Weekly Updates

sdmay25-11

Contributions

01 Ethan
Class-based Python object / height detection

02 Sully
Flutter Screen Development

03 Andrew
YOLO C++ integration

04 Casey
Flutter Tracking Screen

05 Cameron
Running C++ on iOS

06 Josh
Screen Sketches for app, Research into non-AI based object detection

Python Classes

CalibrationManagers

- ColorCalibrationManager handles the calibration of the softball color in random frame locations.
- DistortionCalibrationManager handles the calibration of the lens distortion.

CameraManager

- Initializes OpenCV and a camera
- Optionally can take in a distortion file in initialization.
- **capture()** returns the current camera frame

BallTracker

- Takes in a color calibration JSON file to create color bounds to locate the ball
- **find()** returns ball radius and location

Full Script Step-by-Step

01 Distortion Check

- Checks if a distortion file exists.
  - Yes, initialize camera.
  - No, create a distortion manager and calibrate camera

02 Color Calibration

- Create color manager and record average color in JSON format.
- Initialize the ball tracker with JSON file.

03 Identify Plates

- Select where home plate is located
- Select where pitcher's mound is located.
- Calculate pixel/feet conversion factor

04 Start tracking session

- Start a loop to record a frame
- ball_tracker.find(frame) to find softball
- Find height in relation to pitch line
- Output "Illegal" if height>max || height <min

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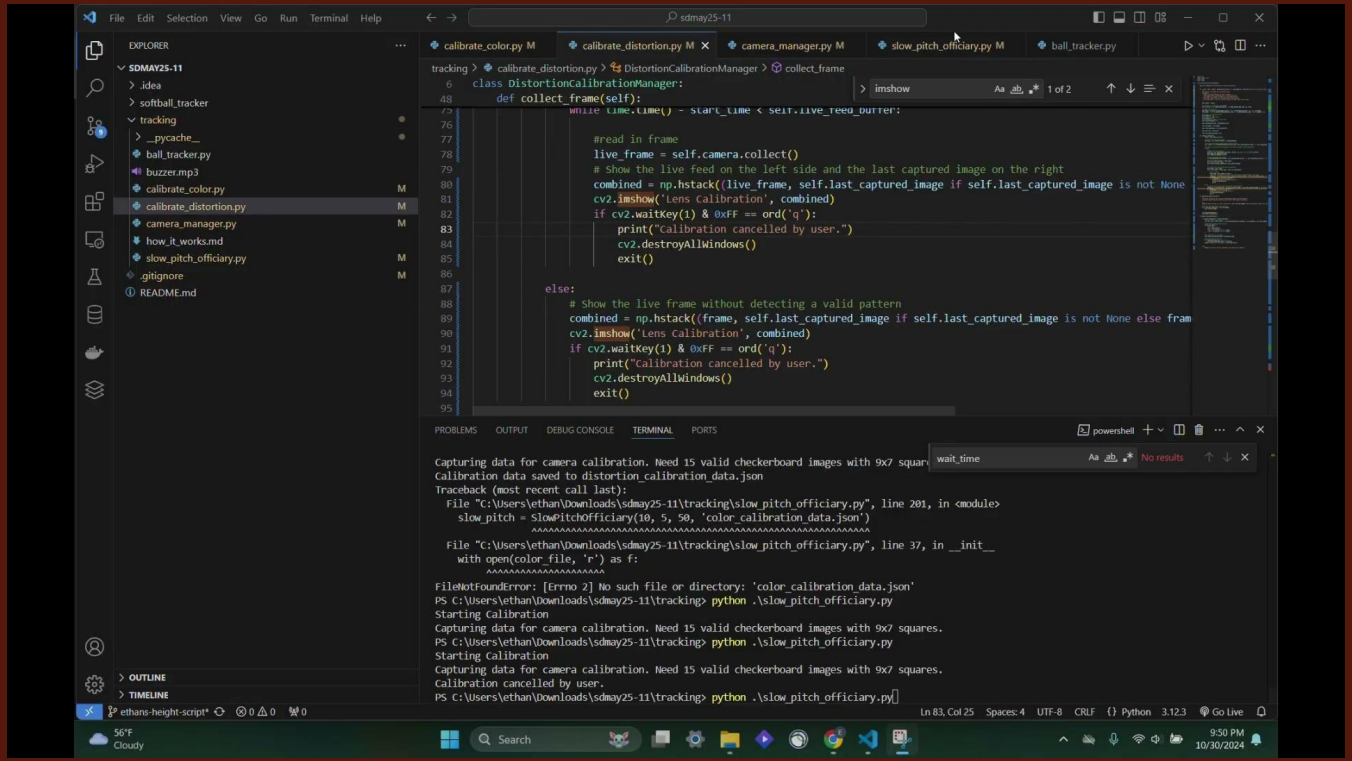
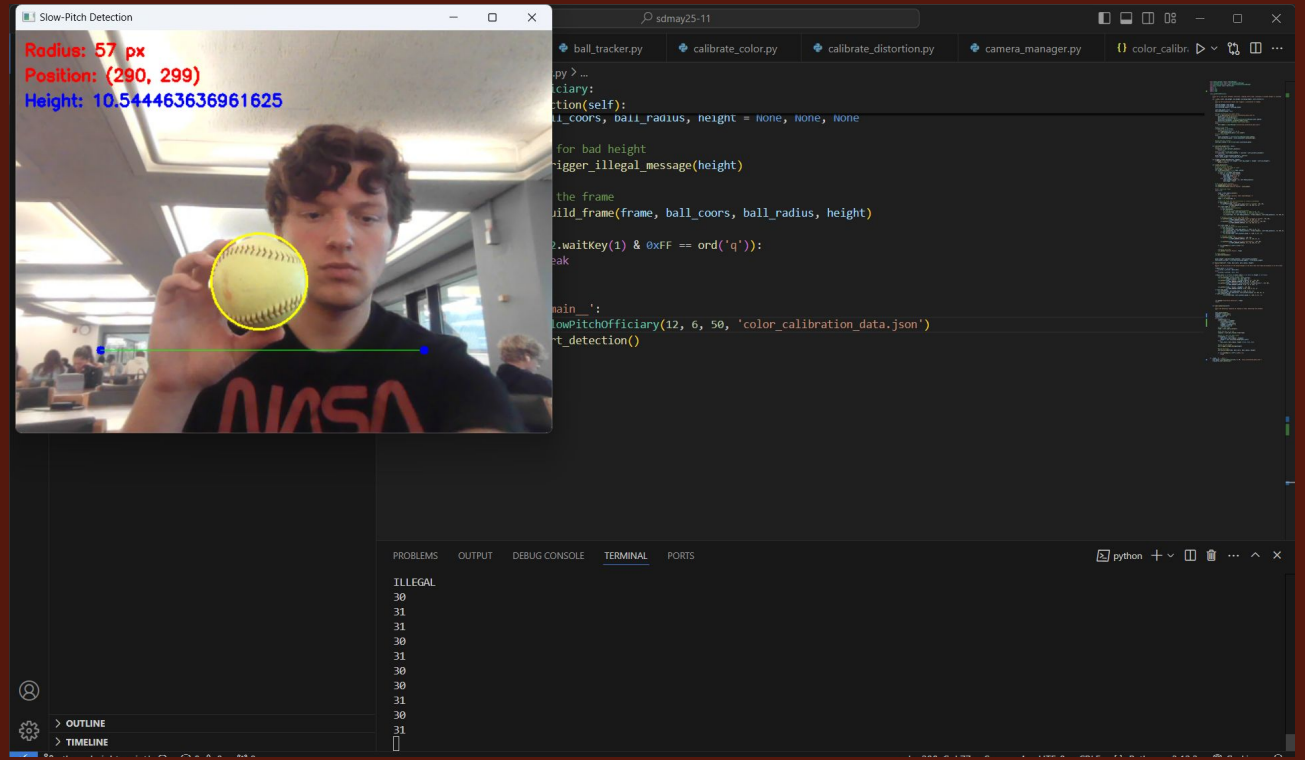

