Wireless Sensor Remote Monitoring Using Raspberry Pi

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INTRODUCTION

The development of micro scale sensors is becoming more common and there are many factors that affect the performance of these sensors. Monitoring their performance is one important factor that allows us to track the improvement or deterioration of the sensors.
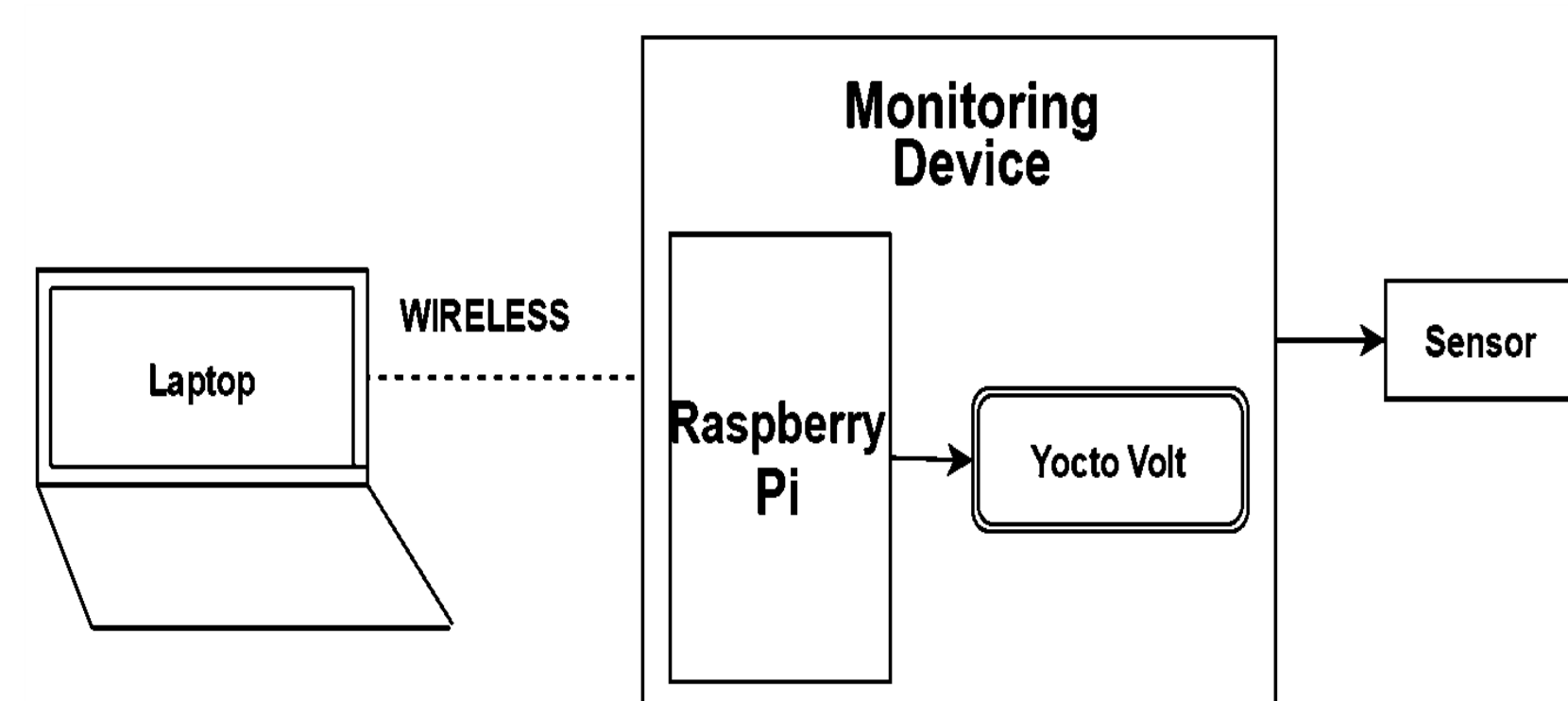
OBJECTIVE

The goal is to fabricate micro scale sensors and a wireless ammeter to monitor and analyze data to improve the sensors. The ammeter will:

- Interface Wireless
- Record and store data
- Be used to analyze data

APPROACH/RELATED WORK

Create a ammeter using Raspberry Pi and a voltage sensor.

