Internet of Things: Technologies and Applications – Lab 3

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1 Part I

We implement and record a short video demonstrating control of two channels of the electrical socket with Raspberry Pi: https://youtu.be/n7XBF9XkGuU

2 Part II

In the second part of the lab, we use the PZEM-004T power sensor to record the voltage, current, power, energy, frequency, power factor, and alarm values of ten electrical appliances: a hair dryer, an electric fan, a table lamp, a speaker, a monitor, a microwave, a street light, a mini-monitor, a laptop, and a phone.

2.1 Hair dryer

We first turn the hair dryer at the first temperature file, measuring the various data, and then do the same for file numbered two. We observe from Figure 1 that the power consumption of the latter test is roughly 10 times that of the former one, which directly correlates to the functionality of the two modes: cool wind and hot wind.

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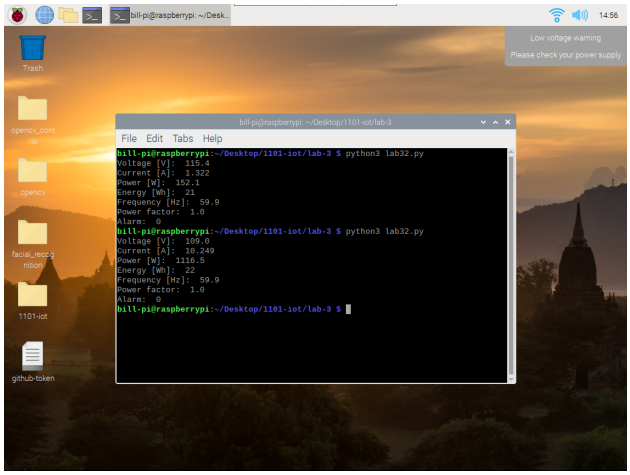

Figure 1: Hair dryer result

Figure 2: Hair dryer specifications

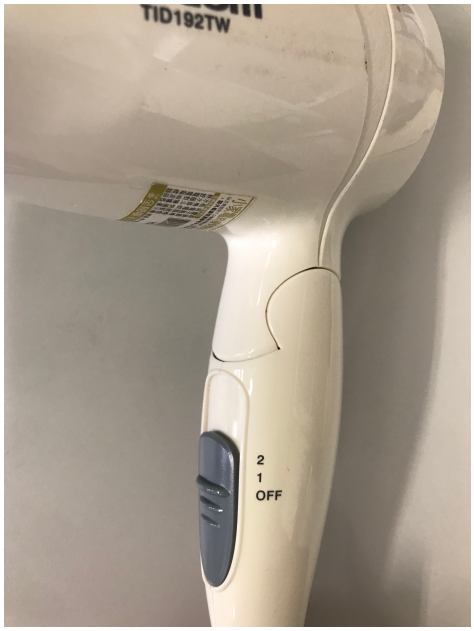

Figure 3: Hair dryer temperature files

2.2 Electric fan

The process is pretty much the same for the electric fan: We first switch the speed button level to the lowest, recording the measurements, and then move on to the highest speed. Figure 4 illustrates a two-third power ratio in the former test relative to the latter one, which corresponds to their respective fan speeds.

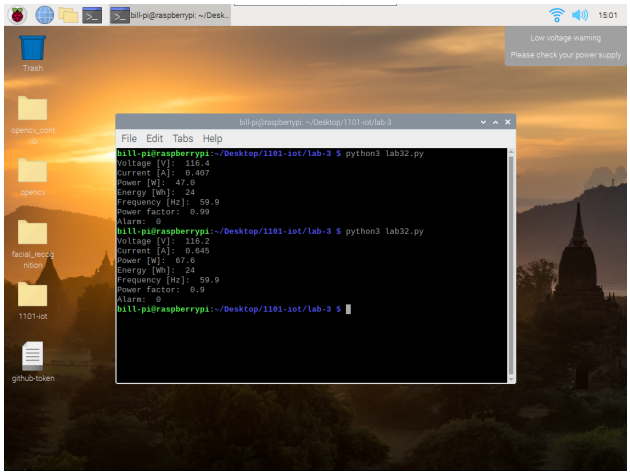

Figure 4: Electric fan result

Figure 5: Electric fan specifications

Figure 6: Electric fan

Figure 7: Electric fan speed buttons

2.3 Table lamp

Subsequent tests are comparatively straightforward: We plug in the power cable, turning on the device, and then record the data. The results are depicted in the several figures.

