

# Revolutionizing FRC Scouting with Data Analysis

Team 564



# Purpose / Importance

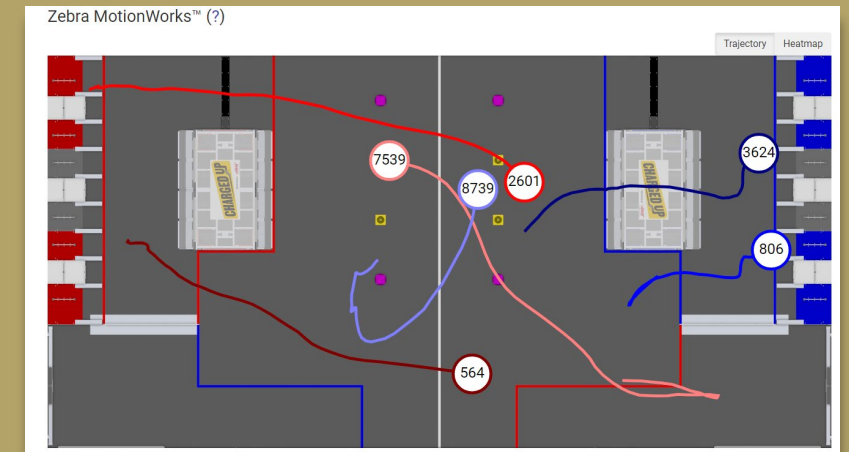


- Automation
  - Enables our scouting department to interpret and analyze data more than collecting and cataloging data
  - Improved accuracy for data collection
  - Enhances real-time data updates, ensuring our team has the latest information for strategic decision
- Future Effectiveness and Implications
  - Empowers teams with comprehensive insights, optimizing strategic choices
  - Facilitates quicker and more informed decision-making during competitions
  - Elevates overall team performance through data-driven strategies



# Zebra MotionWorks Integration

- Utilizes cutting-edge technology for precise tracking of robot positions during matches
- Enables calculation of crucial metrics such as robot velocity, acceleration, and distances traveled
- Provides insights into strategic elements like the time a robot spends in specific locations on the field
- Harnesses real-time positional data to enhance the scouting experience with accurate and dynamic information



\* Team and match data is acquired through The Blue Alliance API \*

# Designing “Zones” on the Field



Defined distinct zones across the field, strategically mapping essential locations such as charge stations



Identified specific areas as "defense zones" to pinpoint opposing teams engaged in defensive maneuvers



Enhances scouting precision by tracking and categorizing robot movements within designated zones



Lays the foundation for in-depth strategic insights

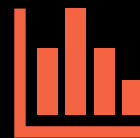
# Zone-Based Insights



Predict whether a team is likely to play defense by assessing their substantial time in designated defensive zones



Explore a team's offensive performance through cycle data including averages for completed cycles, time per cycle, and distance covered during each cycle



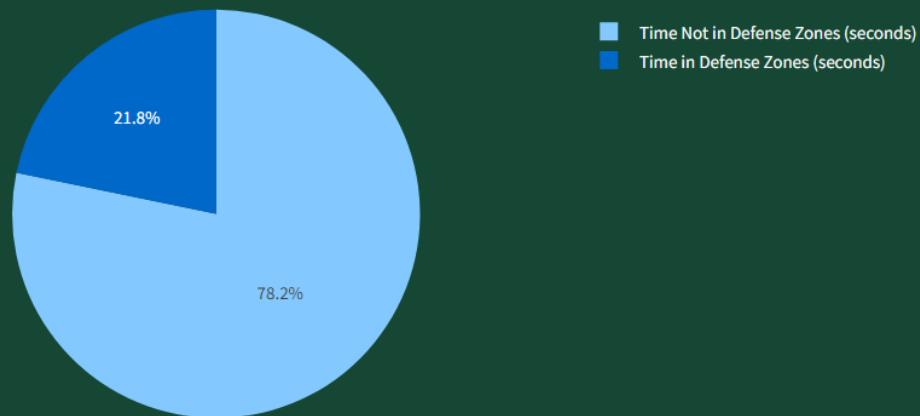
Assess a team's charging ability with statistics revealing average time spent charging

Team 564 spends an average of **30.0 seconds** playing defense.

