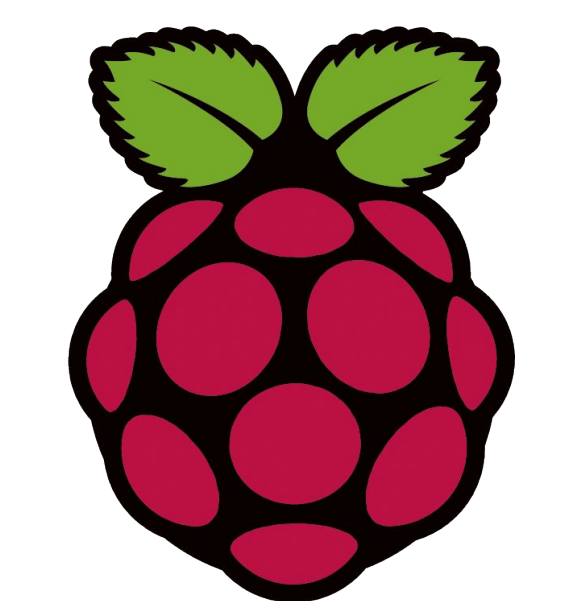




Knight Foundation
School of Computing
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Engineering
& Computing

Florida International University

Spring 2022 Senior Design Project

Network Outage Call Home

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Instructor/Faculty: , Florida International University

PROBLEM

Maintaining network and keeping it available at all times is crucial to both individual and organizational users. Usually network maintenance is pretty manual work and usually involves direct tackling of an engineer to recognize and fix any pending errors or especially outages.

- This issue can be divided into specific subproblems:
- absence automatic detection of gaps, errors and stoppages in the network
 - lack of communication between the network systems and the maintenance team
 - visibility of networks state and performance

CURRENT SYSTEM

Maintenance of current networks requires on-site agents continuously scanning and overseeing the network's state and performance.

In case of detection of any kind of error or outage on-site agents perform calls to engineers who are expected to start tackling the problem.

