Reaching Higher

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APPALACHIAN STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

Computer Science

Today's Presentation

- **(Accelerated) Master's degree in Computer Science**
  - Why, requirements, accelerated program, project vs. thesis
- **Data Science Certificate**
  - Why, requirements, jobs
- **Honors Programs**
  - University Honors, Department Honors, Rigor
- **Adding a Minor**
- **Questions**

Master's of Science in Computer Science

Today’s presentation

- Why a Master’s degree in Computer Science?
- Requirements for the Master’s degree
- Accelerated admission
  - You can complete the Master’s degree in only one extra year!
- Project vs. Thesis

- What is Data Science?
- Requirements for the Data Science Certificate?
- Growth projection and salary for Data Scientists

- University Honors Program
- Department Honors Program
- The Good and Bad of Honors

- How about a minor?
- Questions

Why a Master's Degree in Computer Science?

Money

- In 2023, Bureau of Labor and Statistics reported the median salary for Computer and Information Research Scientists to be $145,080 per year for those with a Master's degree in Computer Science
  - This is $40,000 higher than the median salary for those with only a Bachelor's in CS

Opportunity

- You'll be more marketable and that Master's Degree might help you get that dream job
- 95% of our graduates are employed in the discipline within 6 months of graduation

Experience

- You'll be better prepared for the workforce
- Have better opportunity for advancement

Funding

- Almost all of our graduate students are funded
- Assistantships cover in-state tuition plus $5000 living expenses

Requirements for the Master's degree

- **Three Core Area Courses**
  - Design and Analysis of Algorithms
  - Operating Systems
  - Software Engineering

- **Nine hours in an approved concentration**
  - Data Science and Visual Computing
  - Systems
  - Theoretics
  - Web & Mobile

- **Thesis (9 hours)** or Project (3 hours)
- **Total of 36 hours** of approved course work

- **Total time to degree**: ~ 1.75 years

Accelerated Master's Program

- Up to **twelve hours of graduate courses taken during senior year** count toward undergraduate and graduate degrees
  - 36 - 12 = **24 hours remain to complete graduate degree**
    - typically **two semesters** and a summer
- Application requirements are easier
  - GRE not required
- **GPA** must be a **minimum 3.2** when in the undergraduate degree for the graduate courses to dual count

- **Time to degree:** ~ 1 year

Decelerated Master's Program(those without CS degree)

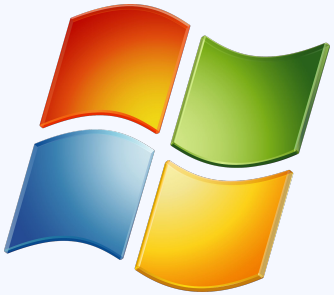
- **Tailored** program of study depending on prior experience

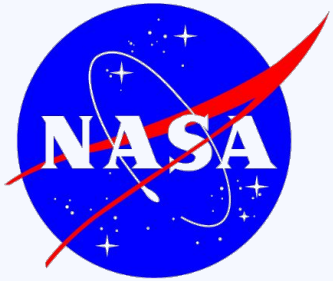
- Programming proficiency: **11 hours in two semesters** (or previous degree)
- About **15 hours of undergraduate CS prerequisites**
- **36 hours graduate** coursework (standard program)

- Time to degree: **about 2.5-3.0 years** depending on programming experience
- Students are eligible for assistantships once they succeed in undergraduate coursework

Recent Employers

- **IBM**
- **Microsoft**
- ECR Software
- **NASA**
- Inmar Intelligence
- University of Iowa (PhD student)
- Moog Music Inc
- US Army Special Ops
- Appalachian State University
- **Epic Games**
- Impulse Wellness LLC
- **Wake Forest University**
- Körber Pharma
- **US Department of Defense**
- QVLx
- Actalent
- Endava





