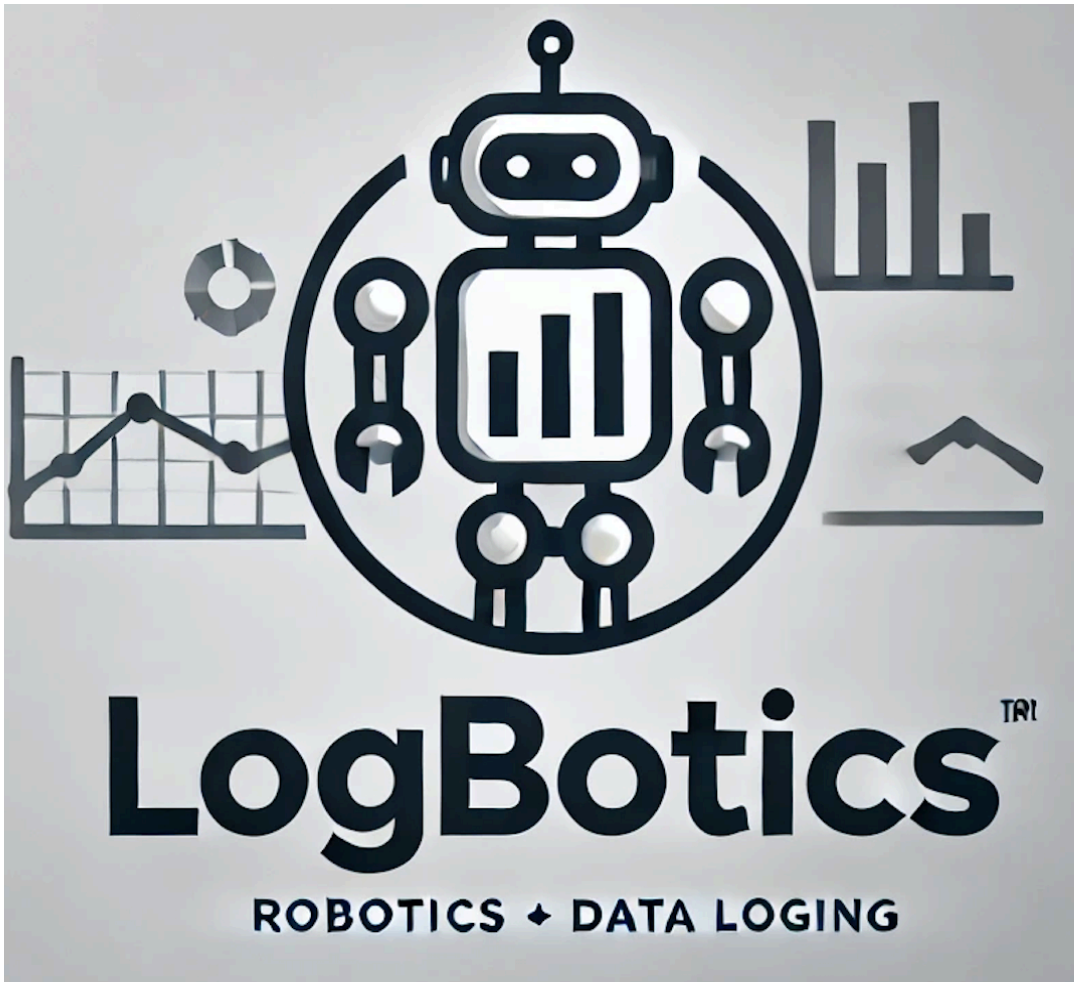


CS 30700
LogBotics | Sprint 1 Plan

By Team #24:

Team Members: James Gilliam | Roger Braun | HyunShu Kim | Jenna Rigdon

Sprint Overview

During this sprint, we plan on developing the initial scaffolding of the data logging tool. This entails establishing the communication medium between the physical robot and the desktop application, allowing the user to send data from the robot to their computer. Along with this, we intend to develop the beginnings of the desktop application UI and functionality, i.e. logging in and simply visualizing the data in any format.

Scrum Master

HyunShu Kim

Potential Risks and Challenges

There are a few challenges that our team will have to overcome within this first sprint. The first being establishing the way in which the robot will send the data to the application. Our team is not familiar with transmitting data from one piece of physical hardware, such as a robot, to upload into an application. This may cause some overhead in developing the tool, however we are confident we will determine an effective solution. In addition to this, we are not familiar with the WinUI framework used to develop desktop applications. Although, all of us are familiar with C++ and some with C# and Web Application development, so this will not pose as much of a challenge.

