1. Introduction

1.1. PROBLEM STATEMENT

Slow Pitch Softball is primarily a recreational sport, a chance for a team to have a good time, be active, and do it in a competitive environment without the stress of professional sports. That said, there are still rules that the players must follow. One such rule plagues pitchers, batters, and umpires everywhere: illegal pitches. All pitches must reach a minimum height, usually 6 feet, and not exceed a maximum height of around 10-12 feet, depending on the league. If a pitch does not meet these requirements, it is considered "illegal," and the batter does not have to swing at it.

However, human error leads to more complications than the simple parameters may let you believe. An umpire standing behind home plate is the one who must call an illegal pitch. If he calls a pitch too late, a batter may have already begun to swing and be frustrated that they didn't have to swing at the pitch. If he inaccurately calls an illegal pitch, the pitcher will be frustrated with a fine pitch, suddenly becoming a free ball for the batter. Frustration about illegal pitches causes frustration amongst players who don't need to be there in a sport like Slow Pitch Softball. This is the crux of our problem.

We are tasked with finding a better way to call these illegal pitches. We will create an external device to detect a pitch's height accurately and quickly signal if it is illegal. Cutting out the subjectiveness of an umpire in illegal calls (and allowing them to direct their focus on the rest of the game) while making a call just as fast, if not faster, than one will make illegal pitches easier to deal with for everyone involved. We will use a camera and speaker system, such as a phone pointed at the pitcher, to track and call an illegal pitch.
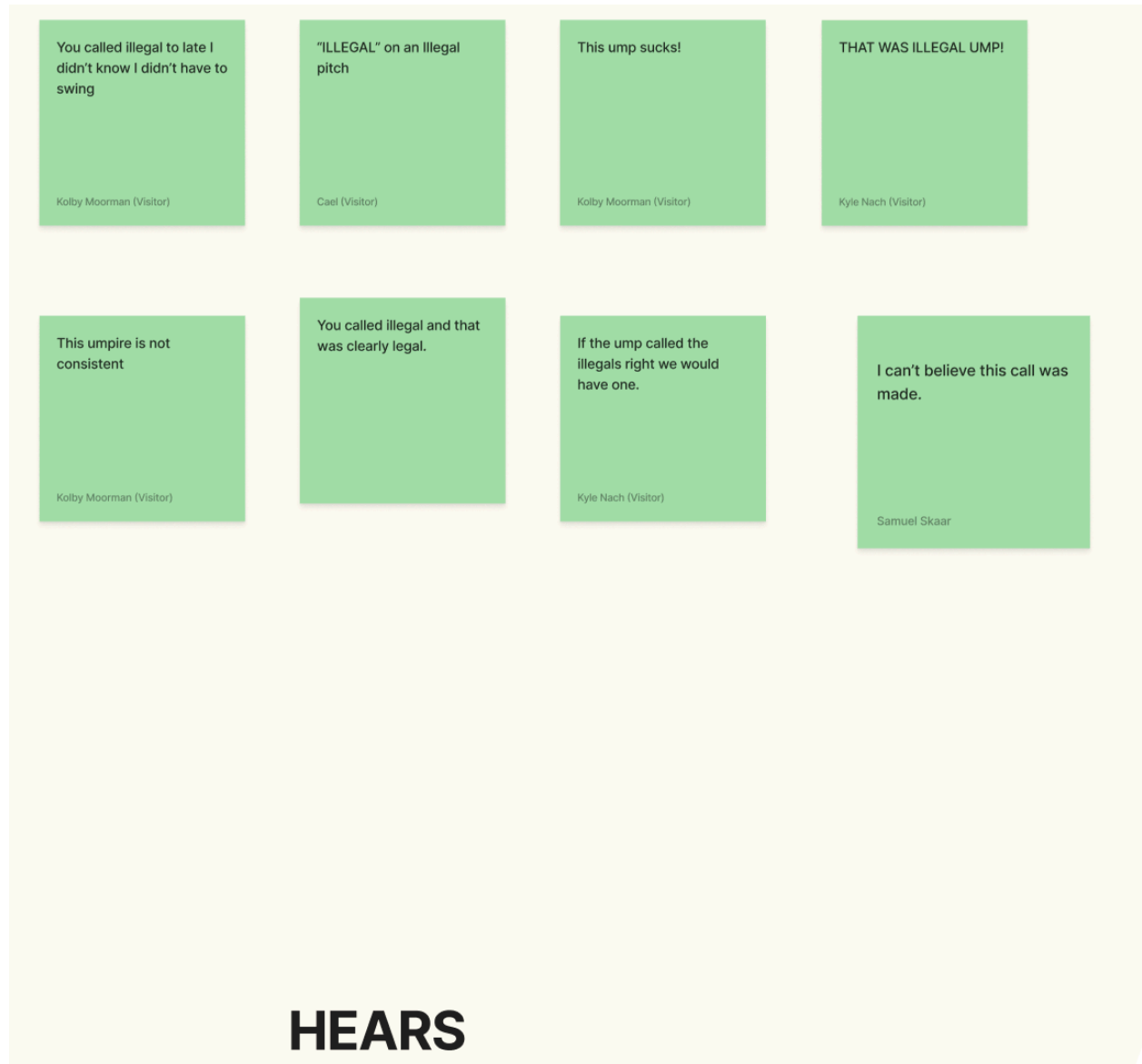
1.2. INTENDED USERS