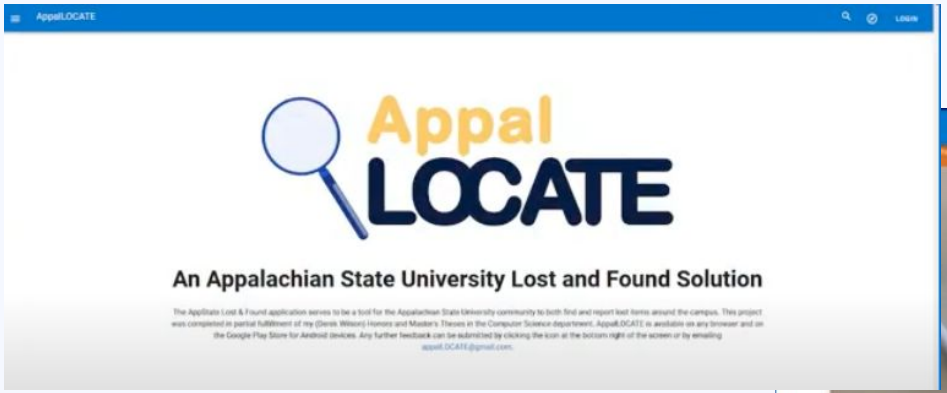
Project versus Thesis

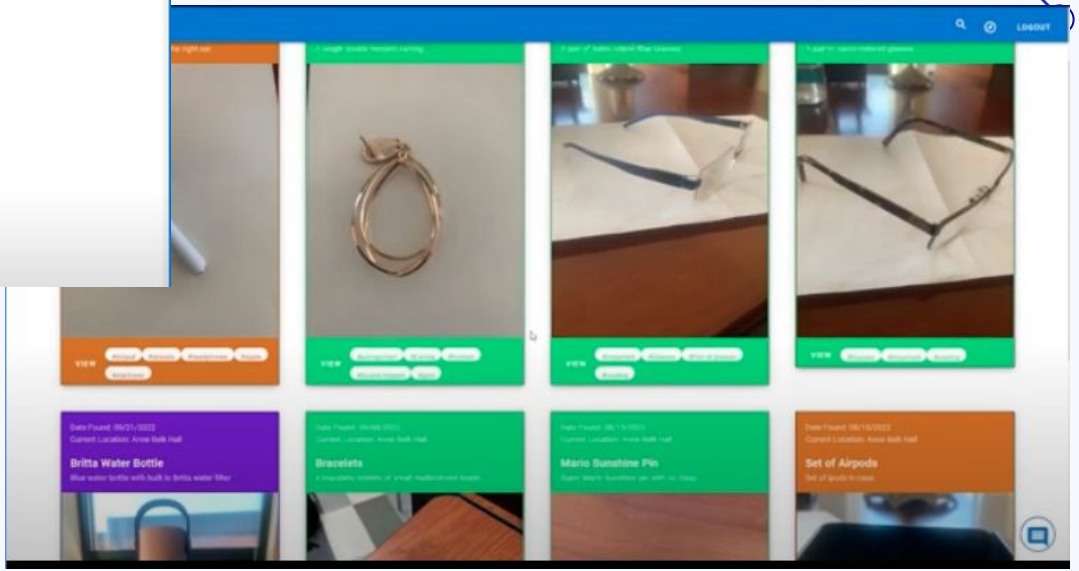
- Student chooses the project or thesis topic
  - Faculty will often help guide this process
- Typically both the project and the thesis will require the design and implementation of software
  - However, sometimes the thesis topic requires the use of others' software for experimentation and study
- Thesis requires research and writing
  - What is the related work?
  - What questions is the research trying to answer?
  - How does the research answer these questions?
- Thesis often leads to a publication

If your ultimate goal is a PhD in any area, the thesis will provide valuable insight into that process.