Meeting Plan

- Monday 2:30 pm
- Wednesday 2:30 pm with Project Coordinator
- Friday 2:30 pm

Current Sprint Detail

Story #1

As a user, I want the system to automatically log motor and sensor activity during matches so that I can diagnose issues.

#	**Description**	**Estimated Time (hours)**	**Owner**
1	Set up the project repository and configure the basic back-end framework for data logging.	4	James
2	Create a basic motor object to track motor activity such as RPM and torque	2	HyunShu
3	Create a basic sensor objects to track sensor feedback during matches	2	HyunShu
4	Set up the database schema to store motor and sensor data	5	James
5	Integrate data logging functionality for motors and sensors into the application	3	Jenna

Acceptance Criteria

- The system must automatically log motor activity (RPM, torque) during matches.
- The system must automatically log sensor feedback during matches.
- Data from both motor and sensor logs should be stored in the database.
- The database should support automatic backup of logged data.
- Unit tests must pass, ensuring motor and sensor data is logged accurately.
- The logged data should be retrievable from the database for later analysis

Story #2

As a user, I want the system to automatically log control system data during matches so that I can diagnose issues.

#	**Description**	**Estimated Time (hours)**	**Owner**

1	Set up the framework for capturing control system data during the matches.	5	Jenna
2	Implement functionality to log control system data in real-time.	4	Jenna
3	Create a control system data object to store relevant metrics such as voltage, current, and system status.	2	Jenna
4	Update the database schema to store control system logs.	5	HyunShu
5	Integrate control system logging with existing motor and sensor logging functionality.	2	HyunShu
6	Write unit tests for logging control system data, ensuring the data is accurate and stored correctly.	3	HyunShu
7	Perform testing with a mock robot setup to verify control system data logging.	1	Jenna

Acceptance Criteria

- The system must log control system data such as voltage, current, and system status during matches.
- Logged control system data should be stored in the database alongside motor and sensor data.
- Unit tests should verify that control system data is accurately logged and retrievable.
- Control system data should be integrated with motor and sensor data for comprehensive analysis.

Story #3

As a user, I want to be able to create an account on the app so that I can set up and save my personal settings/customizations.

#	**Description**	**Estimated Time (hours)**	**Owner**

1	Set up UI component where user can input credentials to log in to the app or create an account	3	Roger
2	Create database or file system to store existing user data	3	Roger
3	Develop backend methods to record newly created account credentials	3	Roger
4	Develop backend methods to validate inputted credentials against existing user info	3	Roger
5	Create framework so that user preferences are saved to that specific user in the database	4	HyunShu
6	Test methods with mock user data and small database	3	Roger

Acceptance Criteria

- Given that I am a new user on the app, when I input valid credentials, then my account should be created and I can login to the desktop application's main page.
- Given that I am a new user, when I attempt to create an account with a username that already exists, then I receive an error message showing that those credentials are taken.
- Given that I am a returning user, when I input my existing username and password and click "Log in", then I should successfully login to the main page of the application.
- Given that I am a returning user, when I input an incorrect password for my username, then I should receive an error message stating the password is incorrect.

Story #4

As a user, I want to be able to select different visualizations of data logging (various plots, various colors, etc.) so that the data is easier to see and customizable to preferences.

#	**Description**	**Estimated Time (hours)**	**Owner**
1	Build backend methods to retrieve data from database	2	Roger
2	Create frontend UI and methods to manipulate the UI to the user's preference	5	HyunShu

3	Develop backend methods to construct different data objects for different viewing formats	5	Roger
4	Develop frontend methods to interpret different data formats into different visualizations	5	Roger
5	Test methods incrementally with small data sets and simple data	3	Roger

Acceptance Criteria

- Given that the database contains user data, when a request is made to retrieve the data, then the backend should successfully fetch the correct data from the database.
- Given the database is empty, when a request is made, then an appropriate response should be returned.
- Given that the user wants to change UI settings, when the user interacts with UI elements, then the changes should be reflected immediately in the app.
- Given data is stored in the database, when the backend is requested to deliver data in a specific format, then the data should be converted into the requested format.
- Given that a data object is passed to the frontend, when the user selects a particular visualization, then the data should be correctly displayed in that format.

Story #5

As a user, I want to be able to export individual plots as visual files (jpeg, pdf, etc) so that they are easy to open and use elsewhere.

