The background is a dark blue-grey color, decorated with various geometric shapes and patterns in teal and white. There are circles of different sizes, some with dotted interiors, hexagons, and triangles. Some shapes are solid teal, while others are white outlines or dotted patterns. The overall aesthetic is modern and technical.

Picture This! (C6)

Joseph Ayala, Anthony Meza, Sophia Zhang

Use Case

Problem – Most games do not promote social connection nor active movement of the body

Solution – Game of pictiography with drawings visible in virtual space

- Provides a novel way of entertainment, as well as social interaction, bonding, and strengthening
- Fun way to form connections, (e.g. icebreaker games or company social events)
- Improves creativity, spatial awareness, and hand-eye coordination in children while still promoting social interaction

ECE Areas

- Software ECE area: line drawing algorithm and AR
- Hardware ECE area: pen used to track positional data



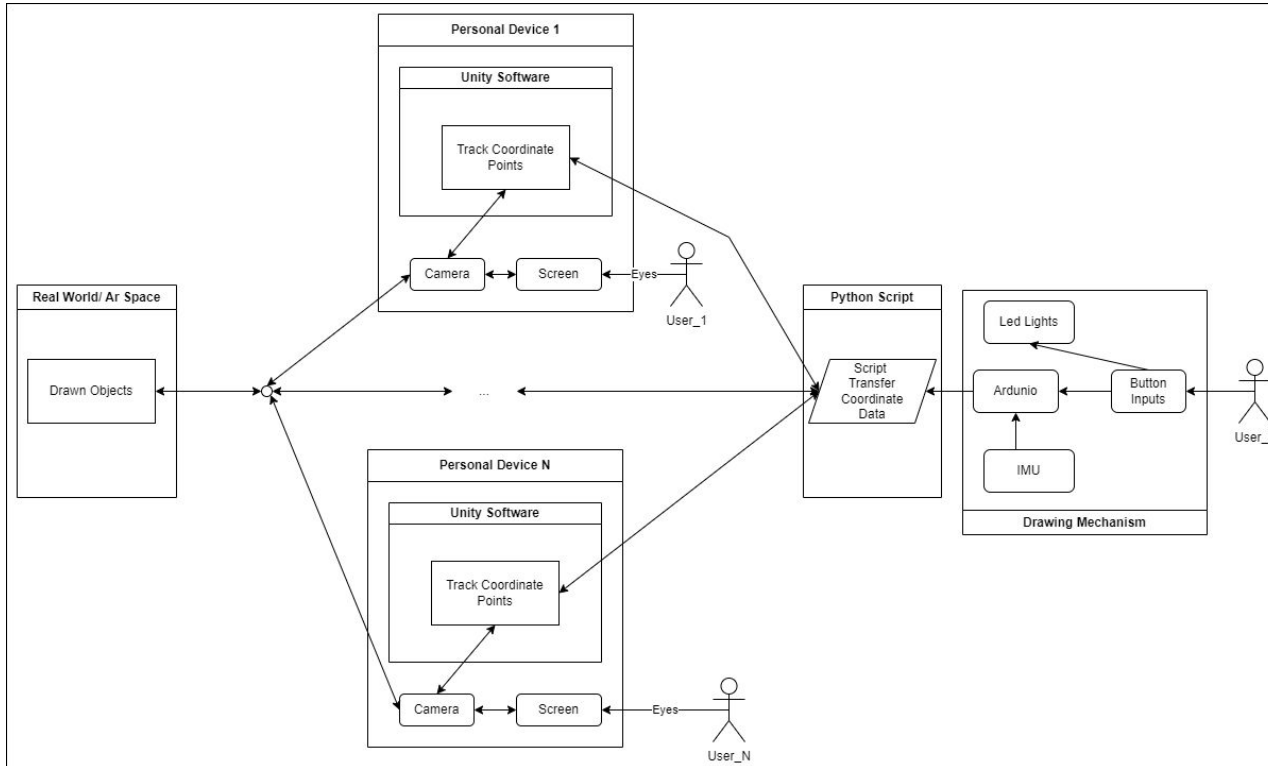
Quantitative Use Case Requirements

- Encourage Social Interaction
 - 3 Players participate minimum
 - “Real time” (<1 second delay) gameplay where devices will interact
- Hardware is responsive and portable
 - Total latency of < 150 ms
 - Less than 1lb and battery life at least 4 hours
- Drawn lines are relatively straight
 - Line pixel deviation < ½ inch both vertically and horizontally

