***EE/CprE/SE 491 SEMESTER 2 WEEKLY REPORT***

***3/1/2025 – 3/14/2025***

***Group number: 11***

***Project title: Slowpitch Softball Pitch Detector***

***Client &/Advisor: Nick Fila***

***Team Members/Role:***

***Andrew Vick - Machine Learning Integration***

***Casey Gehling - Client Interaction***

***Sullivan Fair - Individual Component Development***

***Ethan Gruening - Team Organization***

***Josh Hyde - Research***

***Cameron Mesman - Testing***

o **Weekly Summary**

* This week, we began integrating the YOLO/Flutter prototype into the rest of the app. Customizing the Ultralytics plugin, we have to incorporate the plugin’s source code into our project. Communicating between the model and the app will require a consistent and reliable coordinate system on camera images. This week's major focus was prioritizing our reliability when taking, marking, and analyzing images. Android camera orientation was an issue in viewing and saving photos from the camera. Flutter’s camera plugin does not read gyroscopic movements for Android devices, so platform-specific image management for Android devices was needed when handling images. Work on a gridded system for testing and user setup is still in progress

o **Past week accomplishments**

* **Andrew Vick:**
  + Worked on getting the source code for the Ultralytics plugin added to our project and merged into main. This also included getting my video testing screen and the live camera screen Sully and I worked on merged into main so that, as a group, we can begin integrating our different pieces.
  + I worked with Ethan and Josh to explain how my video screen works so that we can get the logic for the height lines and drawing of the grid added to it. This will help speed up the testing process for new models especially when it comes to performance on a real game.
* **Sullivan Fair:**
  + Looking into ways to return the positional coordinates of the model from the YOLO model detection to Flutter to be used in height calculations
  + Upon further testing of the model I trained, we found that the model couldn’t detect the softball at longer distances. So, I started training a new model on bigger images to better simulate the data we would be getting from the phone camera. However, the CoLab environment from Roboflow does not have enough memory to train on the bigger photos. Currently, I am in the process of seeing if I can get the model to train on my home PC.
* **Casey Gehling**
  + Met with the other softball team to compare current progress and implementation issues. Discussed future feature implementations as well as current solutions for the project.
  + Researched fixes for different compatibility issues we have been facing in development such as the Android camera orientation issue as well as UI differences.
* **Ethan Gruening**
  + Added a new extended class of CameraController, RotatedCameraController, to be used in the CameraPreviewWidget to correctly orient the images into landscape (180 degrees right) when calling takePicture() only when an Android device is being used.
    - The startImageStream is being used for the detection currently.
    - Can switch over to takePicture() to get correctly oriented data and a cached image file.
  + Rotated the CameraPreviewWidgets live feed 90 degrees when running on an Android device to orient the camera correctly.
    - The image isn’t fully maximized and extended on the screen.
  + With Sully and Andrew’s YOLO model page merged into main, I configured the Gradle settings to upgrade our packages to support the Ultralytics plugin on Android.
  + I overlaid the navigational buttons on the YOLO screen and began working on recording the screen. Only one camera controller can be active at a time, and during tracking, the camera controller embedded in the Ultralytics plugin is active. The alternative to recording the camera feed to a file I started testing was recording the Ultralytics plugin’s widget and outputting it to a file. This works around initializing another camera controller and keeps the Past Pitches screen functionality.
* **Josh Hyde**
  + Added the functionality of the gridlines to work on all screens that we wanted to add it for, so the past pitches screen, the camera screen, and the recording screen. These specific grid lines are very useful for potential debugging and testing when we have the actual softball object detection working that can accurately detect the ball and give back information that can be useful when determining the accuracy of the softball data. However, the issue with the implementation of the gridlines is that the orientation issues that were still trying to be fixed messes up the gridlines, so they will need to be slightly adjusted to fit the new dimensions and orientation that was implemented.
  + This week, with the help of Cameron, I looked into the android orientation issues and specifically how to solve these potential issues. There were a few potentially only temporary solutions as to where we got it to fix the orientation, however there would be further compression on the video feed, when there shouldn’t have been any. So, then with the help of Ethan, we found the solution to fixing the orientation issues at least on android, however the functionality of it needs to be added to the past pitches screen and to be further tested. It is tested on my android phone and works for the most part and visibly doesn’t look like there is any sort of compression, and the framerate seems very suitable and quite fast, however it has not been tested yet as it is beneficial to wait until the actual model is being tested through the app
* **Cameron Mesman**
  + Worked with Josh on the Android orientation bug. We found a solution that fixes the orientation on Android, but it still needs to be added to the past pitches screen to be tested fully. We also need to test it further on ios to make sure our new code doesn’t mess up anything there. If it does, we just need to add a check to see what device is being used and only run our new code for Android.
  + Also started working on fixing the grid system that we broke with our orientation code
* **Pending issues** 
  + This week, currently, all of our components are separate. We must centralize and connect each module to create a functional application. We must collect more data on the complete application, so testing another prototype is crucial.

o **Individual contributions**

| **NAME** | **Individual Contributions**  *(Quick list of contributions. This should be short.)* | **Hours this**  **week** | **HOURS**  **cumulative** |
| --- | --- | --- | --- |
| Andrew Vick | Cleaned up detection code, integrated the source code for the Yolo plugin, and added a screen to allow Yolo to do video predictions. | 5 | 87 |
| Casey Gehling | Team communication, bug fix research | 4 | 86 |
| Sullivan Fair | Looking into returning data, Started training new model | 4 | 91 |
| Josh Hyde | Orientation fixes, grid system on new fixes, past pitches screen | 6 | 94 |
| Ethan Gruening | Android camera orientation errors.  Camera/Yolo screen integration. | 9 | 118 |
| Cameron Mesman | Android orientation bug, grid system | 4 | 89 |

**Plans for the upcoming week**

* Andrew Vick
  + Work with group to get all the components integrated and working together
* Casey Gehling
  + Bug fixing
  + Testing
* Ethan Gruening
  + Continue working on recording past pitches.
  + Work on translating YOLO coordinates to Flutter coordinates.
* Josh hyde
  + Add orientation solution to past pitches
  + Fix grid system with solution
* Sullivan Fair
  + Try and get another full implementation of the app running so we can conduct another test
  + Record videos from the angle we need for the camera for model training
* Cameron Mesman
  + Work with Josh on adding orientation fix to past pitches
  + Fix grid system