#	**Description**	**Estimated Time (hours)**	**Owner**
1	Design the Export Feature UI	2	Jenna
2	Implement Export Functionality	2	Jenna
3	Integrate Export Options with Visualization Module	4	Jenna
4	Test Export Functionality	2	Jenna

Acceptance Criteria

- The system must allow users to select and export individual plots as visual files in formats such as JPEG and PDF.
- Exported files must maintain the visual quality and integrity of the original plot.

- Users should be able to open the exported files without any issues using standard image or PDF viewers.
- If the export process fails, the system should provide a clear and informative error message to the user.
- Unit tests must pass, confirming the export functionality works correctly for all supported formats.

Story #6

As a developer, I want a framework that can receive, store, and send logged data to the app so that data logging and display can be implemented in the app.

#	**Description**	**Estimated Time (hours)**	**Owner**
1	Write a script to read the inputted data	2	HyunShu
2	Implement writing and reading the data to a basic data format inside the app	2	James
3	Implement the + storeRawData() function and finish structuring the ImportData class	2	James
4	Implement the + sendRawData() function to create an identical process with the server side, so different devices can access the same data	5	James

Acceptance Criteria

- The system must be able to read the data into temporary storage within the ImportData class
- The system must write the data to the disk in a readable format so it can be read after closing the app
- The ImportData class must implement all variables and functions shown in the class diagram at a minimum
- The data must be able to be written to an read from an external server

Story #7

As a developer, I want to implement an API for retrieving real-time data from the robot's control system so that it can be streamed directly into the logging system without delay.

#	**Description**	**Estimated Time (hours)**	**Owner**

1	Establish some form of communication between the robot and the computer	5	Jenna
2	Create a workflow for the data (that is streamed from the robot to the computer) that communicates between the computer and the application itself.	5	HyunShu
3	Retrieve a continuous data stream from the robot with timestamps	3	James
4	Express the data in a common readable format for the ImportData class	3	James

Acceptance Criteria

- The system must receive some data from the robot (this takes a while because there is currently no communication setup)
- The system must be parse the data into a readable format for the app with time stamps

Story #8

As a developer, I want to create unit tests for the data logging module to ensure that it accurately captures and logs motor activity, sensor feedback, and control system data.

#	**Description**	**Estimated Time (hours)**	**Owner**
1	Create test cases for the motor activity data logging	2	James
2	Create test cases for the sensor feedback data logging	2	James
3	Create test cases for the control system data logging	2	James

Acceptance Criteria

- The user should not be able to create errors in the app for the import data functionality from the GUI window
- Ensure all data is logged and readable with no errors with filepaths, reading, or writing data

Total Hours Per Person for Sprint 1:

#	Description	Total Time
1	James Gilliam	30
2	Roger Braun	30
3	HyunShu Kim	30
4	Jenna Rigdon	30

Remaining Backlog

Data Logging:

1. ~~As a user, I want the system to automatically log motor activity during matches so that I can diagnose issues~~
2. ~~As a user, I want the system to automatically log sensor feedback during matches so that I can diagnose issues~~
3. ~~As a user, I want the system to automatically log control system data during matches so that I can diagnose issues~~
4. As a user, I want to be able to view each motor's activity separately so that I can see issues with specific motors
5. As a user, I want the data to be automatically backed up such that I can restore the data in case I delete them by mistake.
6. ~~As a developer, I want a framework that can receive, store, and send logged data to the app so that data logging and display can be implemented in the app~~
7. As a developer, I want there to be a motor object that tracks data, errors, and states of different motors so that visualizing motor activity can be implemented
8. As a developer, I want there to be a robust library of errors with the robot that can be detected with the logged data so that error messages can be implemented
9. As a developer, I want to have a stored database of information on potential errors that could be associated with the robot's performance so that I can warn the user of potential problems the robot is facing
10. As a user, I want to be able to view error messages from the CAN bus on the control system so that they are clear and easy to see
11. ~~As a developer, I want to implement an API for retrieving real-time data from the robot's control system so that it can be streamed directly into the logging system without delay.~~
12. ~~As a developer, I want to create unit tests for the data logging module to ensure that it accurately captures and logs motor activity, sensor feedback, and control system data.~~

Data Visualization:

1. As a user, I would like to be able to see graphs of the motor, sensor, and control system activity so that I can better understand the current state and trajectory of the robot. And, if time allows, as a user, I would like to see tables of the motor, sensor, and control system raw data so that I can catch specific errors or anomalies with the robot system.
2. As a user, I would like to be able to view the robot's path during the autonomous part of a match as a map so that I can record/visualize the robot's resulting motion in a match
3. As a user, I would like to be able to view the robot's path during the teleoperated part of a match as a map so that I can record/visualize how the robot is responding to commands overall
4. As a developer, I would like there to be a framework to back-calculate the expected path of the robot based on motor output data so that the motion visualization can be implemented