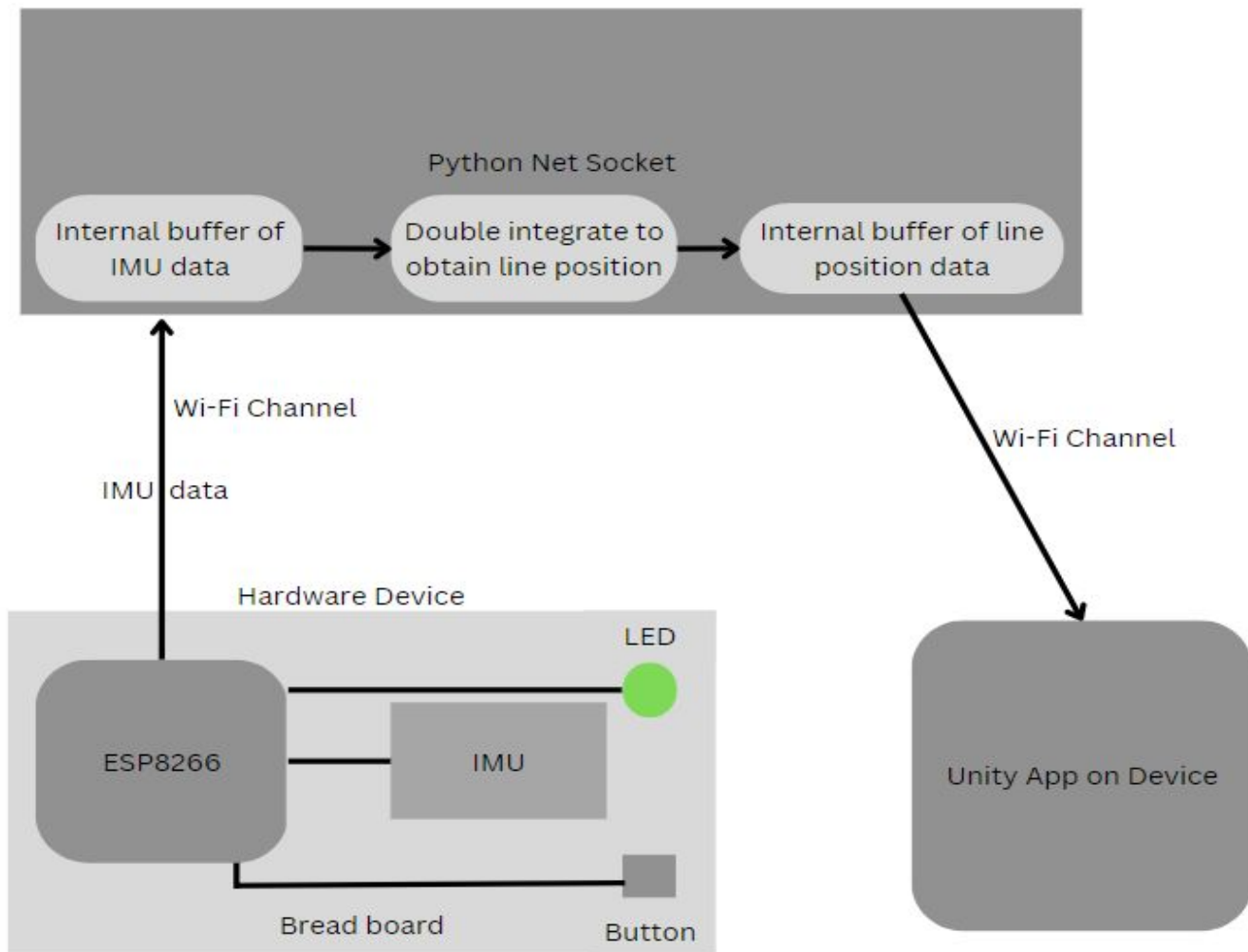


Solution Approach

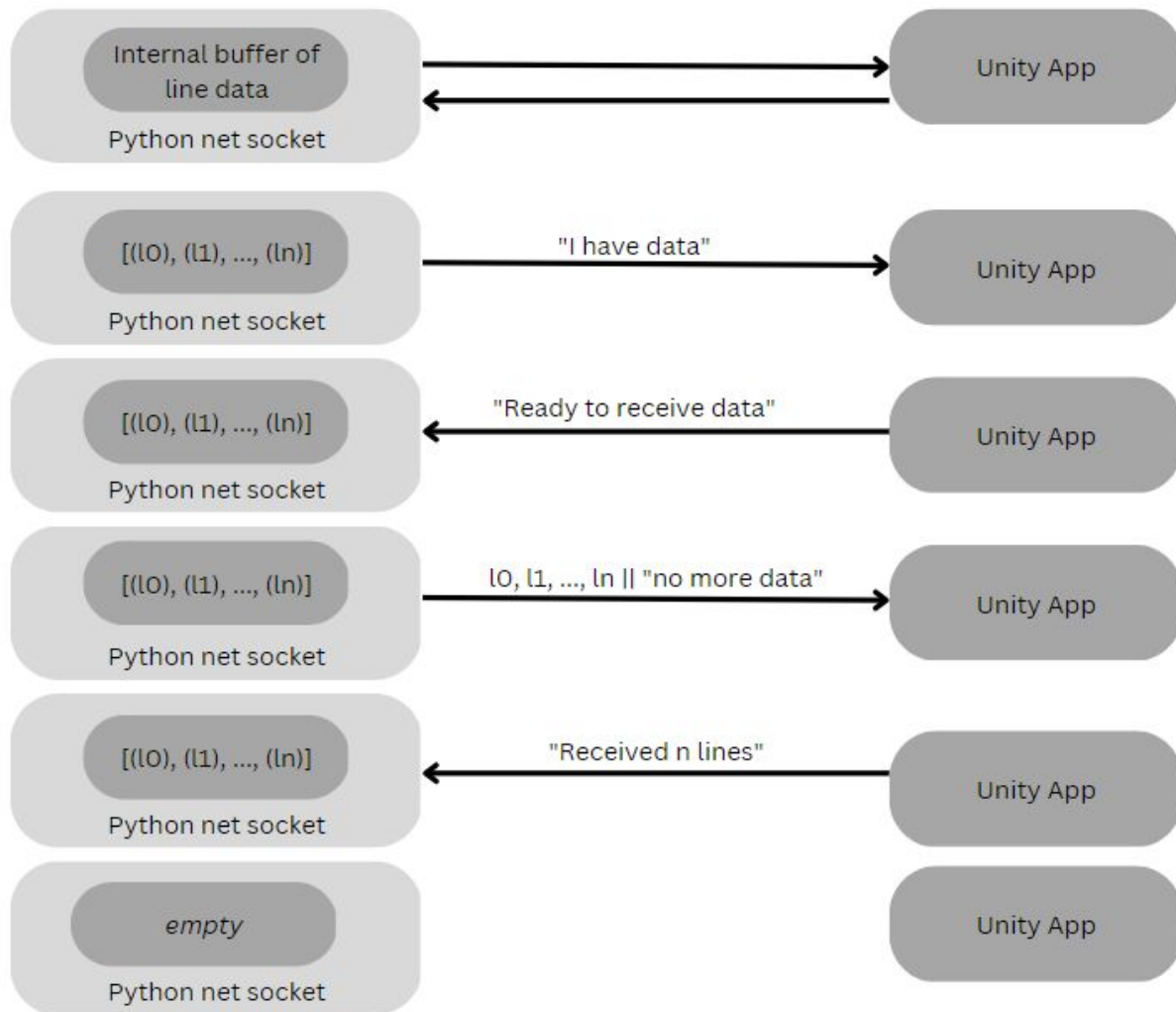
Will be using Unity for game development and for packages it offers
Hardware Pen Component will be used to communicate for image generation