Recent Master's Thesis

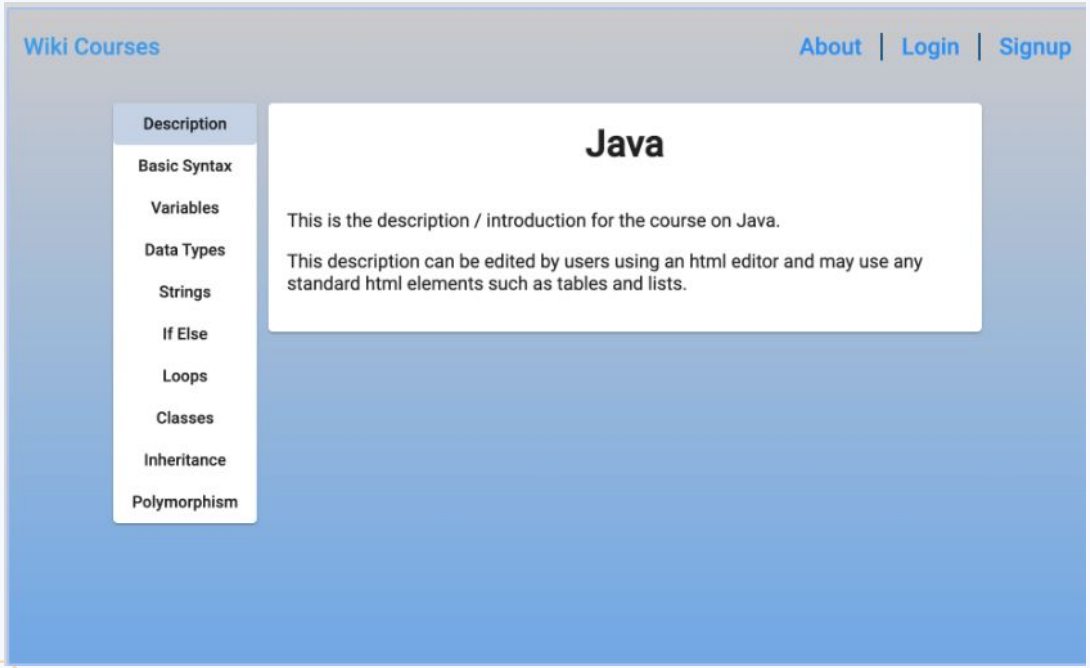
Derrick Wilson (May 2023) - Appal LOCATE: A Lost and Found Solution





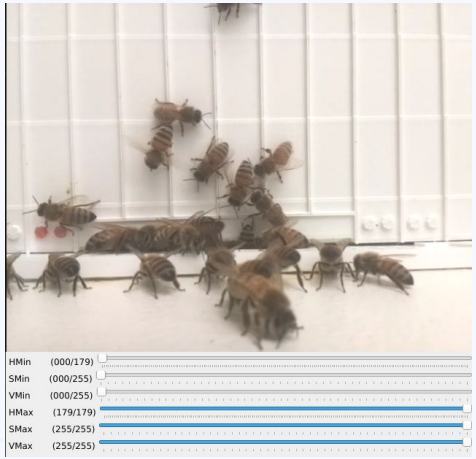
Recent Master's Thesis

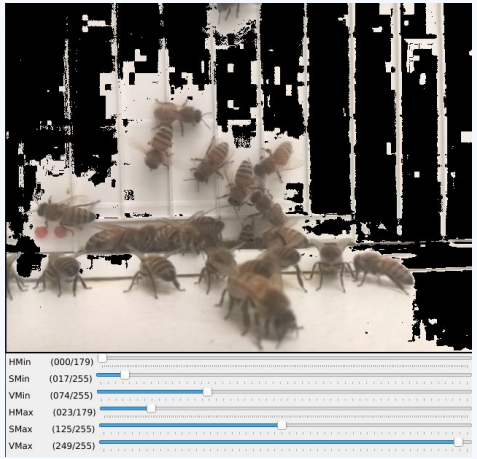
Willow Sapphire (May 2022) - The Design and Implementation of a Teaching Wiki

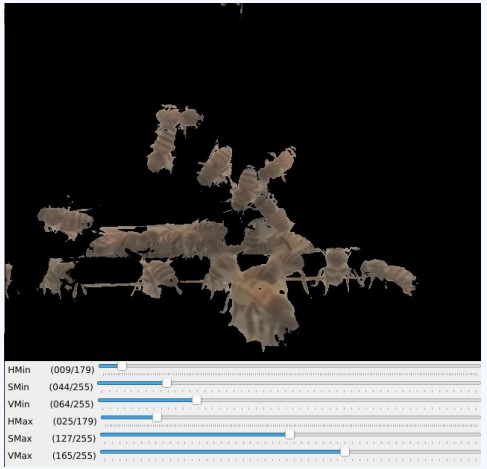


Recent Master’s Thesis

Curt Bridgers (August 2023) -Towards Accurate Bee Arrival and Departure Counts Using Mixture of Gaussian Based Background Subtraction