5. As a developer, I would like there to be a GUI to prompt the user for wheel dimensions and placement on the robot as well as the number of wheels (allowing between 3 and 6) so that the path can calculated

Data Export:

1. ~~As a user, I want to be able to export individual plots as visual files (jpeg, pdf, etc) so that they are easy to open and use elsewhere.~~
2. As a user, I want to be able to export individual plots as .csv files so that they are easy to open and use universally
3. As a user, I want to be able to export all data at one time or select which data plots to export so that such an export process is simple and/or storage/organization/time isn't wasted on unused data
4. As a developer, I want to implement robust error handling for the export feature to ensure that if the export process fails due to file permission issues, clear error messages are shown to the user, so that they know how to troubleshoot and correct the issue.
5. As a developer, I want to implement data compression for exported files, so that large datasets can be exported efficiently without overwhelming storage space or upload/download time.

System Configuration:

1. As a user, I want to be able to set my team number and team name so that data won't be confused with other teams
2. As a user, I want to be able to create an account on the app so that set up and save my personal settings/customizations
3. As a user, I want to be able to access my account on any device that has the app and log in and out of it so that the software is easier to access and multiple accounts on the same machine are possible
4. As a user, I want to be able to customize the color settings of the app to increase/decrease contrast so that the app is more ergonomic and tuned to preferences
5. ~~As a user, I want to be able to select different visualizations of data logging (various plots, various colors, etc.) so that the data is easier to see and customizable to preferences.~~
6. As a user, I want to be able to add or delete data visualization plots from the screen so that the most important data to see is always displayed/prioritized
7. As a user, I want to be able to open multiple tabs for viewing data to that large numbers of data visualization plots are easier to work with
8. As a user, I want to be able to label these tabs so that data is more organized
9. As a user, I want to be able to move plots from tab to tab so that data plots can be grouped according to needs, priority, type, ect.
10. As a user, I want to be able to freely label plots so that plots are easier to keep track of according to my specific needs
11. As a user, I want to be able to view the source code of my robot
12. (If time allows) As a user, I want to be able to develop my robot code in an integrated development environment within the application

13. As a developer, I want there to be a server-client framework (fat-client) so that accounts can be changed and accessed on other devices
14. As a developer, I want there to be a plot object so that different visualizations, data types, windows, and tiles can be implemented
15. As a developer, I want there to be (or to find) a Windows tab framework and tile objects so that multiple tabs with different data can be implemented

