CS 1010- Fall 2022:
Final Raspberry Pi and Python Group Project

Select a project idea and implement a Raspberry Pi-based application

Prof. Kartik Bulusu, CS Dept.

Teaching Assistants:
Marshall Thompson, CS Dept.
Jonathan Garcia, MAE Dept.
Matthew Dionne, CS Dept.

Learning Assistants:
Josie Libbon, CS Dept.
Josh Rizika, CS Dept.
Miles Grant, CS Dept.
Addy Irankunda, Physics Dept.
Talia Novack, CS Dept.
Fred Kamgang, CS Dept.

Due date:
December 05, 2022
11:59 PM

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Fall 2022

Photo: Kartik Bulusu

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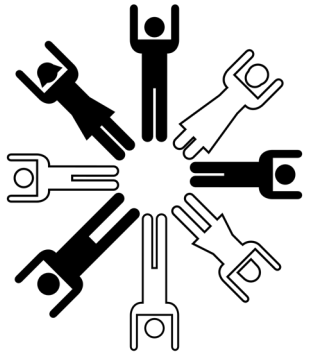
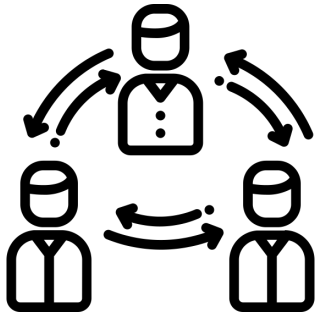
TEAMWORK



Throughout career, you will be working in teams with diversity.

Come up with a teamwork plan

- **Create a workflow** over a virtual or in-person meeting
- **Designate one person to be a "scribe".**
- **Use messaging programs** (such as Slack) to communicate with your team and instructors
- **Make small updates** individually and meet to decide on next steps
- **Contributions from each team member has to be clear and justifiable**



Created by agus raharjo

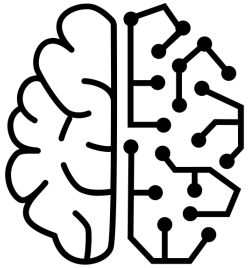
Instruction team

- Can help you with the Raspberry Pi Hardware and Python programming
- Can be contacted during office hours
- Can make appointments if it works better

At the end of the course, we want to see a completed project

Option 1:
Handwriting Recognition Using Python Machine Learning

- **Use a Pi NoIR camera to create a handwriting digit recognition tool**
  - Take pictures of your own handwritten digits
  - Save images and prepare image data
  - Use Python to train a machine learning model
  - Test your digit recognition model and report your findings
- **Software:** Thonny Python IDE (Potentially DeepNote as well)
- **Hardware:** Pi NoIR Camera, Raspberry Pi 3B+, Sense HAT (Optional)
- **Location:** not a requirement
- Note: *If we are able to successfully train a digit recognition model we could potentially have the SenseHAT LEDs light up to indicate the observed digit.*



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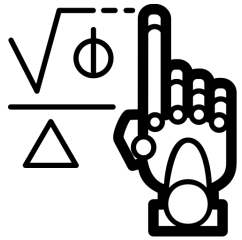

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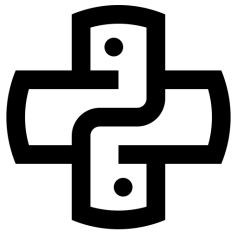

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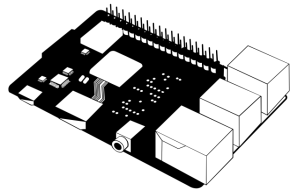

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Project mentor: Matthew Dionne
Email: matthewdionne12@gwmail.gwu.edu

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Option 2:
Web scarping sports data using python

Created by Agus Rijwan Jaelani
from Noun Project

Project mentors:
Email:

*"**Web scraping**, **web harvesting**, or **web data extraction** is data scraping used for extracting data from websites."*

Source: https://en.wikipedia.org/wiki/Web_scraping

- **Write a Python program to web scrape a popular sports web page**
  - Fetch data and extract from it some basic statistics.
  - Plot your data to show trends
  - Discuss your findings graphically
- This project involves only Python programming
- **Software:** DeepNote
- **Hardware:** no requirements (porting on Raspberry Pi is optional)

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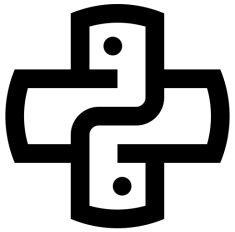

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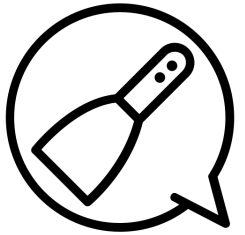

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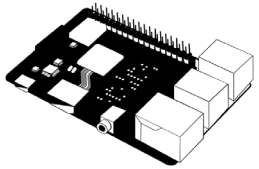
Option 3:
SenseHAT-based personal weather station for the SEH Greenhouse

- **Use a senseHat to build a Raspberry Pi-based weather station**
  - Fetch pressure, temperature and humidity data.
  - Plot your data to show trends
  - Discuss your findings graphically
- **Software:** Thonny Python IDE
- **Hardware:** senseHat, Raspberry Pi 3B+
- **Location:** SEH Greenhouse or alternative location in SEH



