information to the drive coach, creating more feasible and effective gameplans.

Tips and Guidelines For Success

→ Choose your seats in the event venue carefully:

In order to quickly and accurately score matches, scouters need a clear view of the field. Minimize visual impairments like columns and bad angles to the field and scoreboard

→ Treat your scouters well:

Scouting takes a lot of energy! Break the match schedule up into rotations to avoid scouter burnout, and incentivize them with treats.

→ Take effective notes:

Scouting is useful for quantitative and statistical comparison of teams, however, drawing conclusions from the gathered data can be challenging. Consistent, clear notes with important details allows for better, holistic match strategy formulation.

→ Train your scouters:

Make sure your scouters know the current year's game well including knowing all of the rules and scoring. Before competitions take some time to practice scouting previous events in a mock-competition environment.

→ Secure a good internet connection:

When sharing data between devices, make sure that your methods are compliant with event and venue rules. Test to see if bluetooth tethering or Wi-Fi work at an event as personal/team Wi-Fi hotspots are not allowed.

Alliance Selection

Rankings of the event are finalized at the conclusion of qualification matches. The top 8 teams become captains of playoff alliances and must select two other teams to join them. This process, called Alliance Selection, follows a serpentine draft method starting with the first seed captain and working down to the eighth. Once each of the top 8 teams have selected their first pick, the process repeats in reverse order from eighth to first, resulting in 3 team alliances. In some cases, a back up 4th team is assigned to each alliance. During round one of selection, captains may pick a lower seeded captain for their alliance (i.e. first seed can pick second). Teams can choose to accept or reject but if they decline an offer, they may not be selected by other teams.

What is Tableau

Tableau Software is a data visualization tool used to make data easier to understand. It can be challenging to learn at first, but tremendously useful during competitions as it makes strategizing and creating a team pick list for alliance selection much quicker.

Connecting with Master Scouter

1. In order to connect T-Hawk Master Scouting with Tableau, the program Android File Transfer is needed. Plug in the tablet used to run the T-Hawk Master Scouting and after the QR codes are exported, open Android File Transfer.
2. The exported files are in a JSON format, one file per match. Drag the file(s) onto your computer.
3. In Tableau, drag the file into the Data Source tab to add the corresponding data. There is currently no built-in support to transfer data from DynamoDB into Tableau.
4. Such a connection is possible through ODBC drivers. However, T-Hawk Master Scouting does not have this functionality.

Data visualization and data analysis

With over 50 data measures, this app offers a multitude of data visualization opportunities. When Tableau first opens up, data comes in dimensions and measures. Dimensions sort and split the data into categories while measures measure quantitative data. You can also add in calculated fields, which allow you to combine sets of data. To create a calculated field, click the analysis tab at the top of the screen and select create calculated field.

You can look at multiple sets with just one simple bar graph. The bar length can represent one data set while the color, width and label represent other data sets. This simplifies a large amount of data into one bar graph.

Setup of the App

Scouter vs. Master Scouter

In order to efficiently and effectively send and analyze data, Team 1100 uses two apps for scouting data: T-Hawk Scouting and T-Hawk Master Scouting. The T-Hawk Scouting app is used by scouters for inputting data and generating a QR Code using an interactive GUI. The T-Hawk Master Scouting app is used to scan the aforementioned QR codes and upload them to a DynamoDB database.

Scouting App Overview

T-Hawk Scouting has three tabs: Autonomous, Tele-Operated, and Endgame. The Autonomous tab contains a button to change the alliance color, inputs for the team and match, and buttons to for scores during autonomous. In the Tele-Operated screen, an interactive image of the field is

shown. Users can take the field to have a pop-up cycle screen. There, one cycle's worth of shots can be inputted. Penalties and defense timers are also located in this tab. Finally, in the Endgame tab, checkboxes for the control panel and other events such as climbs and disables are present. A textbox for notes is also located in this tab. The Endgame tab also has a button to generate a QR code for the inputted data.

Required Hardware and Software

To install T-Hawk Scouting, tablets running an Android OS or Fire OS will be needed. Team 1100 uses the Amazon Kindle Fire 7 as they are a very cheap and reliable option. However, any tablet running the Android OS will work. 6 of these tablets do not need an internet connection and these tablets will be running T-Hawk Scouting. T-Hawk Master Scouting requires an internet connection to run. T-Hawk Master Scouting also requires the creation of a folder named "THawkScouting" in the tablet's internal storage.