File Edit Selection View Go Run Terminal Help
sdmay25-11
EXPLORER
SDMAY25-11
.idea
softball_tracker
tracking
__pycache__
ball_tracker.py
buzzer.mp3
calibrate_color.py M
calibrate_distortion.py M
camera_manager.py M
how_it_works.md
slow_pitch_officiary.py M
.gitignore M
README.md
calibrate_color.py M
calibrate_distortion.py M
camera_manager.py M
slow_pitch_officiary.py M
ball_tracker.py
tracking > calibrate_distortion.py > DistortionCalibrationManager > collect_frame
class DistortionCalibrationManager:
def collect_frame(self):
imshow
1 of 2
#read in frame
live_frame = self.camera.collect()
# Show the live feed on the left side and the last captured image on the right
combined = np.hstack((live_frame, self.last_captured_image if self.last_captured_image is not None
cv2.imshow('Lens Calibration', combined)
if cv2.waitKey(1) & 0xFF == ord('q'):
print("Calibration cancelled by user.")
cv2.destroyAllWindows()
exit()
else:
# Show the live frame without detecting a valid pattern
combined = np.hstack((frame, self.last_captured_image if self.last_captured_image is not None else fram
cv2.imshow('Lens Calibration', combined)
if cv2.waitKey(1) & 0xFF == ord('q'):
print("Calibration cancelled by user.")
cv2.destroyAllWindows()
exit()
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
powershell
wait_time
No results
Capturing data for camera calibration. Need 15 valid checkerboard images with 9x7 squar
Calibration data saved to distortion_calibration_data.json
Traceback (most recent call last):
File "C:\Users\ethan\Downloads\sdmay25-11\tracking\slow_pitch_officiary.py", line 201, in <module>
slow_pitch = SlowPitchOfficiary(10, 5, 50, 'color_calibration_data.json')
File "C:\Users\ethan\Downloads\sdmay25-11\tracking\slow_pitch_officiary.py", line 37, in __init__
with open(color_file, 'r') as f:
FileNotFoundError: [Errno 2] No such file or directory: 'color_calibration_data.json'
PS C:\Users\ethan\Downloads\sdmay25-11\tracking> python .\slow_pitch_officiary.py
Starting Calibration
Capturing data for camera calibration. Need 15 valid checkerboard images with 9x7 squares.
PS C:\Users\ethan\Downloads\sdmay25-11\tracking> python .\slow_pitch_officiary.py
Starting Calibration
Capturing data for camera calibration. Need 15 valid checkerboard images with 9x7 squares.
Calibration cancelled by user.
PS C:\Users\ethan\Downloads\sdmay25-11\tracking> python .\slow_pitch_officiary.py
OUTLINE
TIMELINE
ethans-height-script*
Ln 83, Col 25 Spaces: 4 UTF-8 CRLF {} Python 3.12.3 Go Live
56°F Cloudy
Search
9:50 PM 10/30/2024