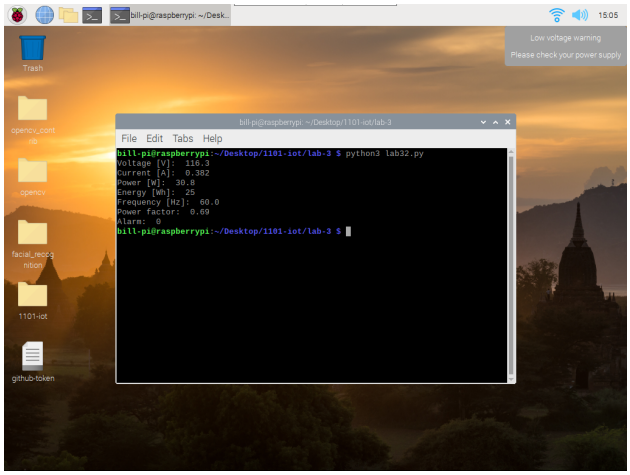

Figure 8: Table lamp result

Figure 9: Table lamp specifications

Figure 10: Table lamp

2.4 Speaker

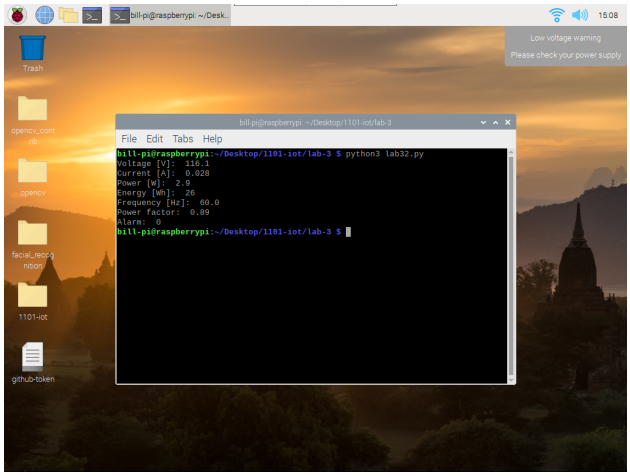

Figure 11: Speaker result

Figure 12: Speaker specifications

Figure 13: Speaker

2.5 Monitor

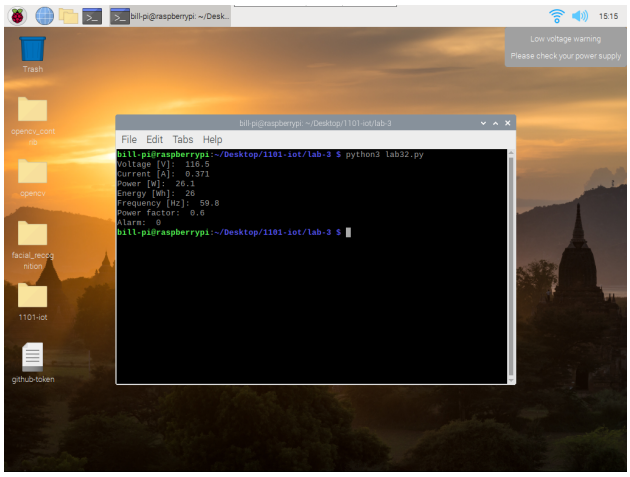

Figure 14: Monitor result

Figure 15: Monitor

2.6 Microwave

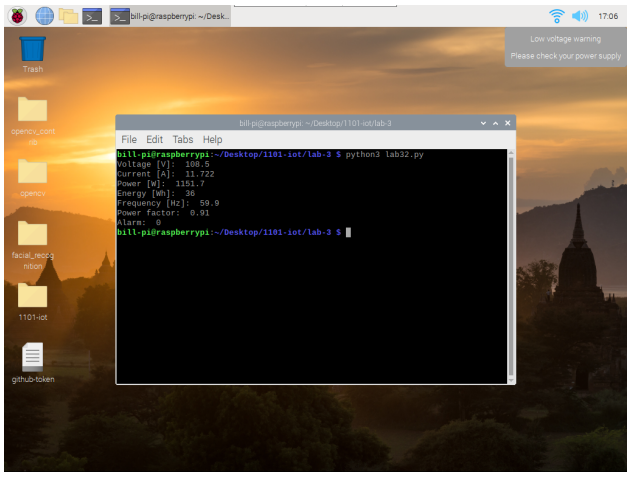