An AWS account is also needed. FIRST provides each FRC team with a n AWS Educate license that will need to be set up. On the FIRST registration site, there will be an option to redeem AWS tokens. Ater doing so, go to AWS Educate and follow the steps to set up the account.

A Tableau license is given to each FRC team by FIRST so purchasing a Tableau license is not necessary. Redeem the license on the FIRST registration site and follow the necessary steps for installation.

Offline vs Online connection

T-Hawk Master Scouting is operational both with and without an internet connection. If a connection is present, match data will be uploaded to DynamoDB. However, if the tablet running T-Hawk Master Scouting is offline, local JSON files will be uploaded to the tablet's internal storage.

T-Hawk Scouting installation:
1. Download Android Studio: https://developer.android.com/studio
2. Open the project directory inside Android Studio
3. Go to the"Build" tab in the toolbar and hit "Generate APK File"
4. Send the APK file to the tablet and download it (Team 1100 uses Google Drive for this)

DynamoDB Table creation:
1. Navigate to DynamoDB in the AWS Management Console
2. Select "Create Table"

3. Enter a table name and remember it!
4. Enter "Team" in Primary key and select "Number" from the data type dropdown
5. Check "Add sort key"
6. Enter "Match" in Sort Key and select "Number" from the data type dropdown
7. Click "Create"
8. It is possible to change the billing method to "on-demand" so the account will be charged for data written and read data
   a. To do this, navigate to your table
   b. Under the "Capacity" tab, change Read/write capacity mode from "Provisioned" to "On-demand"

Cognito User ID Pool creation:
1. Navigate to Cognito in the AWS Management Console
2. Click "Manage Identity Pools"
3. Check "Enable access to unauthenticated identities"
4. Click "Create Pool"
5. Click "Allow"
6. Under sample code, the ID in string format is the ID you will need to put in MainAcitivty.java and awsconfiguration.json in T-Hawk Master Scouting

T-Hawk Master Scouting installation:
1. Steps 1-2 of T-Hawk Scouting installation
2. Navigate to aws configuration.json (located under app/res/raw)
3. Change "tableName" in MatchData.java to the table name created in DynamoDB (NOTE: Create a table for each event as data with the same team and match will be overwritten)
4. Change "Region" in awsconfiguration.json (both instances) to the DynamoDB region
5. Change "PoolId" in awsconfiguration.json to the Cognito Identity pool ID
6. Change "ID" in MainActivity.java to the Cognito Identity pool ID
7. Change "Region" in MainActivity.java to the DynamoDB region
8. Steps 3-4 under the T-Hawk Scouting installation

Sharing Data

In order to share data stored in DynamoDB, IAM Users are required.

How to set up data sharing:
1. Navigate to the AWS Dashboard
2. Go to the IAM service

3. Navigate to "Users" and select "Add user"
4. Allow the user to have programmatic access and AWS Console access and create a password
5. Follow the steps required to create the user and attach permissions that you want this user to have
6. The console sign-in link is the link that the second party will need in order to access your data

Code

Link to the scouting app: https://github.com/AnikethDandu/THawkScouting.git
Link to the master scouting app: https://github.com/AnikethDandu/THawkMScouting.git

Scouting Alliance

What is a Scouting Alliance?

A scouting alliance is a joint collaboration effort between multiple FRC teams dedicated to simplified the process of scouting. Though alliances may vary, most teams in a scouting alliance will share resources such as scouters and scouting data with all teams belonging to the alliance. This allows each team in the alliance to deploy less active scouter while simultaneously receiving robust scouting data shared across the entire alliance.

How to start a scouting alliance

A scouting alliance is most beneficial when participating teams compete at the same qualifying events during the FRC season. Prospective alliance coordinators should aim to recruit local teams who are attending at least one mutual qualifying event. The close proximity of the team before and during competition will allow for easier communication as well as a more efficient transfer of necessary resources.

Conclusion

Scouting is an integral part of any FRC competition and we hope that this guide drives the continued success of scouting systems throughout the FRC community. Future revisions of the scouting handbook and app code will be posted on Github, Chief Delphi, and the Team 1100 website. If any issues or questions arise, please contact Team 1100 at first.team1100@gmail.com. Good luck and see you at the competitions!