Using our algorithm, we predict that Team 564 **could** be a **defensive robot**.

**⚠** This is not a guarantee that the robot is a defensive robot, but it is a good indicator that it is a defensive robot.

#### Team 564's Average Time in Defense Zones (% of match)



Select a team

564

Select a type of Data to search for

Cycle-Data

**i** A *cycle* is completed when a team's robot travels to their alliance's correlating loading zone, and back into their community.

Team 564 completes an average of **2.6 cycles** per match.

The average time it takes the team to complete a cycle is: **11.82 seconds**.

The average distance travelled by the team during a cycle is: **41.85 feet**.



# Per-Robot Performance Metrics

- Gauge a team's overall robot speed by gathering their average speed. This is generated by accumulating positional data throughout the match
- Explore peak performance with the maximum speed observed during a match, factoring in periods of inactivity likely from placing cones/cubes or charging
- Assess acceleration patterns by analyzing the percentage of measurements at or below Velocity X but above 2 ft/s, revealing insights into the robot's acceleration

Select a type of Data to search for

Robot-Stats

Team 564 has an average speed of **2.31 ft/s**

**i** We use a top average speed to account for time sitting still in autonomous and charging, as well as while placing cones and cubes.

Team 564 has a top average speed of **5.83 ft/s**

Team 564 has a maximum in-match viewed speed of **13.86 ft/s**

564

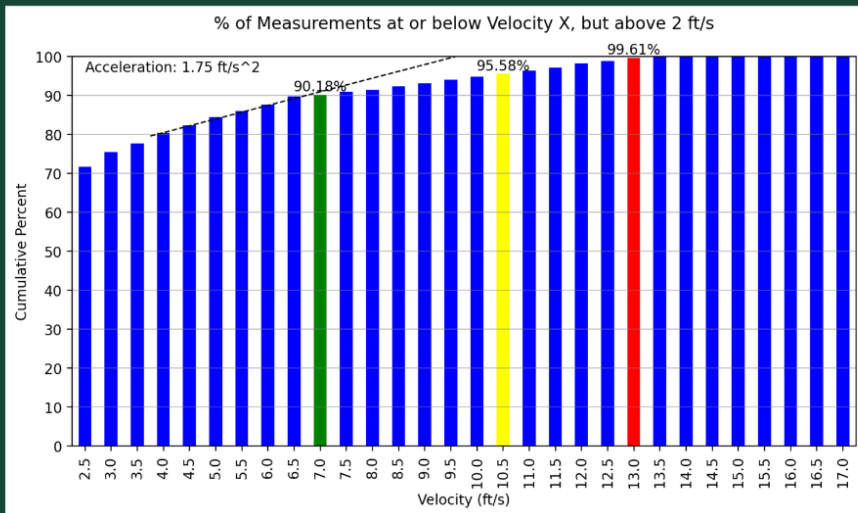
Select a type of Data to search for

Motion-Stats

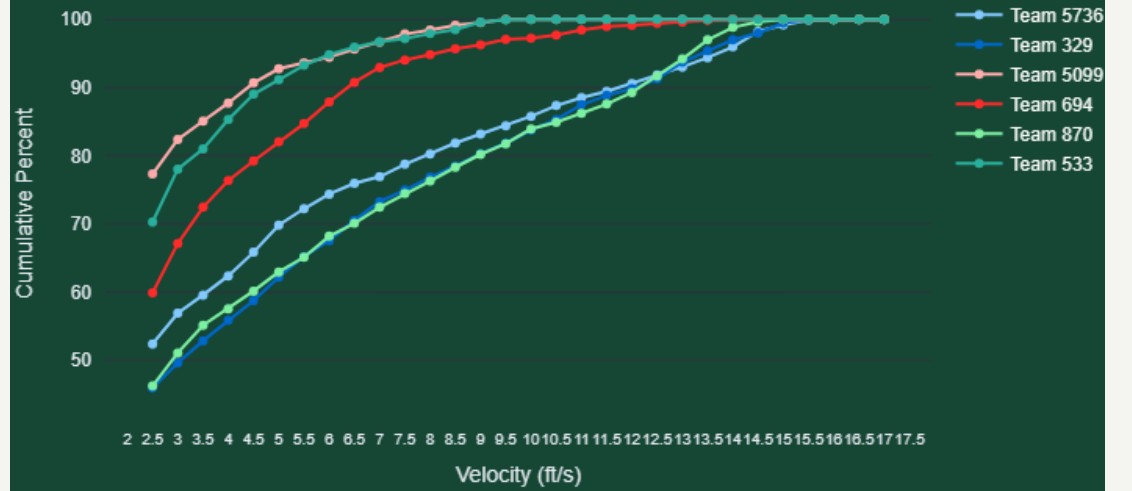
SFOM Match 1 QM Match 2 QM Match 8 QM Match 17 QM Match 25 QM Match 38 QM Match 43 QM Match 49