Figure 16: Microwave result

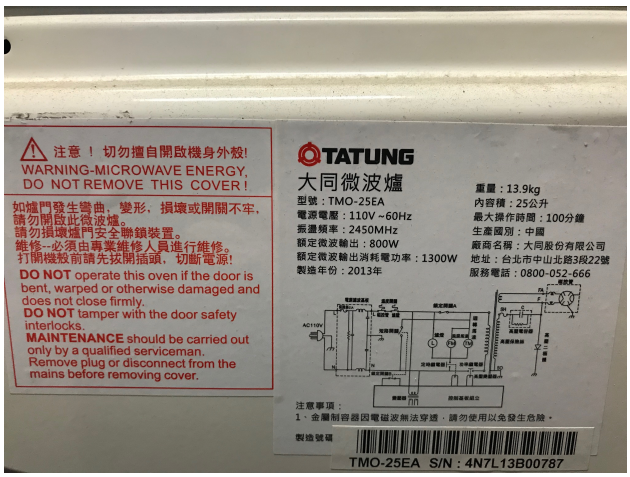

Figure 17: Microwave specifications

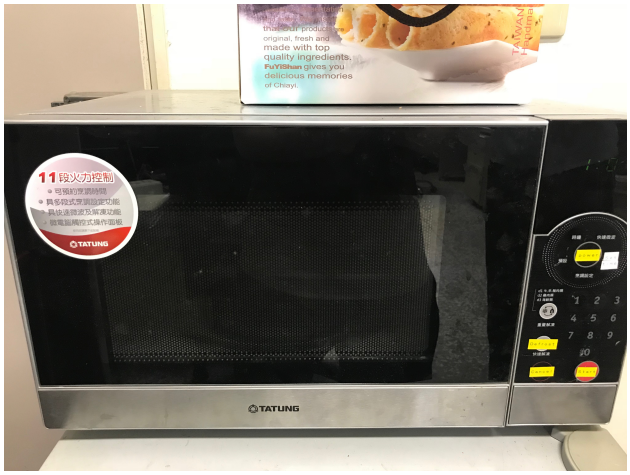

Figure 18: Microwave

2.7 Street light

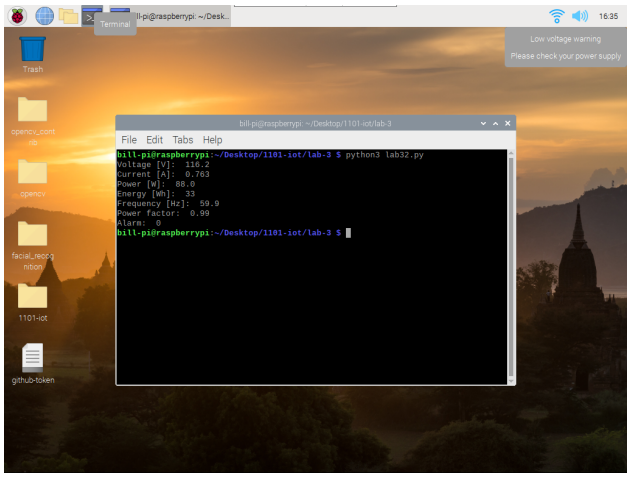

Figure 19: Street light result

Figure 20: Street light specifications

Figure 21: Street light

2.8 Mini-monitor

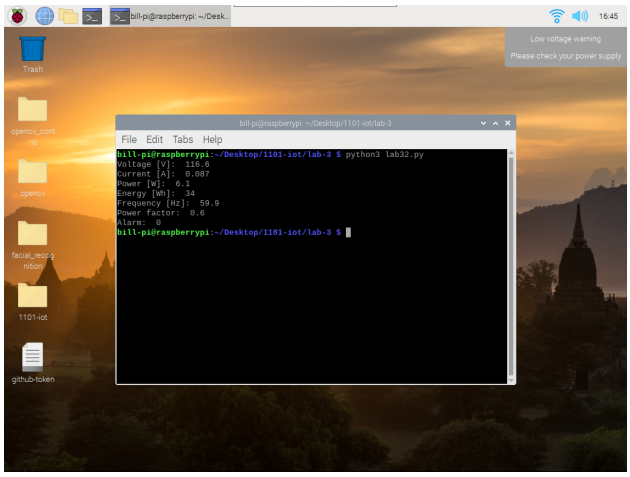

Figure 22: Mini-monitor result