Raspberry Pi is a cost effective solution to expensive multi meters.[1]

Raspberry Pi has been used as a monitoring system by attaching different sensors for weather, air quality and earthquakes.[2]
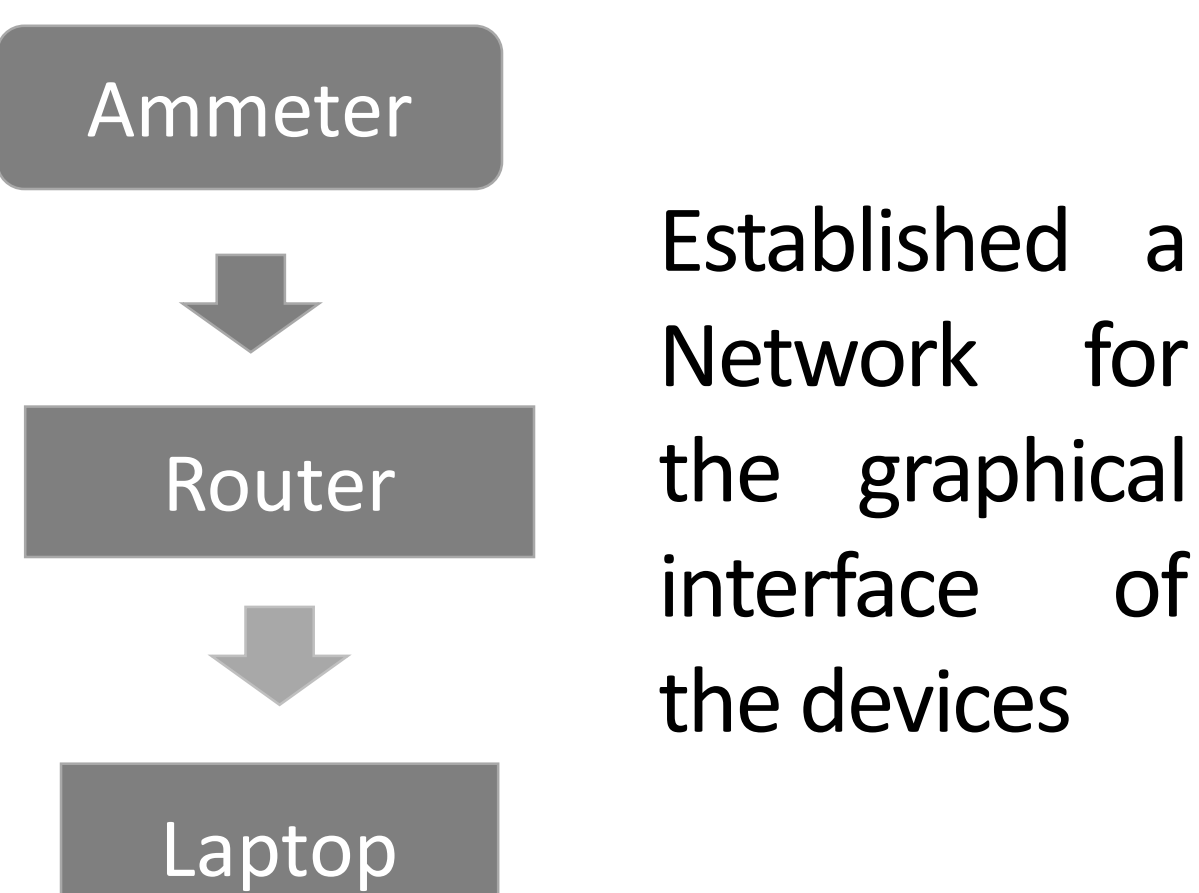
The use of Putty as a remote command line.[2]

