ECE 597SD
Project Proposal

Team

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Motivation

Though it is a refreshing and fun method of entertainment to the consumer, current Augmented Reality (AR) immersion is limited by how the user is able to interact with the virtual environment and how virtual elements are accurately anchored on physical objects and locations. To help bridge this gap between augmented and true reality, there are several visual markers that are currently being explored. A particularly viable solution is the use of LED based anchors for information overlaying. The vitality of an LED based solution is enabled through their subversion of background visual noise, non obstructive nature, and resilience to partial occlusion. These benefits, the robust system they make possible, and the current necessity for accurate AR anchoring serve as our motivation for this project to realize a system capable of AR content linking from LED tags to an iPad.

Design Goals

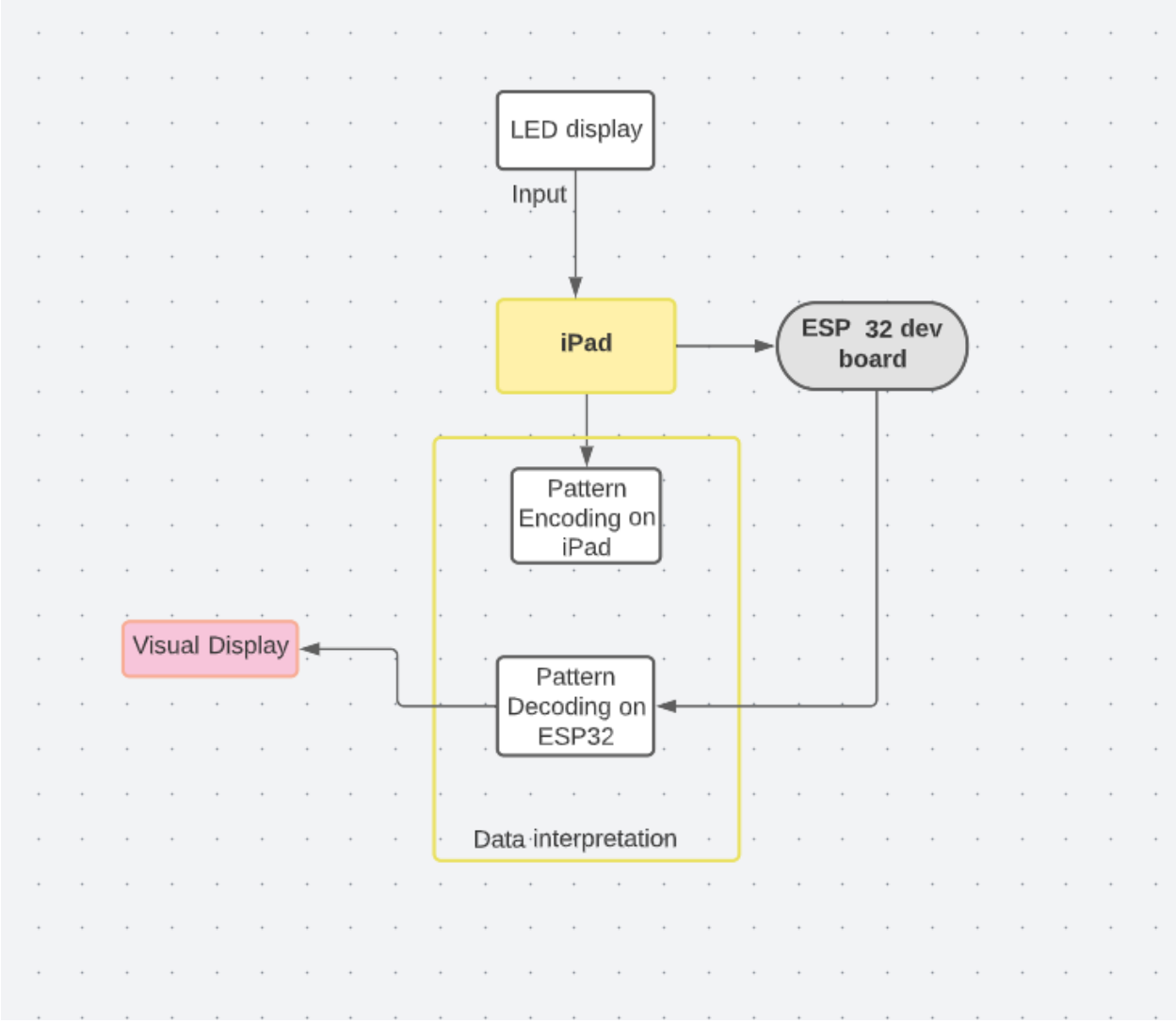
Our goal for this project is to create a screen-camera communication system that can accurately overlay content on an iPad screen using a light based anchor. The system will use LEDs as tags to communicate through our iPad's camera to collect communication and localization data. We will incorporate an identity for each tag by assigning a unique visual pattern that can be identified over a set distance. Our main goal for this project is to develop synchronized real time pattern encoding and decoding for the sender and receiver devices.

Project Deliverables

- Develop unique visual pattern identifications for communication using an LED array display that can be detected up to six feet away
- Collect accurate and consistent communication and localization data from each visual tag using a camera
- Establish wireless communication between the sending and receiving devices that ranges six feet

- Develop encoding patterns for the device sending data and decoding patterns for the receiving the data in real time
- Establish synchronized communication between the sending and receiving devices

System Blocks - Ananya



System Requirements

- Wireless communication between our iPad and ESP32 microcontroller
- Establish pattern encoding capability on an iPad
- Establish pattern decoding capability on an ESP32 Thing
- Create a visual display that conveys unique patterns to communicate data in a six foot range

Team Members Responsibilities

- AJ Saint Louis: LED Decoding + Research
- Paige Wadas: Hardware + Research
- Chen: Integrating all the parts + iPad application + Overlay
- Ananya Rao: LED encoding + iPad application + Overlay

Tentative Project Timeline

Date	Task
September 30th	Project Proposal
October 11th	Hardware Setup
October 18th	LED Encoding
November 3rd	Camera Recognition
November 10th	LED Decoding
November 10th	Project Check-In 1
November 24th	iPad Application
December 1st	Project Check-In 2
December 8th	Demonstration Final
December 20th	Final Project Report

References

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