

LT5 - Detailed Design



Slow Pitch Softball Detector Team 2 - Pitch Perfect

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Project Overview

Pitch Perfect is a device/app designed to track softball pitches and determine their legality based on height, ensuring fair play, safety, and aiding player development.

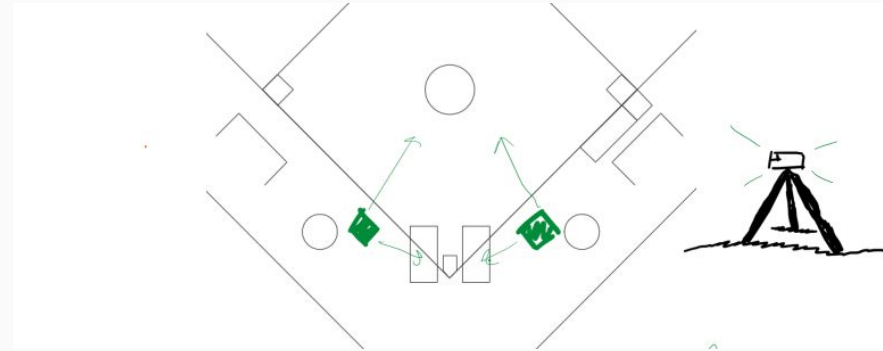


Objectives:

- Improve communication of pitch legality to players and coaches.
- Provide umpires with reliable data for consistent decision-making.
- Enhance overall player experience and development in slow-pitch softball.

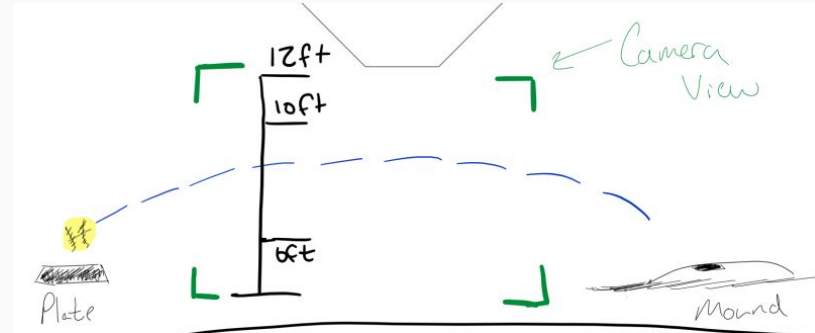
Detailed Design and Visuals

- Our device includes a phone mounted to the outer fence of the softball field
- The phone will run our app made with the QT framework. OpenCV used to perform the image processing to determine the height of the ball



Functionality

- When a pitch is thrown, the phone will read the max height of the ball and determine if it is within the proper range. An audible sound will play if the pitch is illegal
- The height script will be ran in a phone app where the user will calibrate the system to tell:
 - What the ball looks like in frame
 - Camera Height
 - Distance from the camera to the plate
 - Distance from the camera to the mound



Technology Considerations

- OpenCV:
 - Strengths
 - Widely used, large ecosystem
 - Wide range of functions, very versatile
 - Weaknesses
 - Potential high memory use
 - Lacking some advanced features
- QT C++ Framework:
 - Strengths:
 - Great cross-platform support
 - High performance with C++ vs. Python
 - Weaknesses:
 - High learning curve
 - Potential performance overhead

Areas of Concern and Development

- Limitations of our camera
 - Using different types of phones with each different cameras
- Frames per second during image processing
- Sunlight hindering ball detection
 - Softball becomes undetectable by camera when in front of sun.

Conclusion

Our device represents a step forward in ensuring fair play in slow-pitch softball. By leveraging image processing through OpenCV and the QT framework, our device provides real-time feedback on pitch legality, enhancing consistency for umpires and feedback for players. Despite challenges like camera limitations and environmental conditions, our design is poised to make a significant impact on the game, ensuring accurate, reliable, and accessible pitch tracking.