Slow-Pitch Detection
Radius: 57 px
Position: (290, 299)
Height: 10.544463636961625
sdmay25-11
ball_tracker.py
calibrate_color.py
calibrate_distortion.py
camera_manager.py
color_calibr
PROBLEMS
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31
OUTLINE
TIMELINE

Qt Framework - Pros/Cons

01 C++

+ Built on C++
+ May be easier to integrate C++ detection methods

02 Native Performance

+ Doesn't rely on virtual machines
+ Potentially better runtime performance

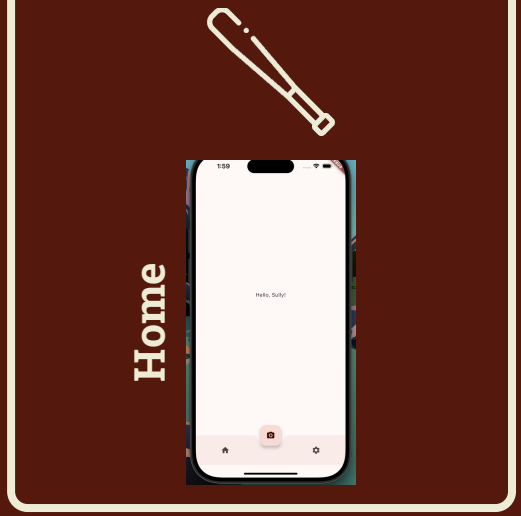
03 Licensing

- Would need to conform to LGPL requirements
- Adds another layer of complication for development

04 Appearance

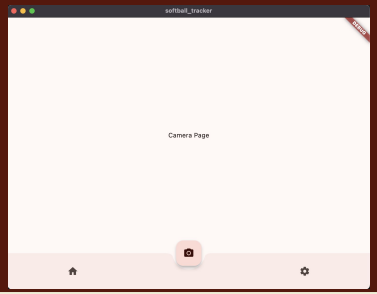
- Qt provides widgets for UI design, but lack "native" look
- Not as friendly for mobile development

