APSC 1001 & CS 1010- Fall 2021:
Final Raspberry Pi and Python Group Project

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

Prof. Kartik Bulusu (MAE Department)

Teaching Assistants:
Katya Karpova & Sara Tenaglio (BME Department)
Zachary Stecher (CEE Department)

Learning Assistants:
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Jon Terry, Jack Umina & Olivia Legault (CS Department)

Due date:
November 16, 2021

chrome

Teamwork

Throughout classes and career, you will need to work in small teams to complete a product or a solution

- **Come up with a teamwork plan**
  - **Create a workflow** over a virtual or in-person meeting
  - **Designate one person to be a "scribe"**
  - DeepNote allows to **collaborate in real-time**
  - Instruction team can help you with the **Raspberry Pi Hardware**
    - You can contact us during office hours
    - Or make an appointment if it works better
- **Using Slack to communicate with your team and instructors is essential**
- Each person can make small updates individually and meet to decide on one
  - Your methods are up to you! But **we need to see a contributions from each group member.**
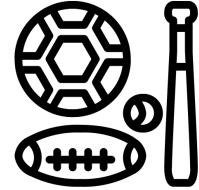- **In the end, we just want to see a completed project**

Be communicators and let the instruction team mentor you!

Project mentor: Jack Umina (Learning Assistant)
Email: jumina@gwmail.gwu.edu

Option 1:
Web scraping sports data using Python

"***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)
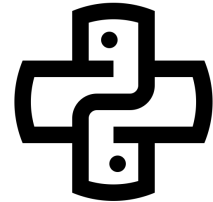
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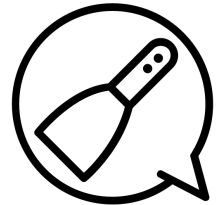
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Project mentors Prof. Kartik Bulusu and Katya Karpova (Learning Assistant)
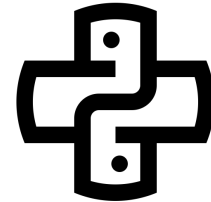
Email: bulusu@gwu.edu; katyakarpova@gwmail.gwu.edu

Option 2:
Sense HAT-based personal weather station for the SEH Greenhouse

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- **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
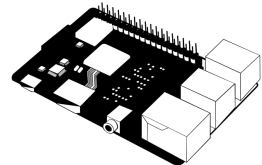- **Hardware:** senseHat, Raspberry Pi 3B+
- **Location:** SEH Greenhouse

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Created by Wilson Joseph
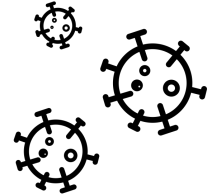from Noun Project

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Project mentor: Jack Umina (Learning Assistant)
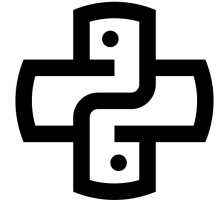**Email:** jumina@gwmail.gwu.edu

Option 3:
Web scraping COVID19 data using Python

*"**Web scraping**, **web harvesting**, or **web data extraction** is data scraping used for extracting data from websites."*
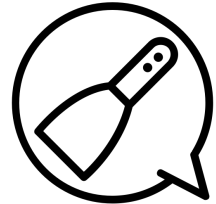
Source: https://en.wikipedia.org/wiki/Web_scraping

- **Write a Python program to web scrape a 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)
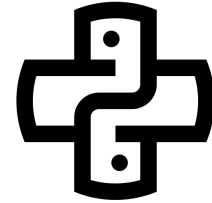
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Project mentors: Jon Terry (Learning Assistant) and Prof. Kartik Bulusu
Email: jterry82@gwmail.gwu.edu; bulusu@gwu.edu

Option 4:
Raspberry Pi-based security camera

- **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)
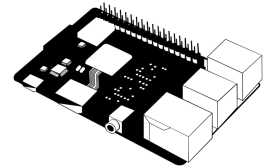- **Location:** TBD in SEH

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**Project mentors:** Prof. Kartik Bulusu and Olivia Legault (Learning Assistant)
Email: bulusu@gwu.edu; olegault@gwmail.gwu.edu

Option 5:
Sense HAT-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+
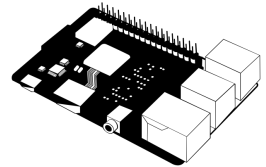- **Location:** TBD in SEH

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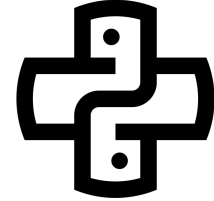
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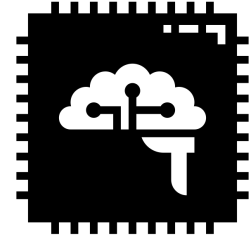from Noun Project

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Project mentor: Jon Terry (Learning Assistant)
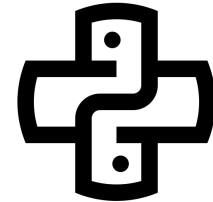**Email:** jterry82@gwmail.gwu.edu

Option 6:
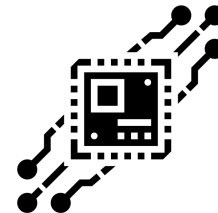# Monitor CPU performance of the Raspberry Pi 3B+

- **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
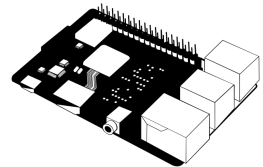- **Hardware:** Raspberry Pi 3B+

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from Noun Project

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from Noun Project

Project mentors: Prof. Kartik Bulusu and Katya Karpova (Learning Assistant)
**Email:** bulusu@gwu.edu; katyakarpova@gwmail.gwu.edu

Option 7:
Raspberry Pi-based motion detection in the SEH greenhouse

Created by Ian Ransley
from Noun Project

- **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)
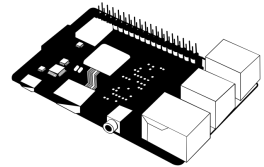- **Location:** SEH Greenhouse
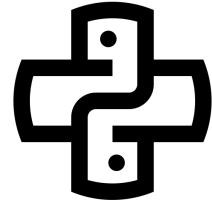
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**Project mentors:** Prof. Kartik Bulusu and Sara Tenaglio (Learning Assistant)
Email: bulusu@gwu.edu; sara_tenaglio@gwmail.gwu.edu

Option 8:
# Sense HAT-based incubator climate monitoring system

- **Use a Sense HAT to build incubator climate monitoring system for tissue cultures for biomedical research**
  - Fetch pressure, temperature and humidity data.
  - Plot your data to show trends
  - Discuss your findings graphically
- **Software:** Thonny Python IDE
- **Hardware:** Sense HAT, Raspberry Pi 3B+, Pi NoIR Camera (optional)
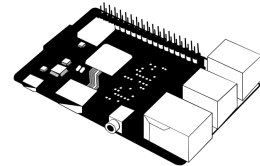- **Location:** TBD in SEH
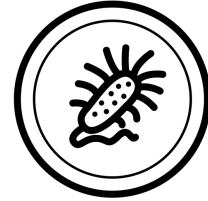
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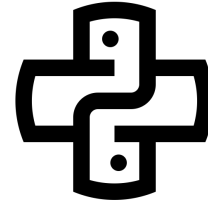
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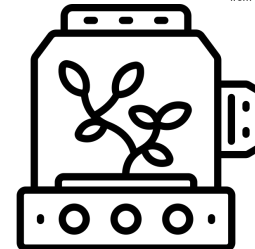
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