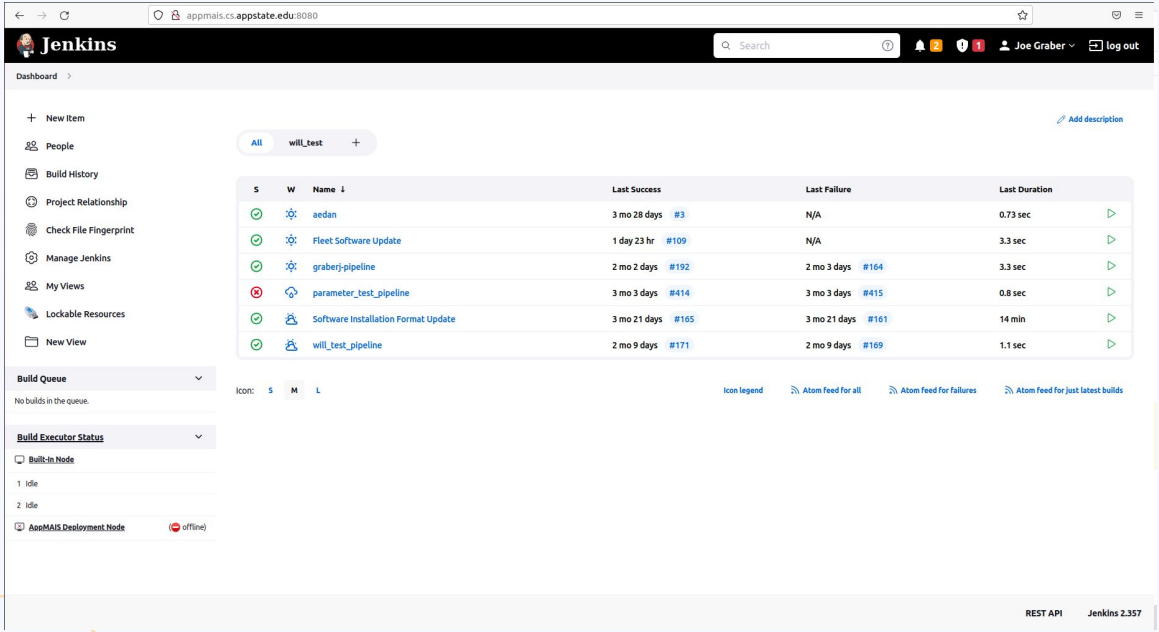






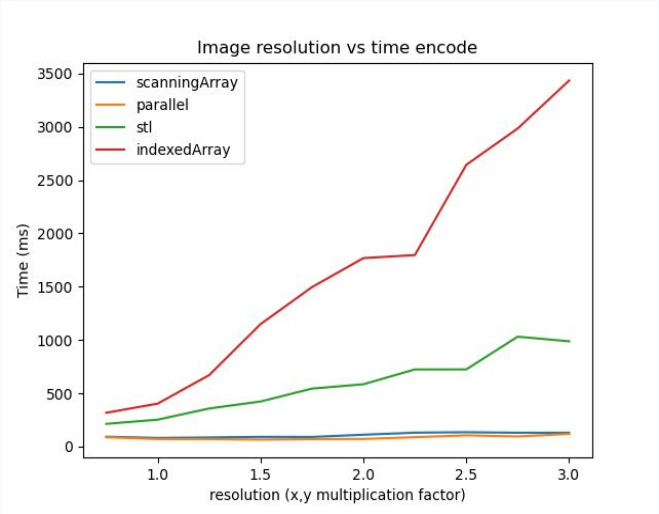
Recent Master's Thesis

Joe Graber (August 2022) - Jenkins for AppMAIS (Honey Bee Monitoring System)



Recent Master's Thesis

Andrew Pobrica (May 2023) - Parallelization of inserting and extracting messages hidden in images



Data Science Certificate

What is Data Science?

Data scientists extract meaningful insights from data using

- Statistics
- Algorithms
- Programming skills

Data scientists use data to answer questions like:

- Will this person renew their subscription?
- What kind of car is this person likely to buy?
- Is this a picture of a cat or a dog?