AMMETER

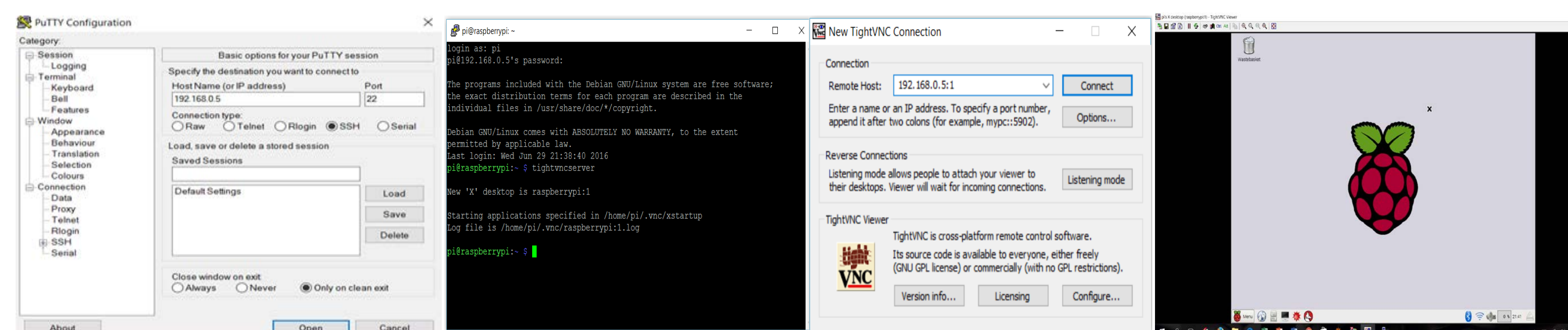**Using Raspberry Pi and Yoctopuce Yocto-Volt to fabricate an ammeter**

= Volt Meter

Volt Meter + + = Ammeter
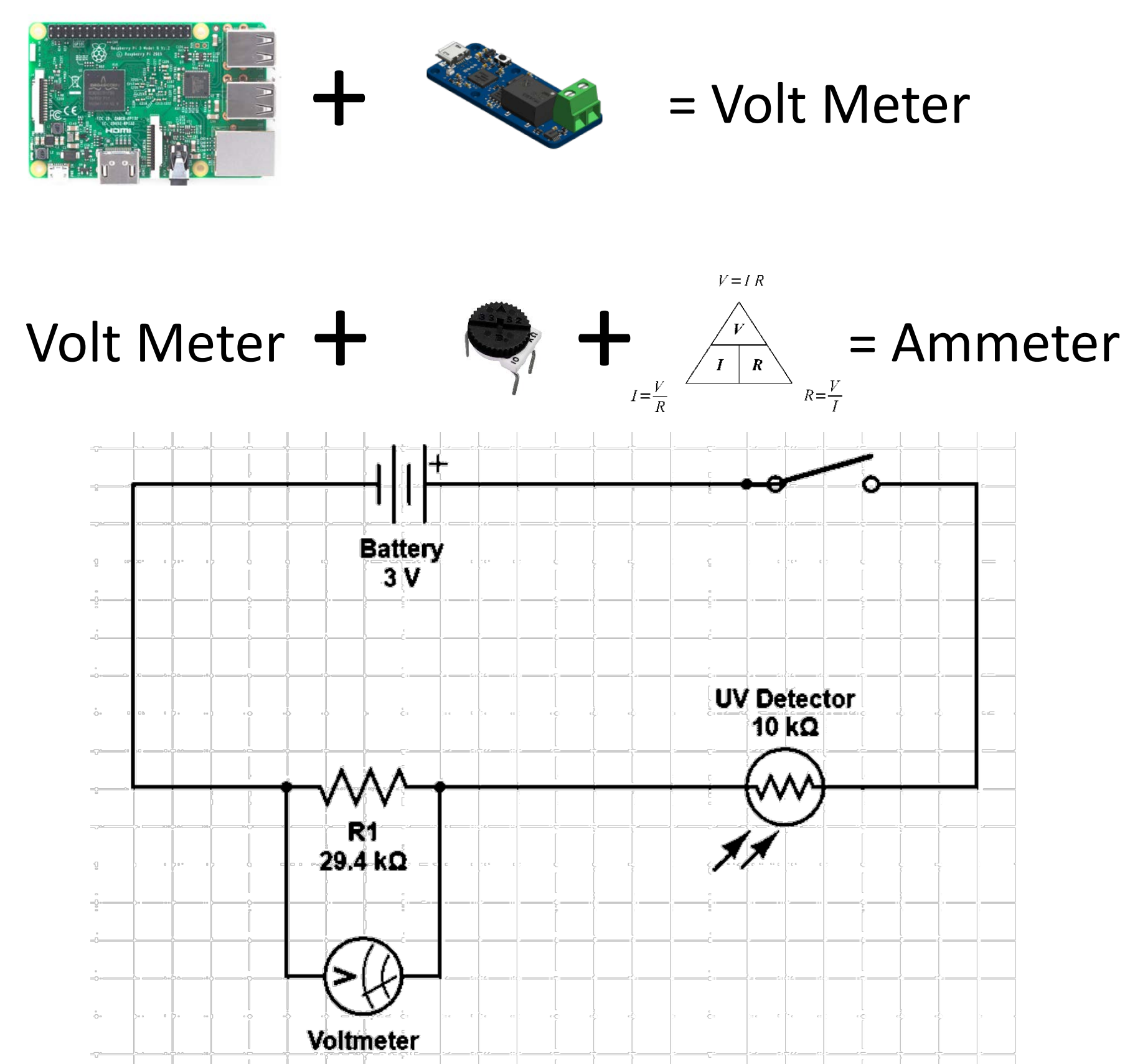
Local Area Network (LAN) Interface Trough Remote Desktop