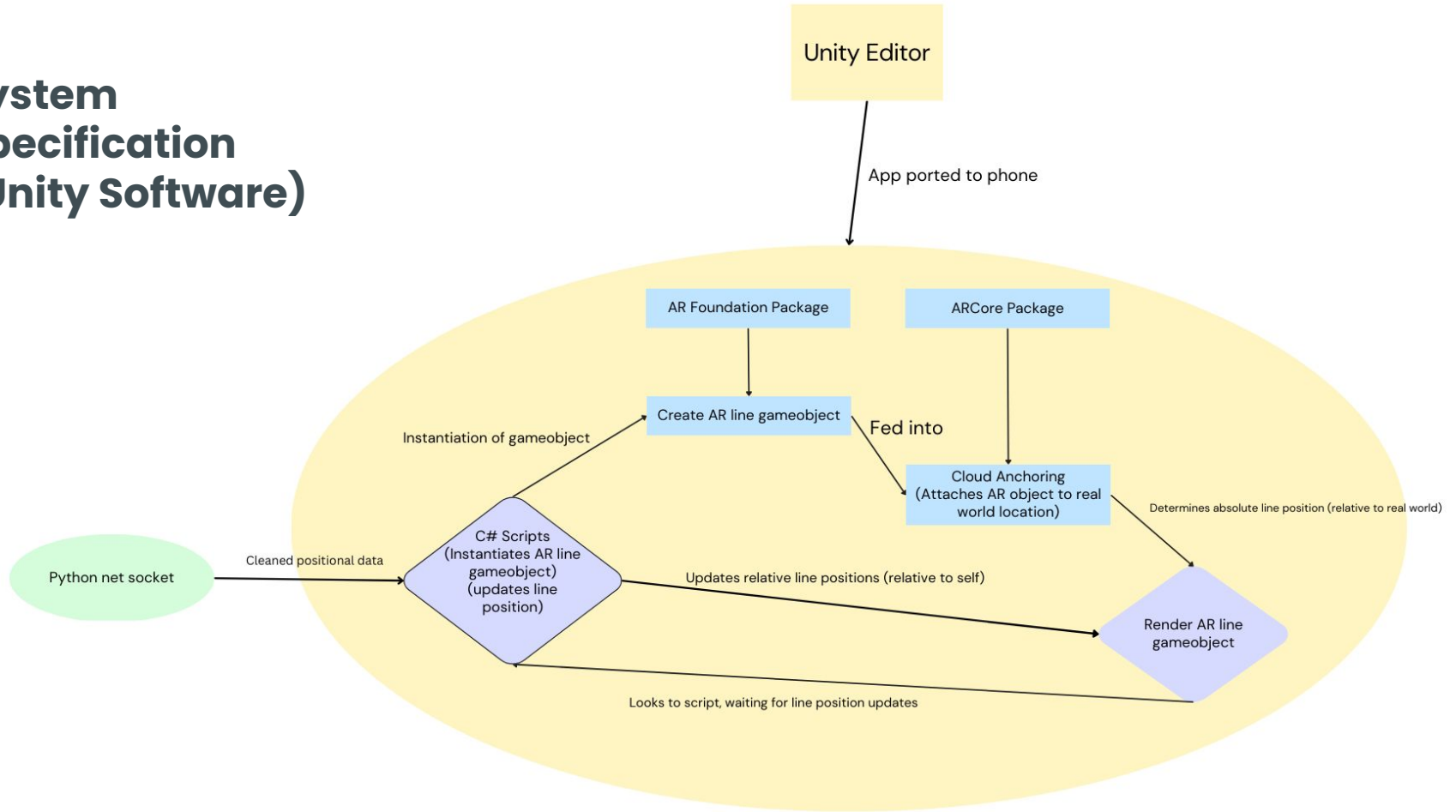
System Specification (Hardware)