REQUIREMENTS

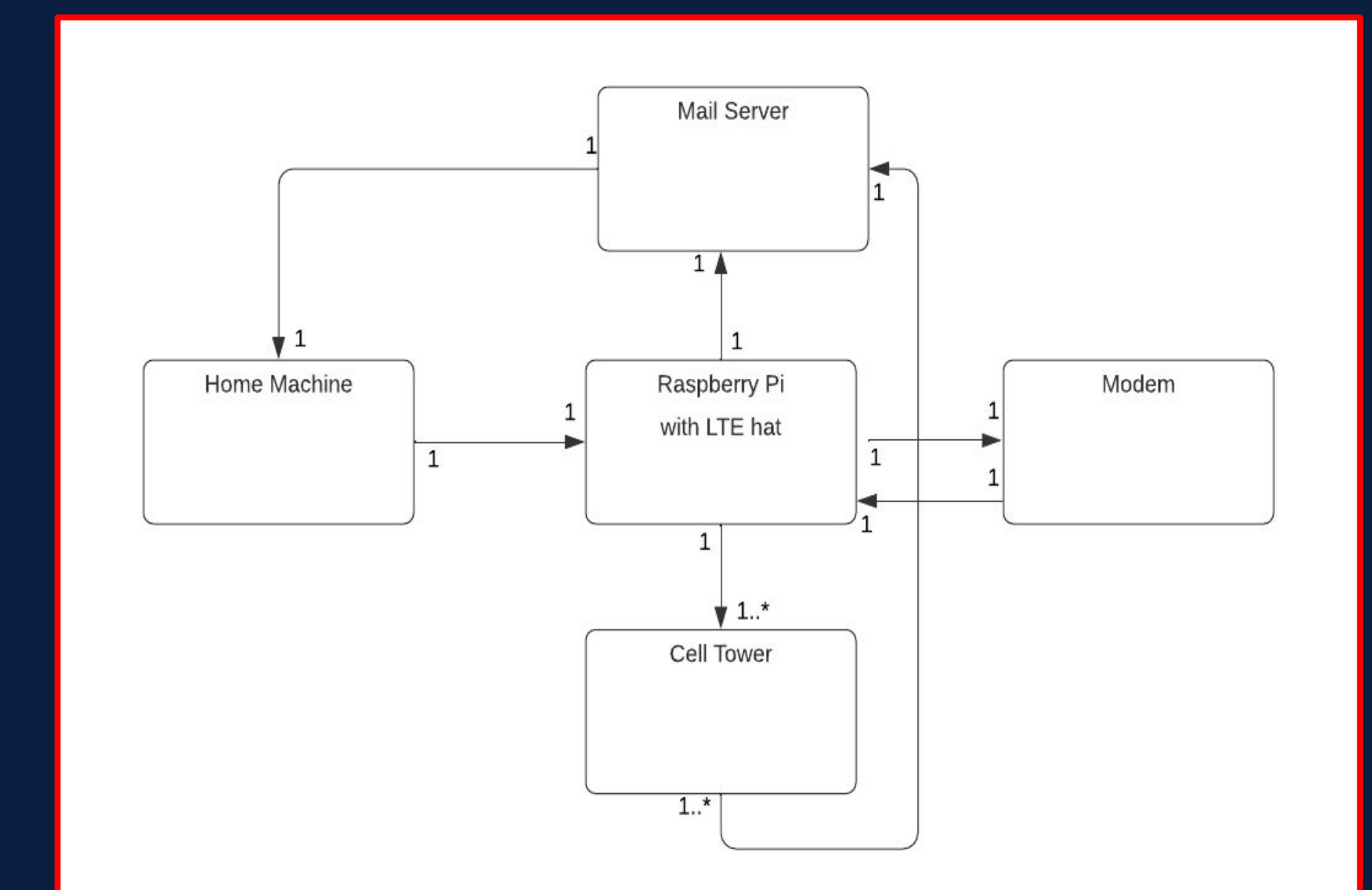
HARDWARE:

- Arduino Elegoo UNO R3
- Raspberry Pi 3
- Sixfab 3G-4G/LTE Base HAT

SOFTWARE:

- Python 3
- VNC Viewer
- Google Docs

GENERAL SYSTEM DESIGN



SCRIPT DESIGNS (SCREENSHOTS)

checking CPU usage

```
import psutil

print('{}%'.format(psutil.cpu_percent(interval=2)))
```

getting info about speed performance of the network

```
import speedtest
import os

st = speedtest.Speedtest()
response = os.system("speedtest-cli --bytes --simple")

print(st)
print(response)
```

getting the temperature state of a Rasperry Pi

```
import vcgencmd
result = vcgencmd.measure_temp()
print(result)
```

default script to email from one user (server) to another (network owner)

```
import smtplib

def phone_home():

    smtpUser = 'mikephonehome@gmail.com'
    smtpPass = '&@YdVva4h18fYZA4FKX5'

    toAdd = 'mbeal006@fiu.edu'
    fromAdd = smtpUser

    subject = 'Python Test'
    header = 'To: ' + toAdd + '\n' + 'From: ' + fromAdd + '\n' + 'Subject: ' + subject
    body = 'From within a python script'

    print (header + '\n' + body)

    s = smtplib.SMTP('smtp.gmail.com',587)

    s.ehlo()
    s.starttls()
    s.ehlo()

    s.login(smtpUser, smtpPass)
    s.sendmail(fromAdd, toAdd, header + '\n' + body)

    s.quit()
```