LogBotics Project

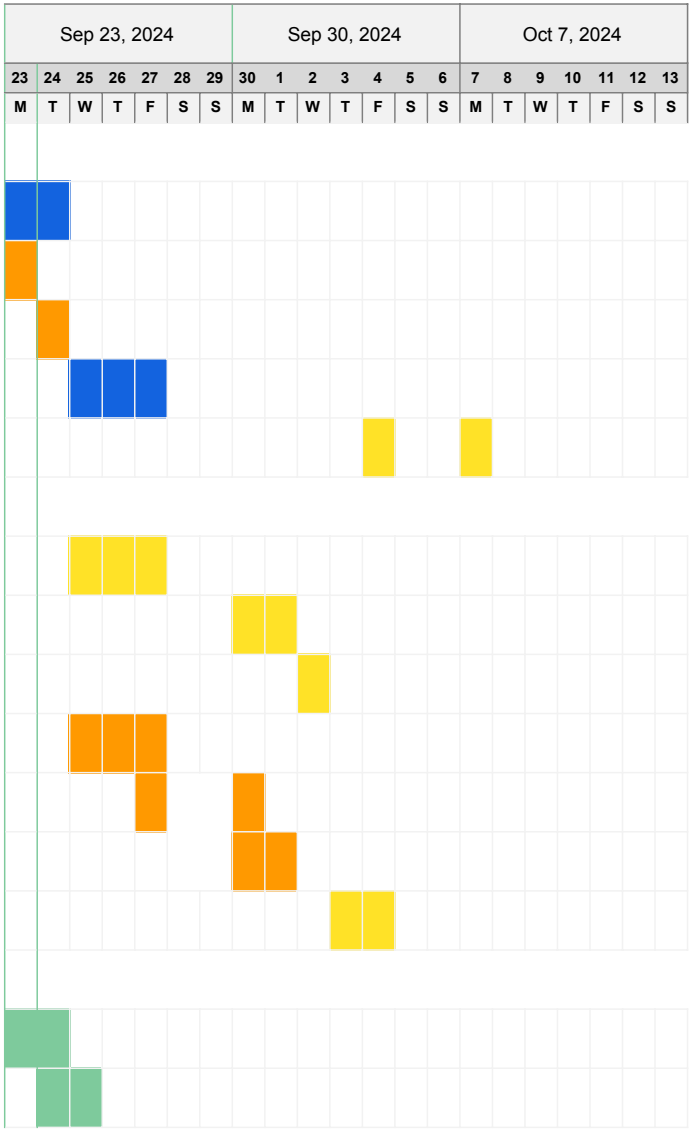
Team 24 Sprint 1

James Gilliam | Roger Braun | HyunShu Kim | Jenna Rigdon

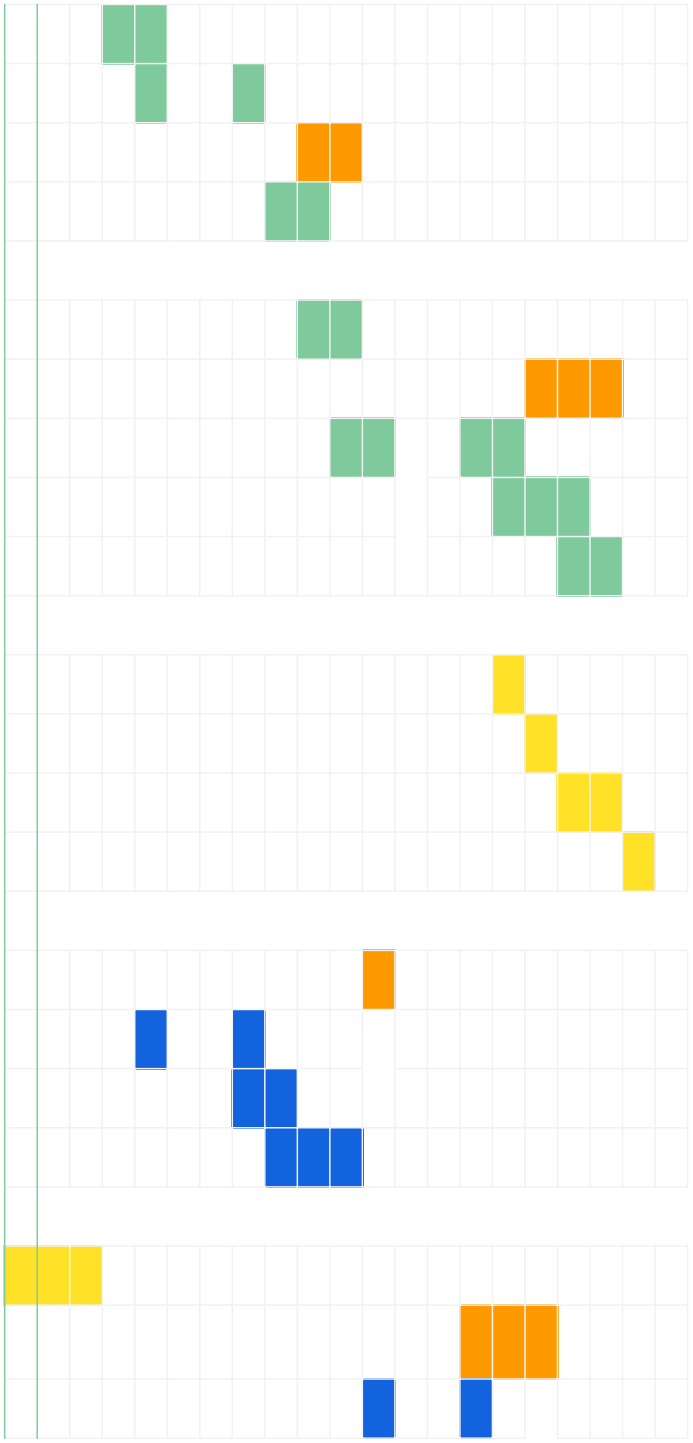
Project start: **Mon, 9/23/2024**

Display week: **1**

Story Number	Task Description	Owner	Start Date	Due Date
1	As a user, I want the system to automatically log motor and sensor activity during matches so that I can diagnose issues.			
4h	Set up the project repository and configure the basic back-end framework for data logging.	James	9/23/24	9/24/24
2h	Create a basic motor object to track motor activity such as RPM and torque	HyunShu	9/23/24	9/23/24
2h	Create a basic sensor objects to track sensor feedback during matches	HyunShu	9/24/24	9/24/24
5h	Set up the database schema to store motor and sensor data	James	9/25/24	9/27/24
3h	Integrate data logging functionality for motors and sensors into the application	Jenna	10/4/24	10/7/24
2	As a user, I want the system to automatically log control system data during matches so that I can diagnose issues.			
5h	Set up the framework for capturing control system data during the matches.	Jenna	9/25/24	9/27/24
4h	Implement functionality to log control system data in real-time.	Jenna	30/9/24	10/1/24
2h	Create a control system data object to store relevant metrics such as voltage, current, and system status.	Jenna	10/2/24	10/2/24
5h	Update the database schema to store control system logs.	HyunShu	9/25/24	9/27/24
2h	Integrate control system logging with existing motor and sensor logging functionality.	HyunShu	9/27/24	9/30/24
3h	Write unit tests for logging control system data, ensuring the data is accurate and stored correctly.	HyunShu	9/30/24	10/1/24
3h	Perform testing with a mock robot setup to verify control system data logging.	Jenna	10/3/24	10/4/24
3	As a user, I want to be able to create an account on the app so that I can set up and save my personal settings/customizations.			
3h	Set up UI component where user can input credentials to log in to the app or create an account	Roger	9/23/24	9/24/24
3h	Create database or file system to store existing user data	Roger	9/24/24	9/25/24



3h	Develop backend methods to record newly created account credentials	Roger	9/26/24	9/27/24
3h	Develop backend methods to validate inputted credentials against existing user info	Roger	9/27/24	9/30/24
4h	Create framework so that user preferences are saved to that specific user in the database	HyunShu	10/2/24	10/3/24
3h	Test methods with mock user data and small database	Roger	10/1/24	10/2/24
4	As a user, I want to be able to select different visualizations of data logging (various plots, various colors, etc.) so that the data is easier to see and customizable to preferences.			