Ammeter → Router → Laptop

Established a Network for the graphical interface of the devices

Raspberry Pi Remote Desktop Set Up

Start Putty session using Raspberry Pi IP address

Raspberry Pi's command line to open session in VNCViewer
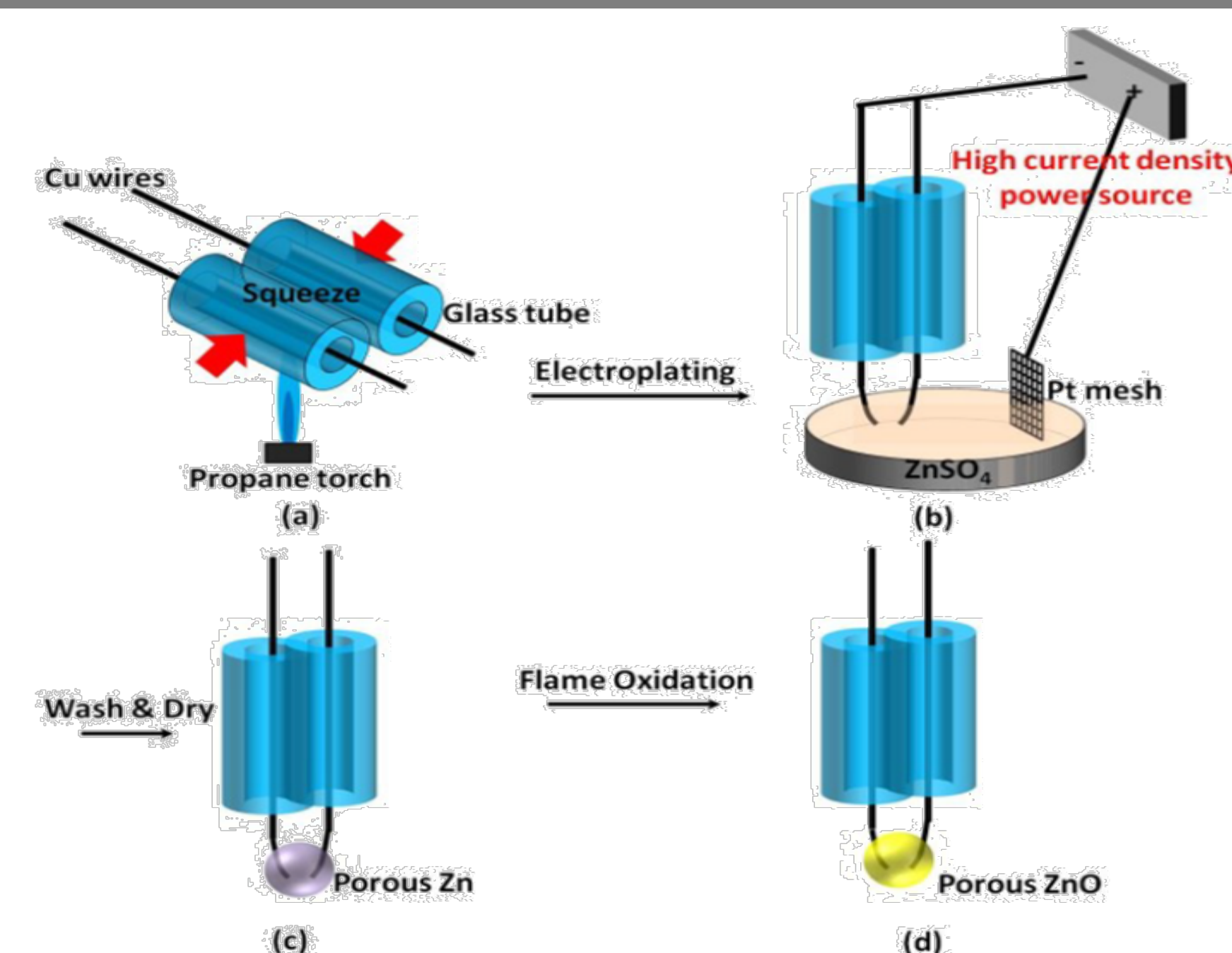
Opens VNCViewer for Graphical User Interface