Requirements for Data Science Certificate

Open to all majors but it is easiest for the CS major students

CS 2435	MAT 2240	STAT 3850	CS 3435	CS 4755
Introduction to Scientific Programming (Programming in Python)	**Linear Algebra**	**Statistics**	**Data Acquisition and Visualization**	**Applied Machine Learning**
CS 2440: CS II can be a substitute	Required for CS major	Required for CS major	An "*extra*" course, but contributes to the 120 hours for CS major	Counts towards the 12 hour CS elective requirement

Growth Projection and Salary

- Because **businesses** are **interested** in obtaining **data driven solutions,** the demand for data scientists is growing significantly

- According to the Bureau of Labor Statistics:
  - Projected employment growth of **36% for data scientists between 2023-2036**
    - Compared to average 4% for all occupations
  - **Median** annual salary in May 2023 for data scientists was **$108,020**

Honors Program

University Honors Program

- To graduate with University Honors, a student must:
  - Earn a **minimum of 24 hours** of honors credit:
    - 9 hours of interdisciplinary Honors courses
    - 3 hours of honors courses within the major
    - 9 hours of honors courses within any area
    - 3 hours of honors thesis/project
  - Possess a minimum GPA of 3.45 (cumulative and in honors courses)

- First year students in the honors program live together in an Honors residential community
- Students with less than 45 semester hours can apply to join the University Honors program
- https://honors.appstate.edu/

Department Honors Program

- To graduate with Honors in Computer Science, a student must:
  - Earn a minimum of 9 hours of honors credit:
    - 6 hours of honors courses in Computer Science
    - 3 hours of honors thesis/project
  - Possess a minimum GPA of 3.45 in the Computer Science major

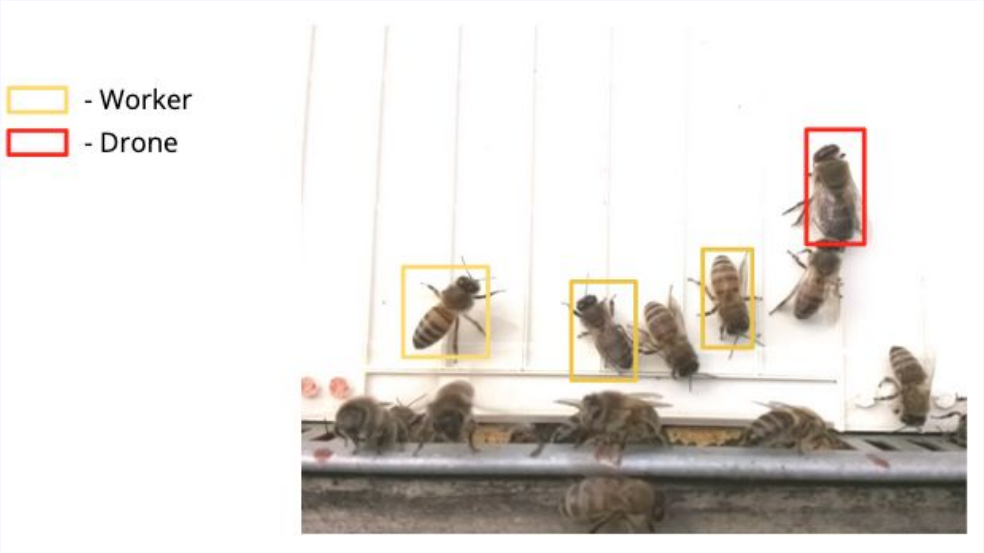
- Graduate courses count as Honors courses
  - Take Graduate courses to graduate with honors and simultaneously work toward earning the Master's degree
- https://compsci.appstate.edu/academics/honors

The good and bad of honors

- The bad - yes, it's more work
- The good
  - **Richer, more in-depth educational experience**
  - **Interested in becoming a faculty member in higher education?**
    - PhD required by most institutions
    - Honors provides the opportunity to write a thesis
  - **Interested in becoming a Researcher in academia or industry**
    - Honors provides the opportunity to perform research under the guidance of a faculty member