2h	Build backend methods to retrieve data from database	Roger	10/2/24	10/3/24
5h	Create frontend UI and methods to manipulate the UI to the user's preference	HyunShu	10/9/24	10/11/24
5h	Develop backend methods to construct different data objects for different viewing formats	Roger	10/3/24	10/8/24
5h	Develop frontend methods to interpret different data formats into different visualizations	Roger	10/8/24	10/10/24
3h	Test methods incrementally with small data sets and simple data	Roger	10/10/24	10/11/24
5	As a user, I want to be able to export individual plots as visual files (jpeg, pdf, etc) so that they are easy to open and use elsewhere			
2h	Design the Export Feature UI	Jenna	10/8/24	10/8/24
2h	Implement Export Functionality	Jenna	10/9/24	10/9/24
4h	Integrate Export Options with Visualization Module	Jenna	10/10/24	10/11/24
2h	Test Export Functionality	Jenna	10/12/24	10/12/24
6	As a developer, I want a framework that can receive, store, and send logged data to the app so that data logging and display can be implemented in the app.			
2h	Write a script to read the inputted data	HyunShu	10/4/24	10/4/24
2h	Implement writing and reading the data to a basic data format inside the app	James	9/27/24	9/30/24
2h	Implement the + storeRawData() function and finish structuring the ImportData class	James	9/30/24	10/1/24
5h	Implement the + sendRawData() function to create an identical process with the server side, so different devices can access the	James	10/1/24	10/3/24
7	As a developer, I want to implement an API for retrieving real-time data from the robot's control system so that it can be streamed directly into the logging system without delay.			
5h	Establish some form of communication between the robot and the c	Jenna	9/23/24	9/25/24
5h	Create a workflow for the data (that is streamed from the robot to the computer) that communicates between the computer and the application itself	HyunShu	10/7/24	10/9/24
3h	Retrieve a continuous data stream from the robot with timestamps	James	10/4/24	10/7/24



3h	Express the data in a common readable format for the ImportData class	James	10/7/24	10/8/24
8	As a developer, I want to create unit tests for the data logging module to ensure that it accurately captures and logs motor activity, sensor feedback, and control system data.			
2h	Create test cases for the motor activity data logging	James	10/9/24	10/9/24
2h	Create test cases for the sensor feedback data logging	James	10/10/24	10/10/24
2h	Create test cases for the control system data logging	James	10/11/24	10/11/24