IMPLEMENTATION AND REFERENCES

• Speedtest CLI

checks network speed -
<https://www.speedtest.net/apps/cli>

• 'smtplib' Python Module

smtp protocol for emailing
<https://docs.python.org/3/library/smtplib.html>

• 'psutil' System Util Library

check system performance
<https://pypi.org/project/psutil/>

• 'vcgencmd' RaspPi tool

returns voltages/temperatures
<https://www.nicm.dev/vcgencmd/>

SUMMARY

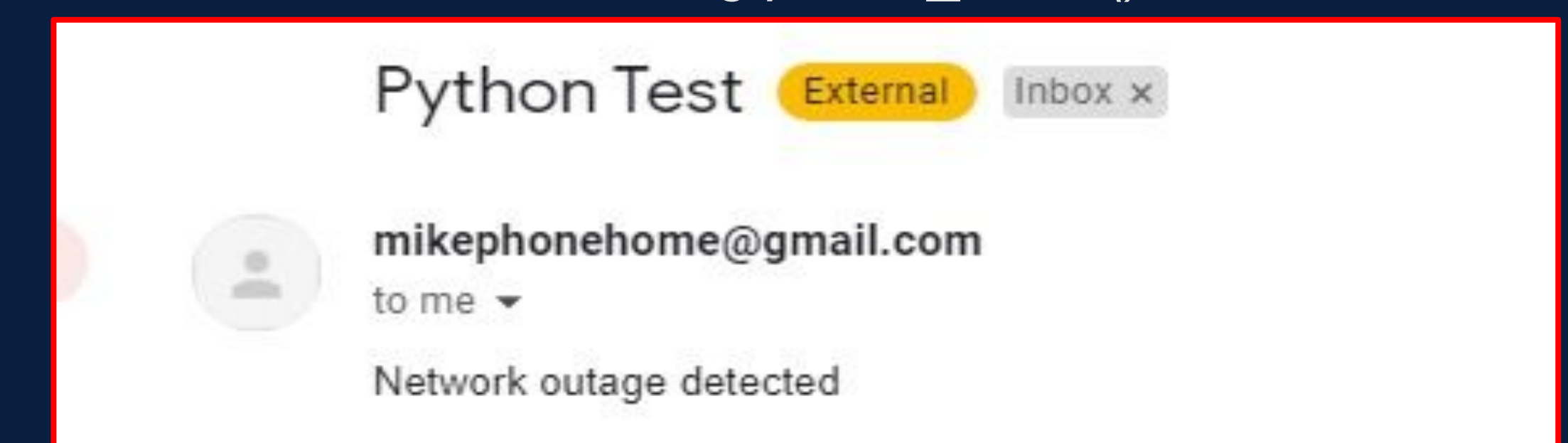
The core idea of the project is to keep the maintenance of failed network as automatic as possible with least involvement of a physical agent.

One of the main elements of this purpose is to keep the log of network's state and performance and make it most visible, sensible and communicable.

The provided scripts test and provide given aspects of the network such as speed performance, temperature state, cpu usage and make it all possible to communicate (email) to a given user (owner)

VERIFICATION

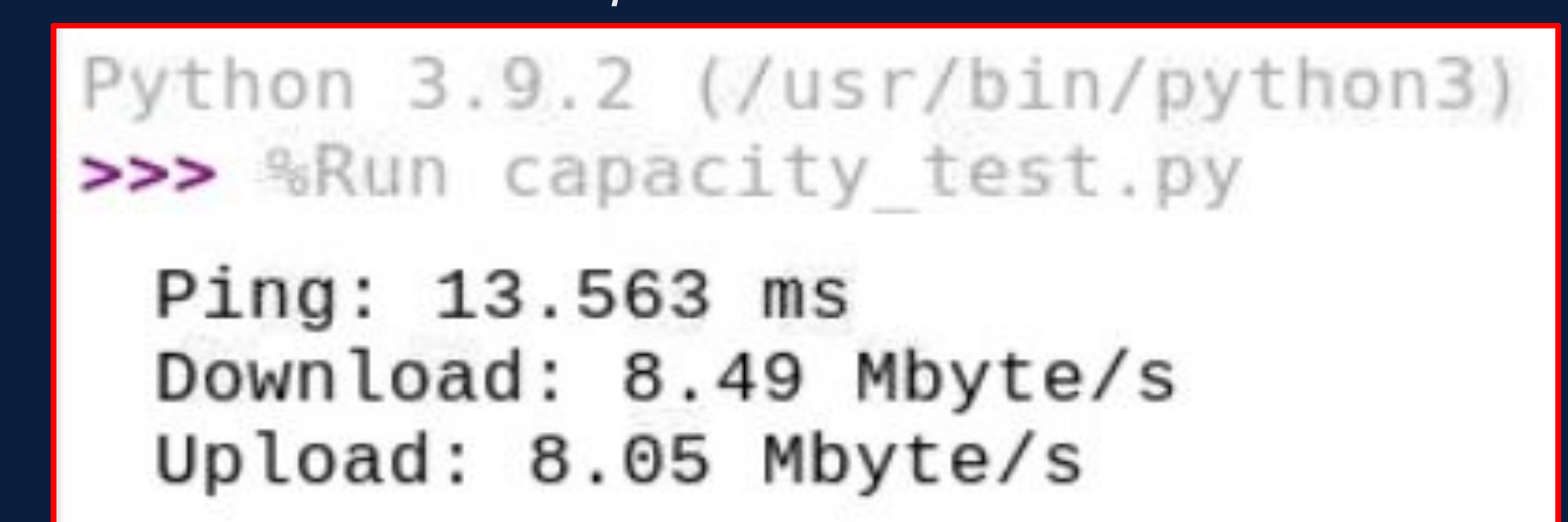
test email received using phone_home() method