Raspberry Pi desktop display in laptop

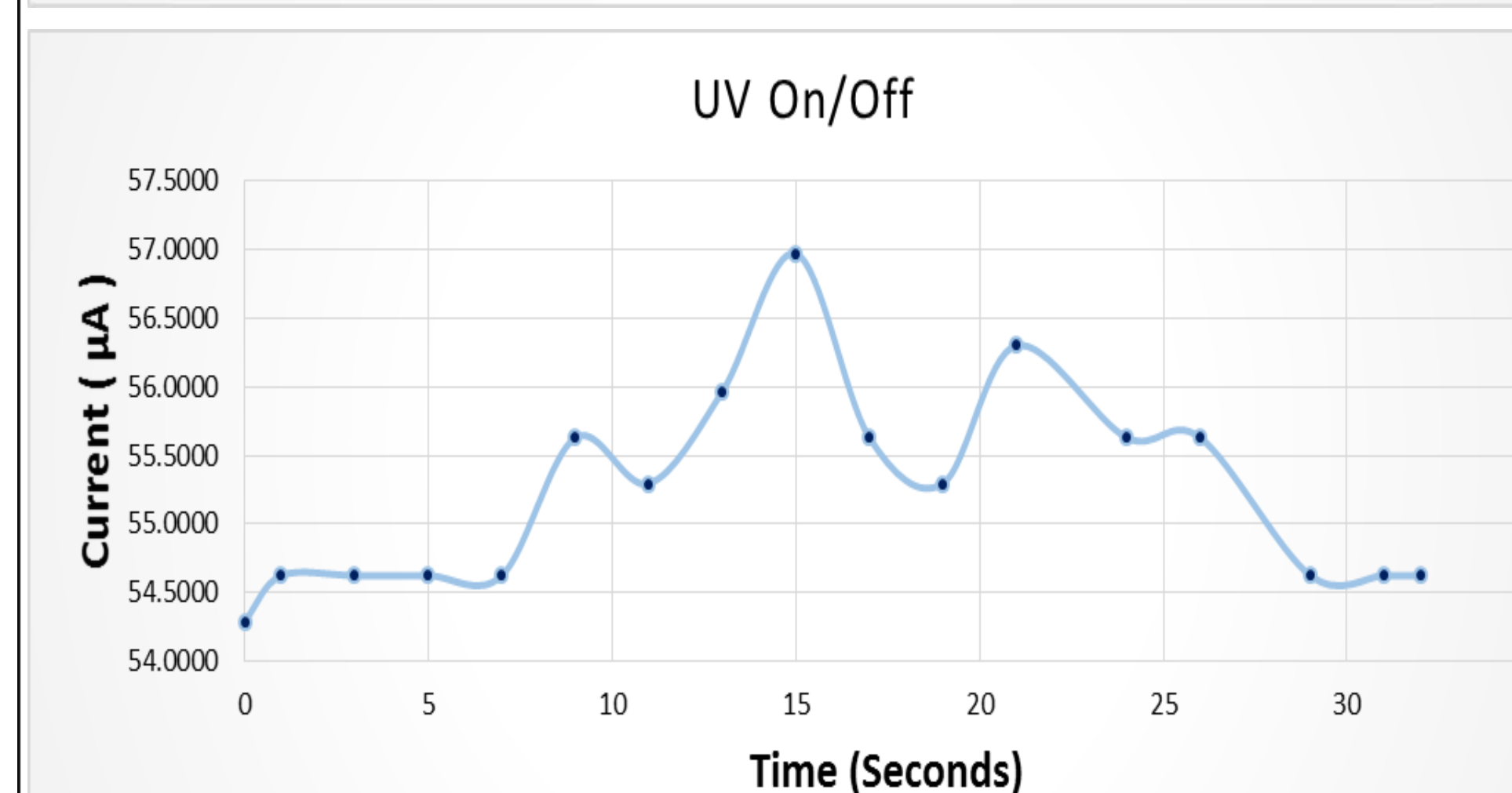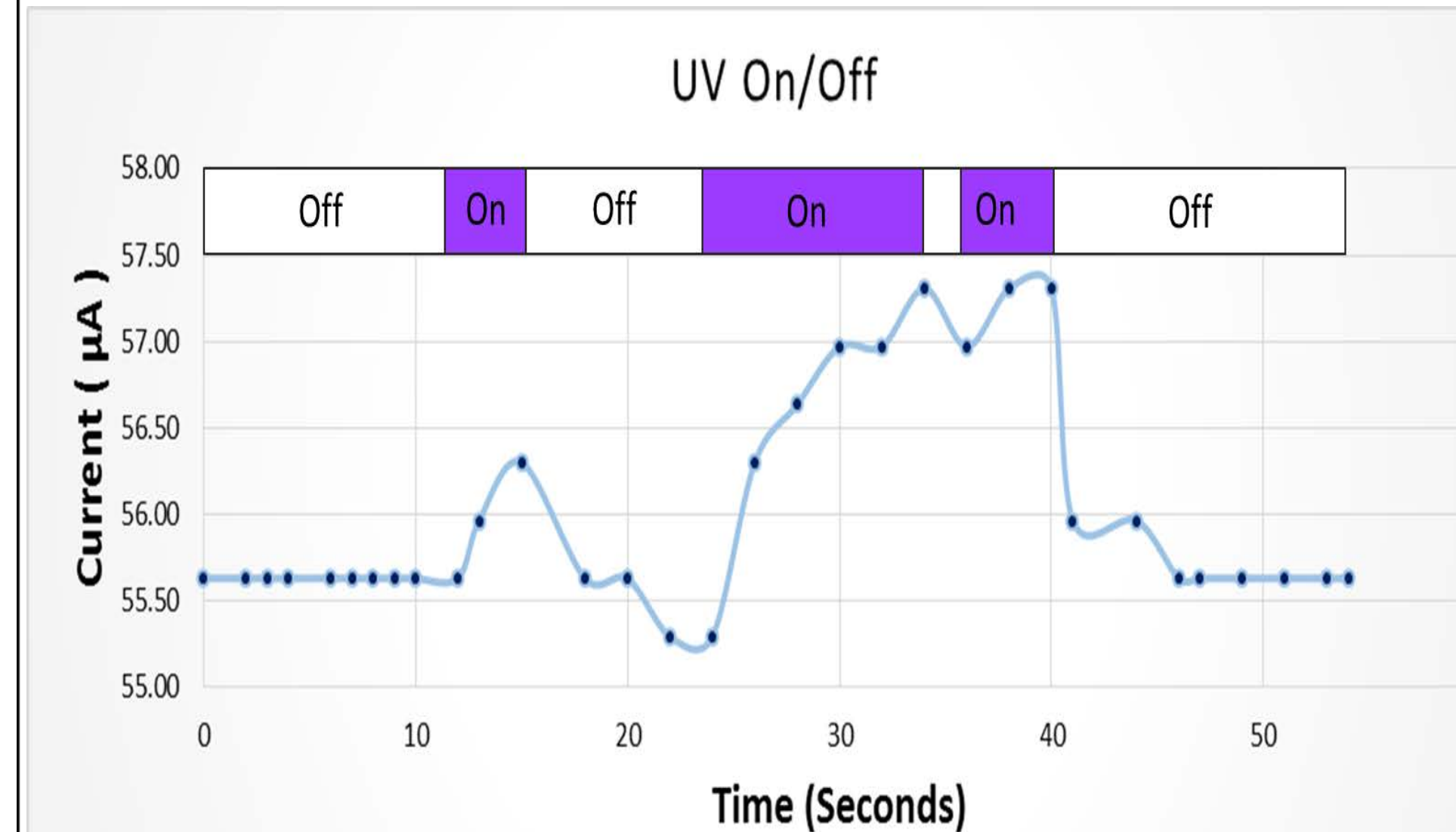## SENSOR FABRICATION PROCESS

UV Light Sensor

The UV light sensor is fabricated as a prototype.