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Project mentor: Matthew Dionne
Email: matthewdionne12@gwmail.gwu.edu

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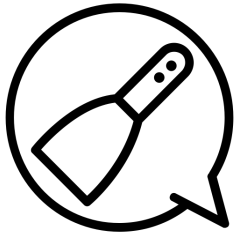
Option 4:
Web scarping COVID19 data using Python



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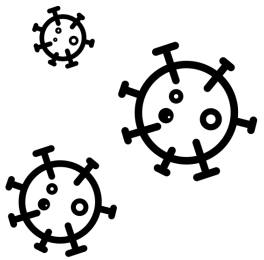
Project mentors:
Email:

*"**Web scraping**, **web harvesting**, or **web data extraction** is data scraping used for extracting data from websites."*

Source: https://en.wikipedia.org/wiki/Web_scraping



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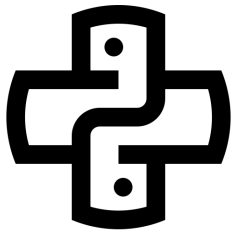
- **Write a Python program to web scrape a COVID19-data from a reliable website**
  - Fetch data and extract from it some basic statistics.
  - Plot your data to show trends
  - Discuss your findings graphically
- **Software:** DeepNote
- **Hardware:** no requirements (porting on Raspberry Pi is optional)



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Option 5:
Raspberry Pi-based security camera

Project mentors:
Emails:

- **Use a Pi NoIR camera to build a Raspberry Pi-based security camera**
  - Track motion of objects
  - Save images
  - Send an alert
  - Discuss your findings
- **Software:** Thonny Python IDE
- **Hardware:** Pi NoIR Camera, Raspberry Pi 3B+, Sense HAT (Optional)
- **Location:** TBD in SEH or Tompkins Hall

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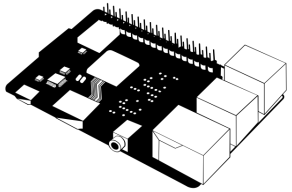

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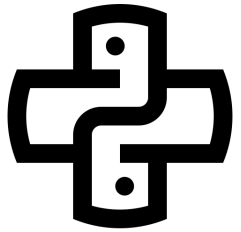

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Option 6:
SenseHAT-based personal weather station for any SEH location

- **Use a senseHat to build a Raspberry Pi-based weather station**
  - Fetch pressure, temperature and humidity data.
  - Plot your data to show trends
  - Discuss your findings graphically
- **Software:** Thonny Python IDE
- **Hardware:** senseHAT, Raspberry Pi 3B+
- **Location:** TBD in SEH

Project mentor: Matthew Dionne
Email: matthewdionne12@gwmail.gwu.edu

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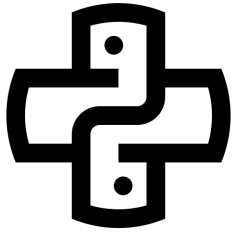

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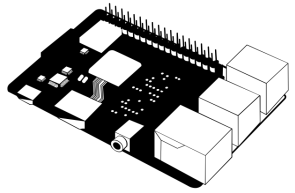

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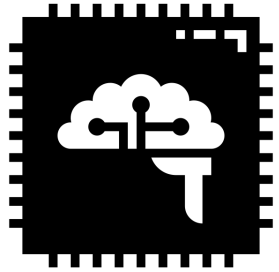
Option 7:
CPU performance monitor for the Raspberry Pi 3B+

- **Monitor the CPU usage on the Raspberry Pi**
- Write a Python program
  - using *psutil* library
  - to get CPU & memory usage,
  - create live graph results
  - Discuss your findings graphically
- **Software:** Thonny Python IDE
- **Hardware:** Raspberry Pi 3B+



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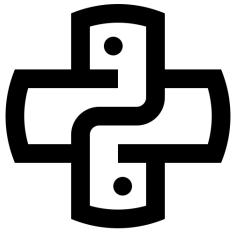

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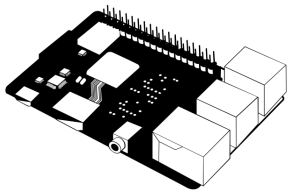

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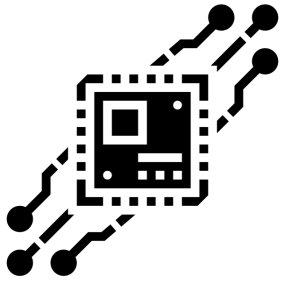

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Option 8:
Raspberry Pi-based motion detection in the SEH Greenhouse

- **Use a Pi NoIR camera to build a Raspberry Pi-based motion tracker**
  - Track motion of objects next plants such as venus fly traps
  - Save images
  - Send an alert
  - Discuss your findings
- **Software:** Thonny Python IDE
- **Hardware:** Pi NoIR Camera, Raspberry Pi 3B+, Sense HAT (Optional)
- **Location:** SEH Greenhouse

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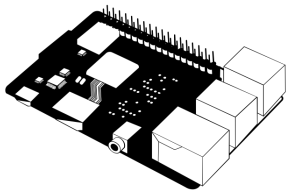

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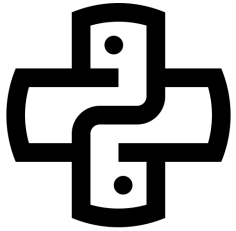

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