The application we create to determine whether or not a pitch is legal or illegal will have three different users. These users consist of slow-pitch pitchers, hitters, and the umpires for the slow-pitch games. The pitchers can benefit from this application as they can fine-tune their pitches to the perfect height. The batters will benefit from this application as they will be informed that it is illegal and that they do not have to swing in plenty of time. Lastly, the umpires, typically umping as a side job, will benefit from this application because they will not have the pressure of being perfect at calling illegal pitches based on their eyesight and will be able to rely on the application itself to do it.

The pitchers that play slow pitch need this system to ease consistent illegal pitch calls. Right now, the pitcher relies on the umpire to call it early enough in the pitch's life cycle so that the batter knows they don't need to swing. Although it may sound like only a benefit for the batter, the batter knowing they don't have to swing allows for a safer environment for the pitcher as there is a smaller chance that the ball gets hit right back at the pitcher.

The batters that play slow pitch need this system so they know when an illegal pitch is present and they aren't required to swing. In slowpitch softball, there is an unwritten rule to not hit the ball right back at the pitcher. If the batter has two strikes and the last pitch they see is illegal but not called, there is more of a chance the ball gets hit right up the middle where parties from both teams may be upset. This application will also allow the batter to be more specific on pitches they are swinging at so that they can be selective on when to swing and when to not.

The umpires that work during the slow pitch games need this application so that they are required to do less and can focus on watching the ball in play and the bases. The umpires benefit from this the most because they will have less weight on their shoulders on being consistent throughout the game on knowing the exact height of a pitch. They won't have to hear complaints from the teams about calling it illegal too late or not calling it illegal at all as the application will take that aspect out for them, and no one can complain.

Empathy Map:

You called illegal to late I didn't know I didn't have to swing Kolby Moorman (Visitor)	"ILLEGAL" on an Illegal pitch Cael (Visitor)	This ump sucks! Kolby Moorman (Visitor)	THAT WAS ILLEGAL UMP! Kyle Nach (Visitor)
This umpire is not consistent Kolby Moorman (Visitor)	You called illegal and that was clearly legal.	If the ump called the illegals right we would have one. Kyle Nach (Visitor)	I can't believe this call was made. Samuel Skaar

HEARS

Softball games

Cael (Visitor)

Pitches, both legal and illegal

Cael (Visitor)

Upset pitchers and batters

Kyle Nach (Visitor)

A good or bad pitch

Samuel Skaar

Home runs

Cael (Visitor)

SEES

Frustration with illegal calls

Cael (Visitor)

Frustration with speed

Cael (Visitor)

Relief when a pitch is called correctly

Cael (Visitor)

Annoyed at a call they dislike

Cael (Visitor)

Annoyed with the consistency of the umpires calls

SAYS & DOES

Ump calls an illegal pitch

Cael (Visitor)

Batter decides to swing at a pitch depending on if it is illegal or not

Cael (Visitor)

Pitcher throws a pitch

Cael (Visitor)

Cussin

Samuel Skaar

Batter hits a pitch they like

Cael (Visitor)

Personas:

Daniel

"Pitcher"

- 28
- Accountant
- Des Moines, IA
- More info
- More info

Bio

Daniel is an accountant who enjoys playing slow pitch games with a team from work. He found that he has a knack for pitching and enjoys being a team player. He gets frustrated, however, when an umpire calls his pitch illegal when he throws a changeup, even though he knows his pitch was in the correct height zone. He wished there was an easier way to make these calls so he could through a different pitch without it always being called illegal.

Personality

Introvert		Extrovert
Analytical		Creative
Busy		Time rich
Messy		Organized
Independent		Team player
Passive		Active
Safe		Risky

Billford

"Umpire"

- 53
- Industrial Engineer
- Ames, IA
- Married with a wife and kids

Bio

Billford spends his spare time after work helping to umpire local slow-pitch softball games. He doesn't do it for the small pay, but instead to give back to his community and for his love of the sport. He is by no means a professional umpire but does his best to make fair unbiased calls.

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Kevin

Batter

- 30
- Mechanic
- Ames, Iowa
- More info
- More info

Bio

Kevin is a local mechanic at a nice shop in Ames. He used to play baseball a lot when he was younger which that lead him to join a slow pitch softball league after work. He is used to working alone so he doesn't talk to his team much or argue with the ump. He gets upset when umpires are inconsistent with their calls and call "illegal" too late. Kevin enjoy Busch lite and watching sports.

Personality

Introvert	Extrovert
Analytical	Creative
Busy	Time rich
Messy	Organized
Independent	Team player
Passive	Active
Safe	Risky