# Introduction

In daily life, users are integrating wearable technology products into their lives more and more day by day. This technological revolution, which started with the daily use of smart phones, continues to accelerate in the market with products such as smart watches and wristbands. Smart glasses, which are new types of wearable technology products that include augmented reality in the past years, have not received a great acceptance in the market yet. The reason why these wearable technology products, which bring the border between reality and information technologies closer together, have not yet found a place in the market, is that smart glasses and their derivatives are not attractive to users in terms of design and their costs are high. Our top priority is accessibility and customization to solve this very problem.

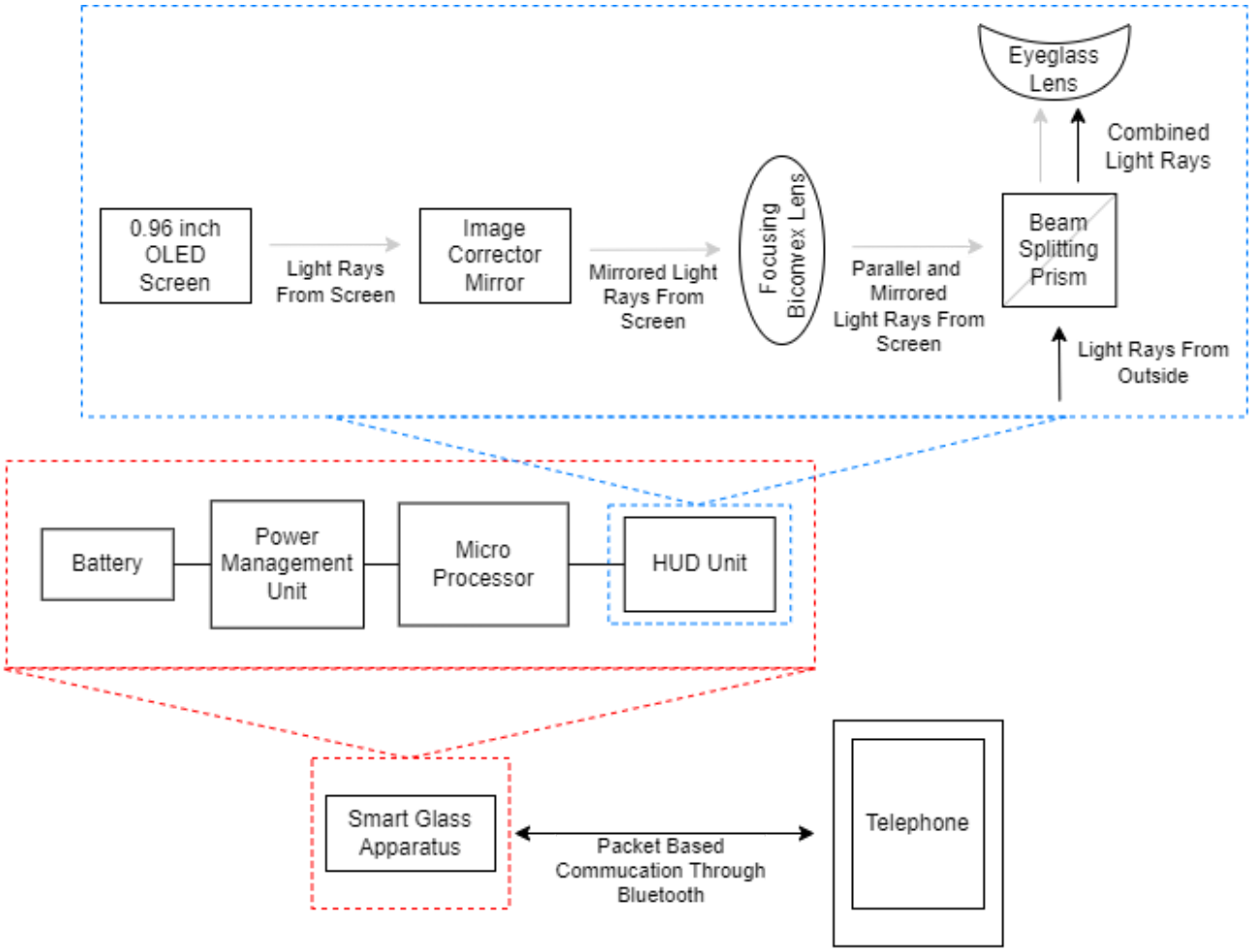
# Current Implementation

Current implementation which was our graduation project from electronics engineering is made up from two distinct modules. First module contains the microcontroller unit, capacitive touch user interface and the optical package that user view's. Second module contains the battery, voltage boost and battery charging circuit. Apart from the body of the smart glass, every component used is off the shelf and is open to further optimization opportunities.

# Use Cases

Main use case for the current implementation is displaying necessary smart phone information to the user seamlessly, such as time and application notifications. Improvement for this use case would be implementing support for other applications such as maps which would be useful for drivers to check their map without obstructing their view. Another use case could be that for deaf people, the device could perform speech recognition through the use of a speech recognition API with the Wi-Fi of the phone and display the recognized speech to the deaf person.

# Technical Details




The software of the microcontroller, which is 'Espressif ESP32-WROOM-32D', is written in an efficiency-oriented manner aiming for low power consumption. Software has been developed with the help of the 'Arduino Framework' on the 'C++' software language and the 'PlatformIO' plug-in using 'FreeRTOS' open source operating system. The advantage of this operating system type is that more than one process can be performed at the same time, various processes can be run on selected cores, and task assignment for operations. Power Delivery Unit consists of 'Adafruit Powerboost 1000C' Li-Ion Battery Charging and Voltage Booster circuit and the 2000mAh 3.7V Lithium-Ion battery. As for the optical details, a generic 0.96 inch OLED screen is located at the back of the optical housing. Image rendered at the display is reflected upon the mirror to direct it to the biconvex lens. Image with focal length aligned to human perception is combined with background image at the beam-splitting prism and this combined image is then viewed by the user.

# Improvement Plans

Microcontroller development board that is currently used is not utilized fully GPIO-wise. An integrated circuit board with this very microprocessor and desired display embedded in one will massively cut the physical size of the board thus decrease the footprint of the smart glass body. By utilizing mirrored images on the display itself, need for the correcting view mirror can be

eliminated and overall size of the smart glass body can be decreased even more. These two past improvement plans will decrease the already low cost of the product. Rather than further cost and size improvements, electronics improvement which open the doors to more hardware intensive wearable technology implementations. With better hardware protocols such as 'Android Auto' and 'Apple CarPlay' can be utilized to give users heads-up display experience for any application they want for example maps.

# Final Words

As a duo of engineers, we are interested in improving our project even further to fill the wearable technology deficiency for glasses wearing tech enthusiasts. We are interested and open to improve ourselves further in embedded system technologies.

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