

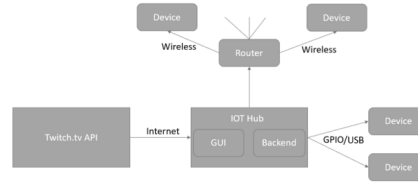
## Executive Summary

In the recent boom of livestreaming entertainment, a live streamer's success is dependent on their ability to entertain their viewers. To aid the live streamer in this endeavor we have developed the Stream Hopper. The Stream Hopper is a customizable IOT Hub Device that enhances both the livestream viewer's experience and the streamer's interaction with their viewers by allowing viewers to trigger various devices in the streamer's room. The IOT Hub can be customized to trigger devices on Twitch events per the streamer's preference. The IOT Hub has three different device-type capabilities: USB, GPIO, and WiFi connections. The Stream Hopper will provide "in-real-life" notifications for streamers based on stream events.

## Experimental Setup

As seen in Figure 1, the Stream Hopper will be an IOT Device that connects to various smart devices via WiFi, USB and Raspberry Pi GPIO pins. The central processing unit will process data from Twitch and StreamLabs and will issue trigger commands on Twitch Stream Events to the various devices connected to the IOT Hub. There will be Smart bulbs, Smart LED Strips, Smart Plugs, and an LED Message Board that come with the Stream Hopper, however the user can add any compatible device to the Hub via GPIO, WiFi or USB

Figure 1:  
System  
Overview  
Conceptual  
Drawing



## Experimental Results

During experimentation, there were a few design choices that were changed. We decided to use SQLITE instead of MySQL for our database utility as SQLITE is a much more lightweight solution which was critical for use on the Pi. Additionally, we decided to utilize a relay board as a convenient interface for the GPIO pins. This board provides the user with a much simpler way to connect GPIO devices and it provides a much more elegant software solution as the relay board has an API that we will utilize. Finally, the customer wanted to use a large, LED message board as a device on the Stream Hopper, however this message board was difficult to program through code and the budget did not allow for such a device, so it had to be removed from the project. Other than these highlighted changes, the project has gone smoothly, and the team is pleased with the result.

## Background

Although several services exist that allow for Twitch events to be triggered by actions that occur during the stream, there is an apparent lack of support for similar automation of physical devices, such as turning on or off lights, changing the color or pattern of lights, and various other dynamic effects in the area around the streamer. Some streams use these sort of hardware setups, but whenever the appropriate action occurs in stream, they must divert their attention off the game and manually change the device configuration as requested. This product will reduce the need for streamers to micromanage these hardware components on their stream and allow them to focus on the quality of their livestream performance.

## Experimental Test Plan

- The IOT Hub will run a Raspberry Pi 4B and will be written in JavaScript using the Node.js framework. The Twitch and StreamLabs public API will be used to listen for Twitch events (such as Follows, Subscriptions Donations etc.) and based on customizations set by the user, these events will trigger various devices. We will provide the user with a physical tablet-GUI and a web-based GUI per the customer's requirements. We will use React as the front-end framework as it is versatile and will operate on the web-based GUI and physical GUI. We will provide two LIFX IOT devices (a backlight and lightbulb) and a WEMO IOT smart plug as these devices offer an open API and will allow easy communication between the Pi and the devices.

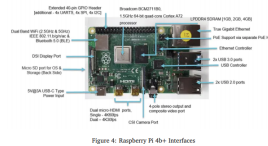


Figure 4: Raspberry Pi 4B+ Interfaces



Figure 5: Raspberry Pi 4B+ Touchscreen Case

## Conclusions

- In conclusion, the team, and our customer, are content with the final product. All the critical and high-priority requirements were met, and all devices (except the LED board) were successfully configured. The Stream Hopper team thanks Dr. Shawn Geiser for his continued support throughout the design and build process and we look forward to seeing the IOT Hub active on his Twitch Stream.

## References