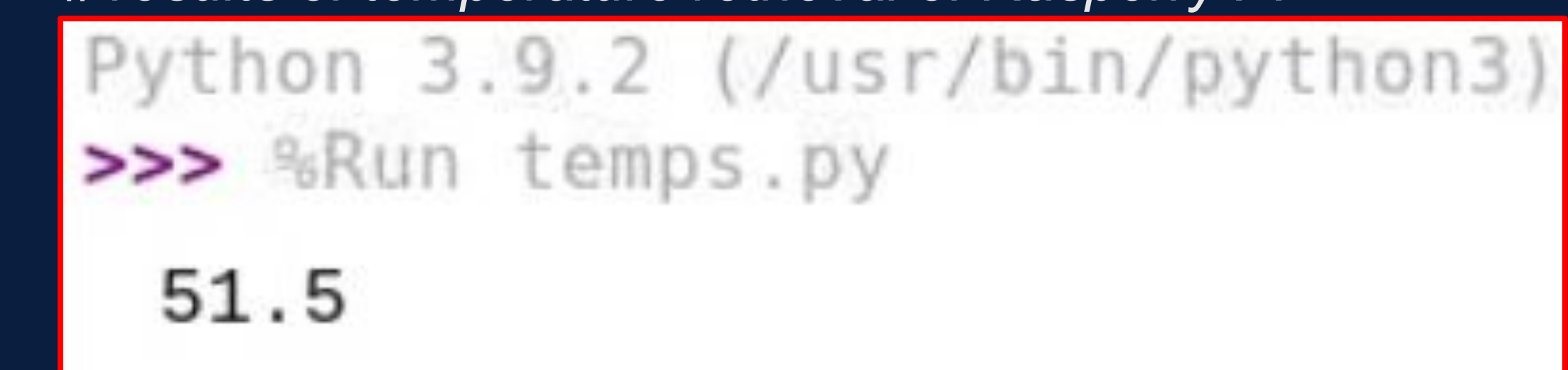
results of cpu.py script (cpu usage)



results of network speed test



results of temperature retrieval of Rasperry PI



ATTENTION: Subheadings shown above is a recommended structure for a research/scientific poster. Main elements of a poster are Introduction, Research and Conclusion. Researchers can customize the section headers based on their projects' needs. REMOVE THIS TEXT ONCE YOU START WORKING ON YOUR POSTER

ACKNOWLEDGEMENT

The material presented in this poster is based upon the work supported by Ryan Hutcheson. We/I thank Ryan Hutcheson for his/her/their assistance and mentorship that I/we received throughout the senior design project.

FLORIDA INTERNATIONAL UNIVERSITY