A Wearable Wireless Video/Audio Recording System for Live Streaming Undergraduate Engineering Labs

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Abstract

The challenges of the COVID-19 pandemic have required instructors and students alike to approach learning like never before. While some courses have adapted well to online learning, others have not. Courses that require hands on learning struggle the most with students being remote. That is where an affordable, wearable, wireless audio-visual streaming device comes in. It is built to incorporate all capabilities of its competitors on the market, but for a fraction of the cost. By using a microcontroller with Bluetooth and Wi-Fi connectivity, a 720p wide angle camera, and long-lasting battery, our device will be able to stream up to 2 hours.

Introduction

This project is about developing a wearable technology. Its central purpose will be to make teaching labs to students easy and efficient. This device will help record different kinds of presentations regardless of their time duration with exceptional video/audio quality. This device will be worn by the TA or the lab instructor. This device will include lightweight camera which will have tactile zoom functionality and it will be able to focus on the experimental apparatus. The camera will be attached to a strap that will be worn on the user's forehead. A lapel mic will be used for audio.

Methods and Materials

This device uses a small microcontroller paired with a similarly sized battery to power and control a 1080p camera to provide a video stream over any wireless network. The device interface can be accessed via remote desktop and is used for initial device setup and diagnostics.

Figure 1: Component View w/o Case

Results

The device can achieve a video stream quality of 720p 30fps while either in wireless or USB mode. Microphone offers 360-degree coverage within unimpeded 160ft range of host machine. Battery was calculated to operate continuously for 2hrs at measure power draw with Wi-Fi connection and video stream maintained.

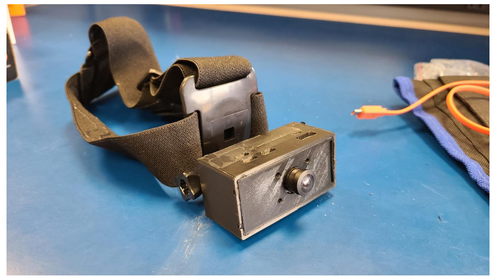

Figure 2: Completed Prototype

Discussion

During the construction phase of the project, programming and intermittent testing of individual components took place. Programming of the microcontroller took place first to establish the foundation for all other components. Following that, integration of the camera, battery and head mount took place.

Conclusions

In the current pandemic, in person lectures and labs needed to be moved to fully remote just as most of the industry experienced. This project will provide a device that will solve this problem, designed by students within the department. This device is designed with the internet of live streaming labs so students can still receive a lab experience while attending virtually.

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