Flutter Screens

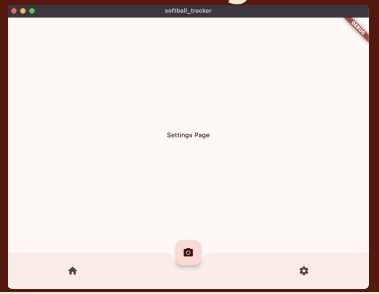


Home

Camera



Settings

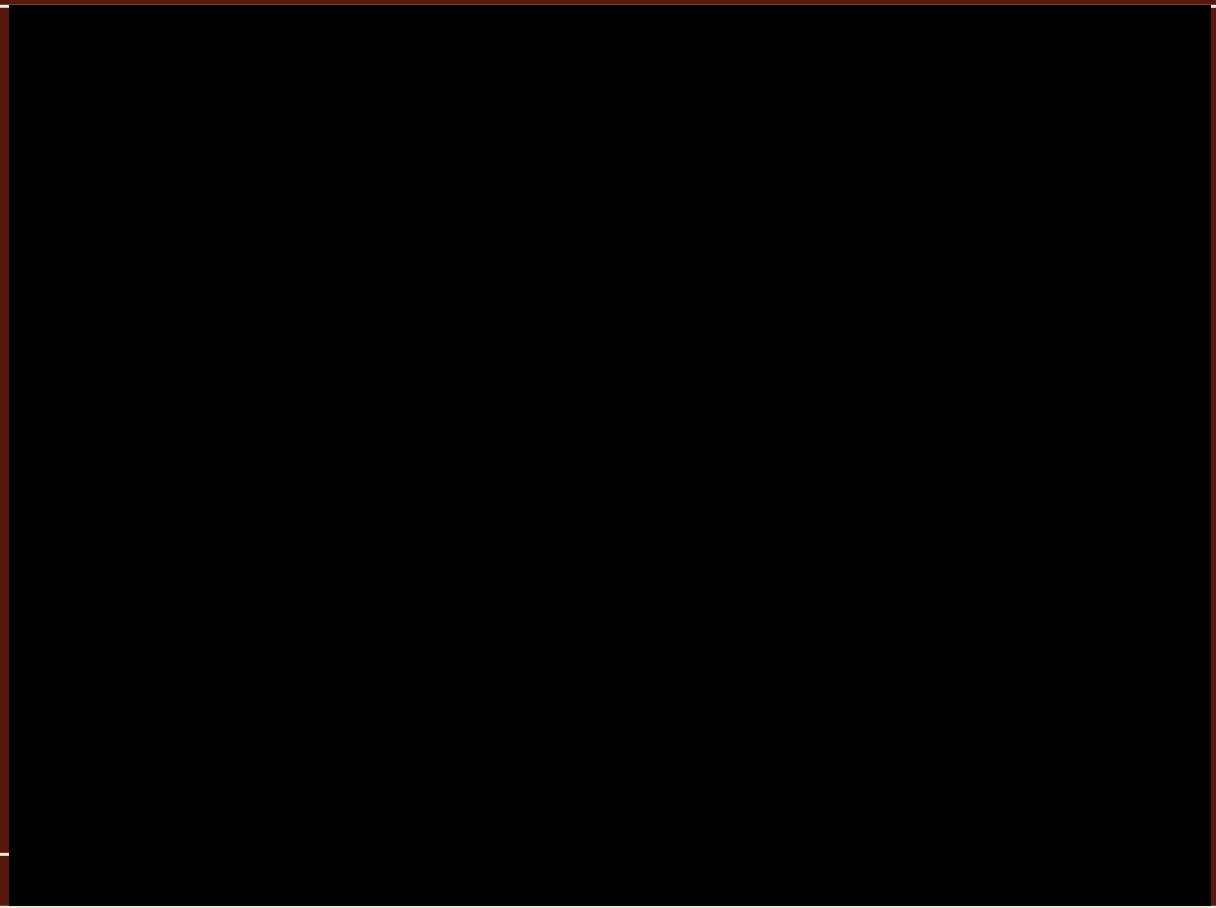


```
    return Scaffold(
      body: Center(
        child: _getBodyContent(),
      ), // Center
      bottomNavigationBar: SafeArea( // Wrap in SafeArea for padding on all devices
        child: Column(
          mainAxisSize: MainAxisSize.min,
          children: [
            BottomAppBar(
              shape: const CircularNotchedRectangle(),
              notchMargin: 8.0,
              child: Row(
                mainAxisAlignment: MainAxisAlignment.spaceAround,
                children: [
                  IconButton(
                    icon: const Icon(Icons.home),
                    onPressed: () => _onItemTapped(0),
                  ), // IconButton
                  const SizedBox(width: 40), // Empty space for the FAB
                  IconButton(
                    icon: const Icon(Icons.settings),
                    onPressed: () => _onItemTapped(2),
                  ), // IconButton
                ],
              ), // Row
            ), // BottomAppBar
          ],
        ), // Column
      ), // SafeArea
      floatingActionButtonLocation: FloatingActionButtonLocation.centerDocked,
      floatingActionButton: FloatingActionButton(
        onPressed: () {
          _onItemTapped(1);
        },
        child: const Icon(Icons.camera_alt),
      ), // FloatingActionButton
    ); // Scaffold
  }

  Widget _getBodyContent() {
    switch (_selectedIndex) {
      case 0:
        return const Text("Home Page");
      case 2:
        return const Text("Settings Page");
      default:
        return Text(
          hello("Sully".toNativeUtf8()).toDartString()
        );
```

```
class _MyHomePageState extends State<MyHomePage>
{
  int _selectedIndex = 0;

  void _onItemTapped(int index) {
    setState(fn: () {
      _selectedIndex = index;
    });
  }
```



Next Week

- Test prototype for height error.
- Research methods to improve the object tracking and find maximum height from a pitch.
- Continue C++ translation
- Continue Flutter development