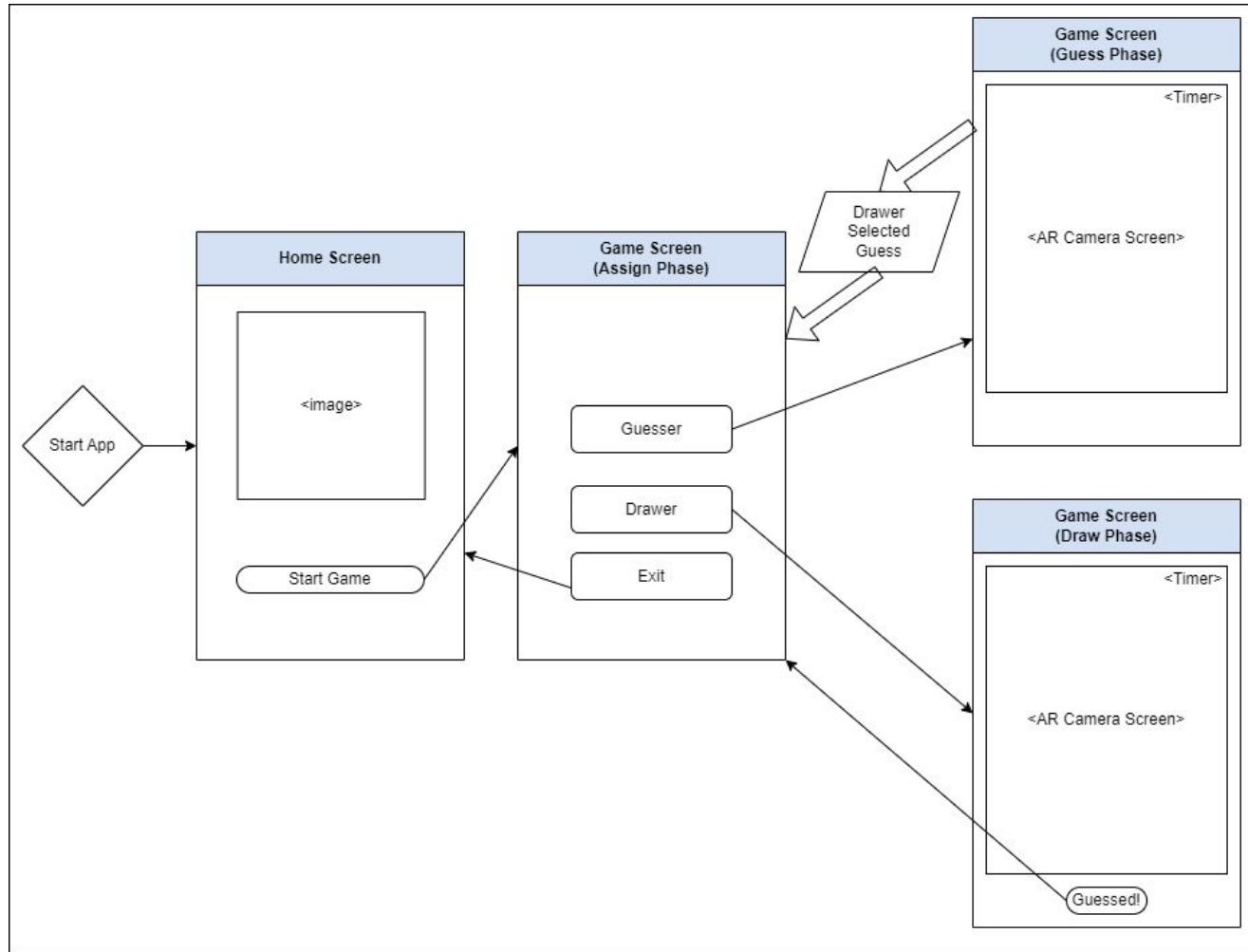
Wifi Communication Protocol



System Specification (Unity Software)



System Specification (Game Scenes)



Implementation Plan

Buying:

- Hardware components
 - ESP8266, LED, button, IMU

Designing and Assembling:

- Pen is pieced together from bought hardware components

Developing:

- Python script to function as net socket for data transfer
 - Receive data from IMU
 - Send data to Unity App
- Python script calculate line position from IMU data
 - Double integrate data
 - Estimation via trapezoidal integration

Implementation Plan (cont)

Downloading:

- Unity
 - Implements game scene and renders line gameobject + C# Script communicates with Python Script
- ARFoundation
 - Allows creation of AR game objects and portability of app to android phone
- ARCore
 - Allows Cloud Anchoring functionality to position line gameobject in real world location

Creating:

- Gamescene + AR objects (rendered virtual line)
 - Real world replicated through use of camera
- Android application ported to phone



Testing, Verification, and Metrics

- Pen
 - Collection of data during specified intervals
 - Measurement on latency of sending data
- Visual verification of drawn lines
 - User testing - 4 out of 5 users are satisfied with the generated drawing
 - Achieve 90% accuracy between AR line and real line in overlapping line test
 - E.g. a virtual red line drawn over a real black line, 90% of line pixels should be red
- Game Functionality
 - 3 players are able to view drawing on devices