- Zinc Oxide (ZnO) will react to UV light
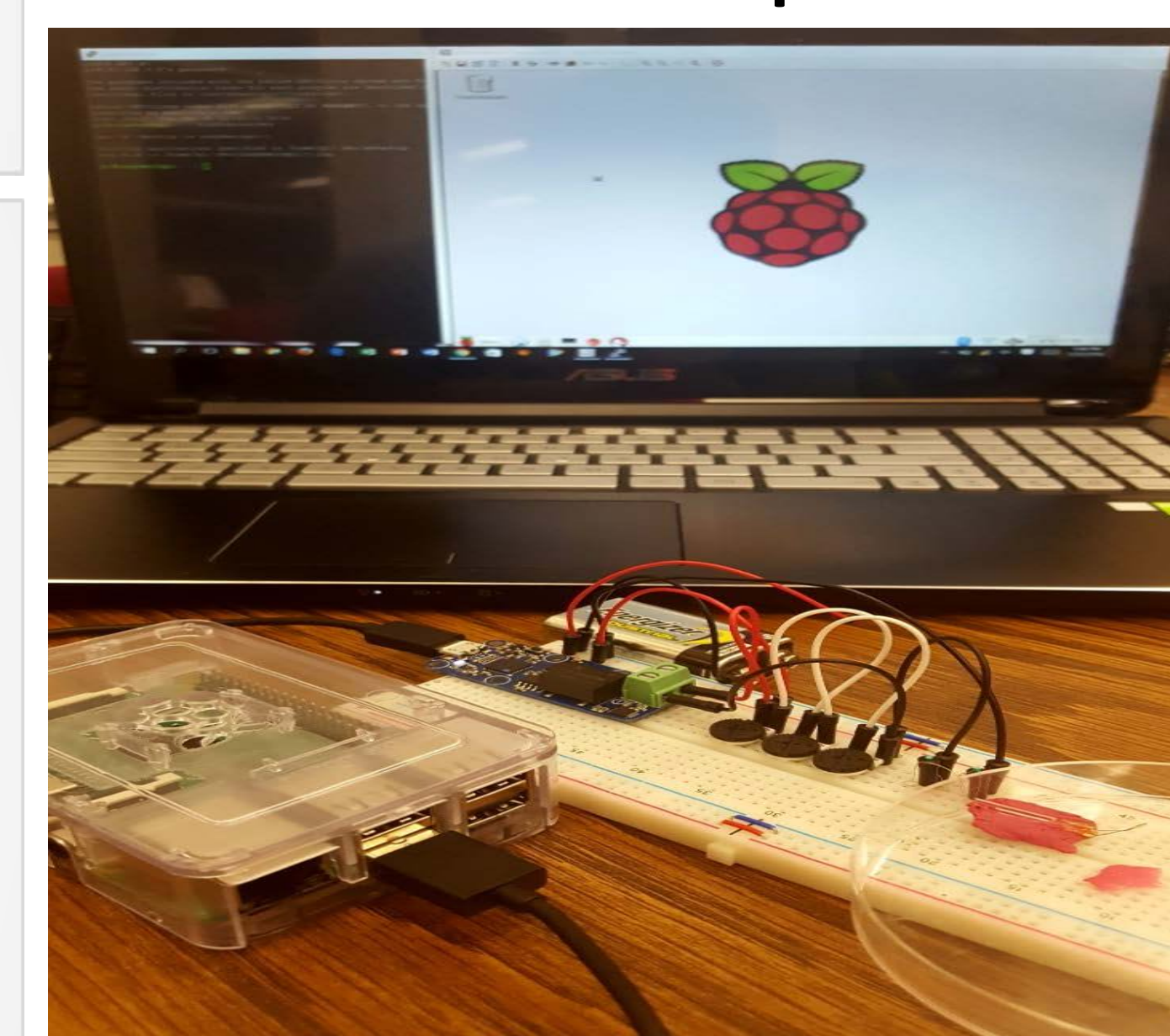- Exposure to UV light causes a change in current.