Total Distance Traveled: 391.22 feet

Highest Average Velocity: 13.12 feet/second



% of Measurements at or below Velocity X, but above 2 ft/s (For Match Final (1) 1)





# Match Predictions

Generate match predictions by incorporating the Offensive Power Rating (OPR), providing an estimate of a team's average point contribution to an alliance

Enhance accessibility with a clear display of match predictions on a per-team, per-match basis, ensuring ease of use (even per-event)

As the data on each team only grows in quantity over time, as each competition goes on, the predictions only become more accurate.

# Match Prediction Example

Predicted Score: 117-77  
Actual Score: 127-70

Match-Predictions

## Match Predictions for 2023nyli2

QM Match 2 QM Match 8 QM Match 17 QM Match 25 QM Match 38 QM Match 43 QM Match 49 QM Match 59

Predicted Winner: **Red Alliance**

Predicted Match Score: **117 - 77**

Team 564 is on the predicted winners alliance!

Red Alliance Teams: **2601, 564, 7539**

Blue Alliance Teams: **806, 3624, 8739**

🕒	Quals 38	2601	<u>564</u>	7539	806	3624	8739	<u>127</u>	70
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# Future Possibilities

- Live Color Commentary Integration: Envision expanding the impact beyond scouting, with the potential integration of live color commentary, providing real-time insights during matches
- Extended Data Visualization: Enrich the user experience by delving into more comprehensive data visualization tools
- Valuable data for selecting alliances for playoffs at events



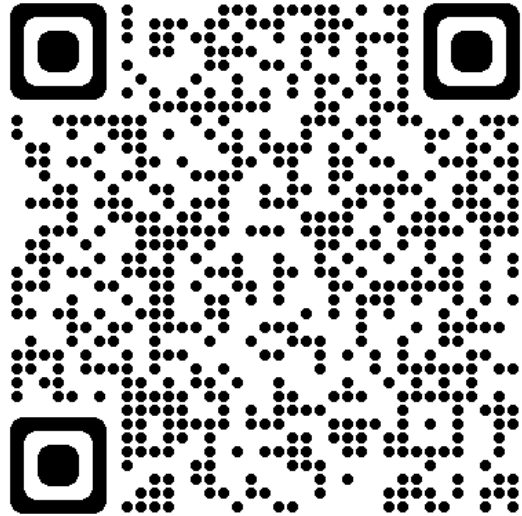
# Outreach and Global Impact

- Embracing inclusivity, our scouting application and its data are freely available to teams worldwide, fostering collaboration within the expansive FRC community
- Ensuring universal access, our application seamlessly integrates with The Blue Alliance API, providing teams access to data at all events and facilitating a user-friendly experience
- The Zebra MotionWorks data is only available at competitions with the MotionWorks chips.

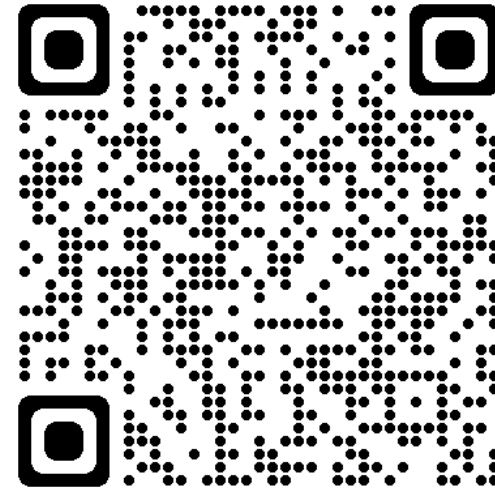




## The Scouting Site



## Data Visualization Example



Important Links