
Software Requirements Specification

for

SLOW-ARC

Version 3.0 approved

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11/14/2023

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Revision History

Name	Date	Reason For Changes	Version
SLOW-ARC	Oct 2023	N/A	1.0
SLOW-ARC	Oct 2023	Reviewed SLOW-ARC 1.0 for organization and completeness, correctness, quality attributes, traceability and other special issues	2.0
SLOW-ARC	Nov 2023	Removed gold-plating: ‘adjunct legal’ classification.	3.0

1. Introduction

Purpose

The **SLOW-ARC** shall be deployed on-field in soft-ball games where it shall accurately identify each pitch as being either a **strike** or a **ball**.

Product Scope

It often requires significant training for umpires to learn to gauge the **strike zone** of a batter. As a result, judging whether a pitch passed through the strike zone, and furthermore, declaring the pitch to be a strike or a ball, is not an easy task. The **SLOW-ARC** is being designed and developed as an assistive tool for umpires in order to automate the tasks described above while maintaining the umpires' ability to intervene at any point.

2. Overall Description

Product Perspective

Several professional sports leagues make use of a system called Hawk-eye¹, which is effectively able to umpire the match even despite ball-speeds in excess of 100 mph. While the system is comprehensive, its heavy requirements in the used hardware and software force the system to be expensive. While such an expensive system is not viable in the context of slow-pitch soft-ball games, the SLOW-ARC aims to capture critical functions of Hawk-Eye while remaining far more scalable and cost-effective.

Product Functions

The primary function of SLOW-ARC is to classify pitches into strikes or balls and report the result upon user request. To do so, it tracks the batter and home plate to determine the strike zone and tracks the pitch to determine if the ball passed through the strike zone or not.

User Classes and Characteristics

There is one class of users for the SLOW-ARC: umpires (whether registered or unofficial). The umpires shall have access solely to the ball/strike classification function.

3. System Features

3.1 The system shall be able to obtain videos of the pitch from the sensors/cameras

3.2 The system shall be able to determine if the pitch is a ball or a strike.

3.2.1 The system shall be able to determine the position of the ball, batter, and pitch in 3-dimensional space in real time.

3.2.1.1 The system shall determine the strike zone from the position of the batter in the batter box and the position of home plate.

3.2.1.2 The system shall be able to track the path of the pitch in proximity to the strike zone

3.2.2 The system shall determine when the pitch passes through the strike zone.

3.2.2.1 The system shall register a pitch as a strike when the pitch passes through the strike zone.

3.2.2.2 The system shall register a pitch as a ball if it does not pass through the strike zone.

3.3 The system shall be able to report the determination of the result to the user.

4. Other Nonfunctional Requirements

4.1 The system should be installable within 20 minutes and retractable within 5 minutes

4.2 The system shall be at least as accurate as a human umpire.

4.2.1 The system shall correctly determine if a pitch is a ball or a strike at least 96% of the time.

4.2.1.1 If a factor outside of the variables tracked by the system affects the correctness of the call, then it is up to the user to overrule the system's call.

- 4.2.2** The system should be able to make a determination of a strike or ball in less than a minute.

Appendix A: Glossary

B

Ball

A pitch that does not enter the strike zone in flight and is not struck, or attempted to be struck, by the batter

S

Strike

A pitch that is entered in the strike zone but not swung at, or a pitch at which the batter swings and misses or fouls off. If a batter receives three strikes the batting team receives an out.

Strike zone

The area over home plate from the batter's kneecaps to directly below the batter's armpits, or back shoulder, when the batter assumes a natural stance.