RESULTS

UV On/Off

UV On/Off

	Raspberry Pi	Protek 506
UV OFF	55.6 mA	54.4 mA
UV ON	57.3 mA	56.1 mA

The drift can be attributed to various factors such as:

- Internal battery resistance
- The exact value of the resistance in Potentiometers
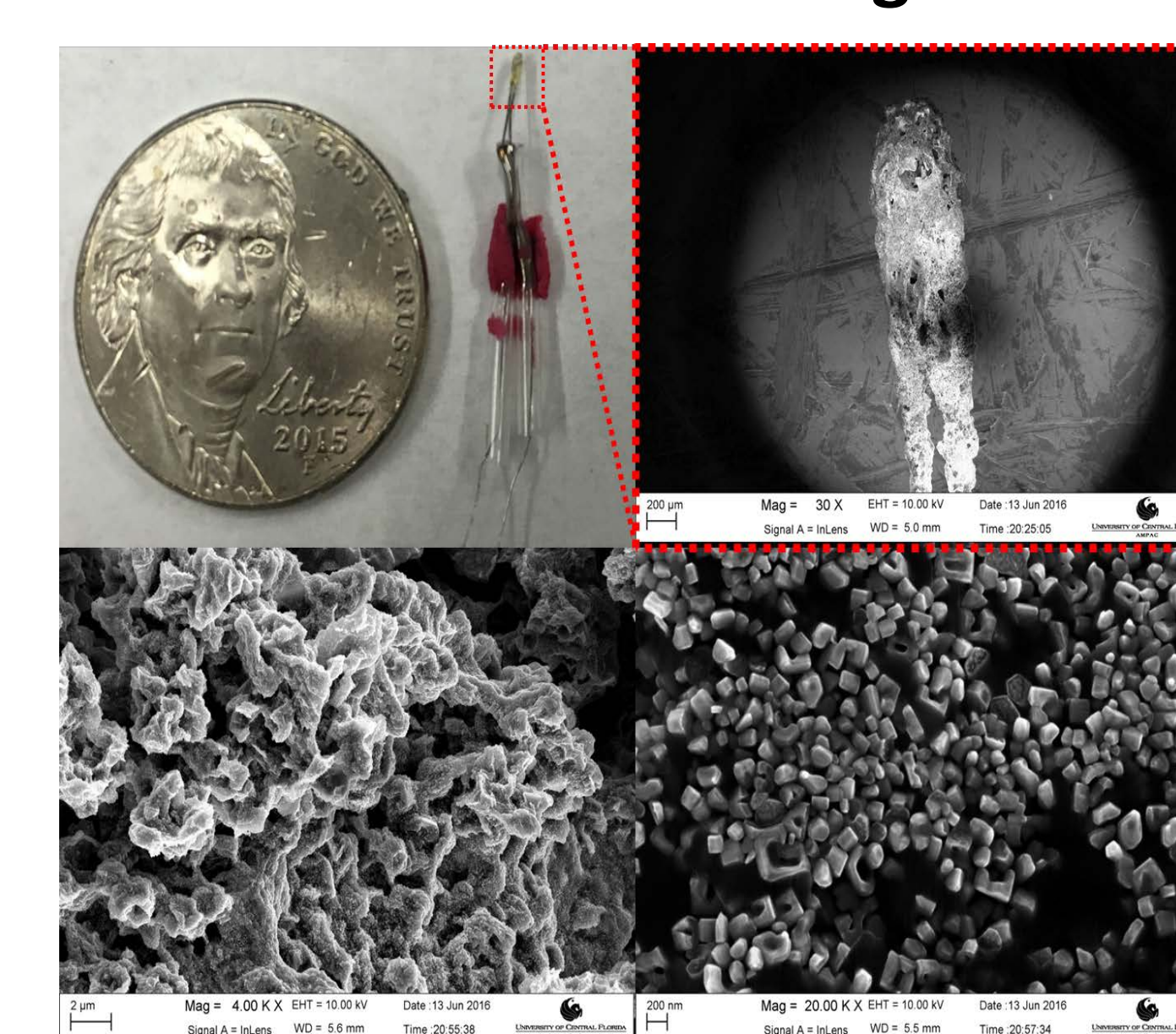- The response of UV light Sensor

Sensor Test
Expected peaks and change in current are recorded when the sensor is exposed to UV light. Second test show similar behavior but a signal drift.

Device setup

UV sensor SEM images

FUTURE WORK

- Use the monitoring device in an open Internet network.
- Improve UV light sensor by using Photolithography method for fabrication to make it more stable and responsive.

ACKNOWLEDGMENT

[1] M. Maksimović, V. Vujović, N. Davidović, V. Milošević and B. Perišić. "Raspberry Pi as Internet of Things hardware: Performances and Constraints" ResearchGate 2014
[2] M. Ibrahim, A. Elgamri, S. Babiker, A. Mohamed. "Internet of Things based Smart Environmental Monitoring using the Raspberry-Pi Computer" IEEE 2015.