Figure 23: Mini-monitor specifications

Figure 24: Mini-monitor adapter specifications

Figure 25: Mini-monitor

2.9 Laptop

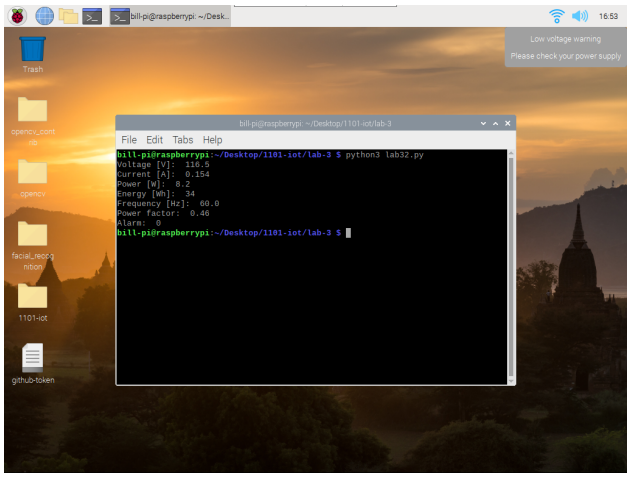

Figure 26: Laptop result

Figure 27: Laptop specifications

Figure 28: Laptop adapter specifications

Figure 29: Laptop

2.10 Phone

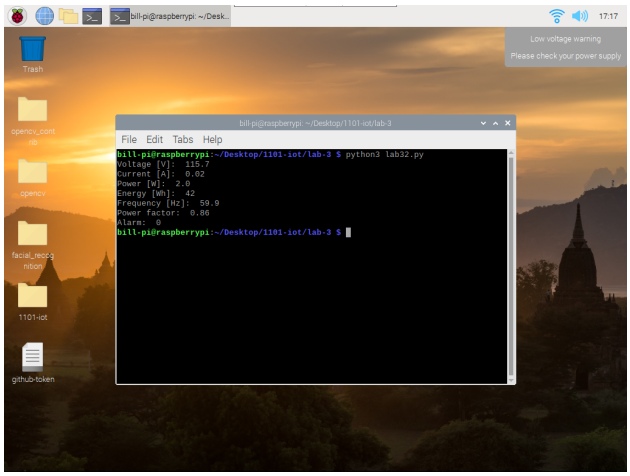

Figure 30: Phone result

Figure 31: Phone adapter specifications

Figure 32: Phone