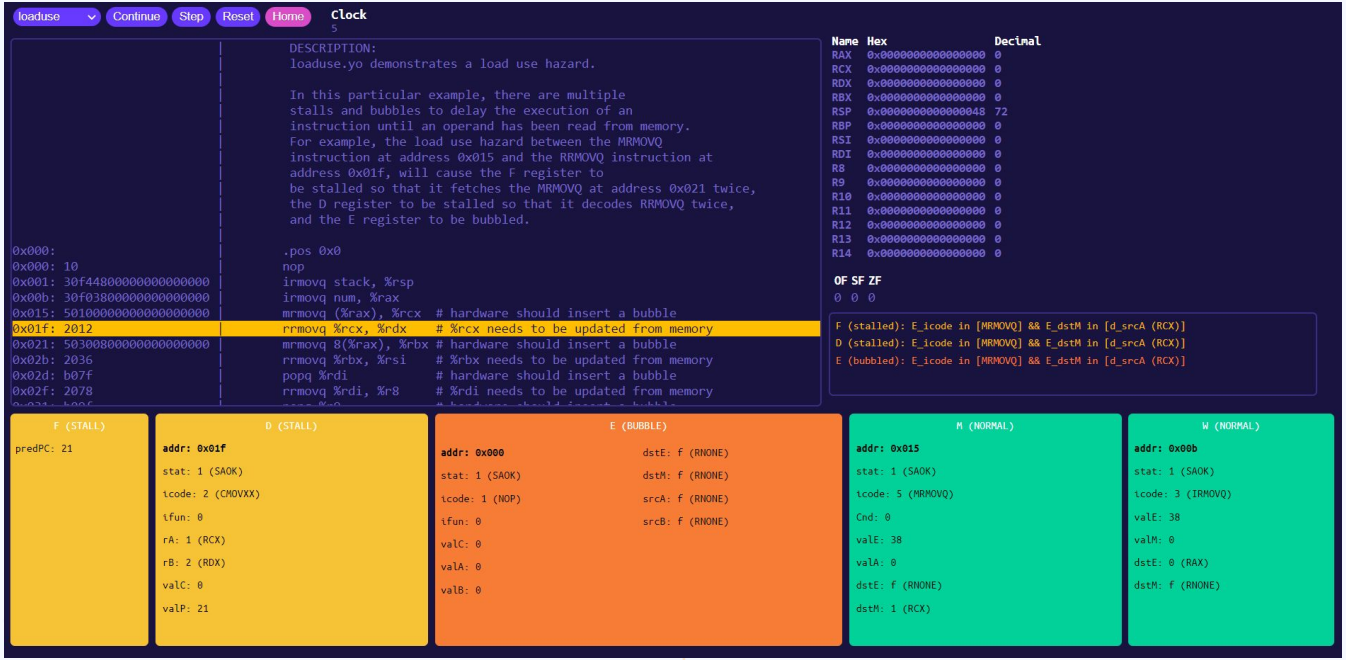
Recent Honors Thesis

Will O'Brien - A Framework for Neural Network Training on Honey Bee Image Data using Active Learning



Recent Honors Thesis

Jenny (Chau) Ly - LY86-64: Implementation and Evaluation of a Y86 Browser-Based Simulator



Adding a minor

How about a minor?

- Math Minor: Because of the overlap in CS and MAT requirements, **CS majors can earn a minor in Mathematics with as little as one extra course**
  - CS requires some math courses that can also count toward a math minor
    - MAT 1120: Calculus with Analytical Geometry II
    - MAT 2240: Introduction to Linear Algebra
  - **MAT 4310:** Numerical Methods counts as a CS elective and toward the math minor
    - MAT 2310: Computational Mathematics Prerequisites counts toward the math minor
      - This is the one “extra” course (but not really extra because it also counts toward the 120 hours to graduate)

- Other minors attractive to CS majors include:
  - Cybersecurity
  - Physics
  - Business
  - Japanese

Majoring in something else? How about a CS minor?

- 12 hours at the 2000 level or above
  - CS 1100: Discrete Math
  - CS 1440: Computer Science 1
  - CS 2440: Computer Science 2
  - + 3 CS electives

Department Fast Facts

Academic Programs

- Bachelor's of Science, ABET accredited, 600 students, 110 graduates/yr
- Master's of Science, 25 students, 10 graduates/yr
- Data Science Certificate, 30 students

Engaged Faculty

- 21 funded grants, > $6 million over last 9 years
- 21 faculty members

Origins

- Program began in mid 1970s, became department in 1998

Questions?

- Also don’t forget to visit these rooms:
  - **Undergraduate Program in room ??????**
    - Learn why you should get your Bachelor’s degree in CS here at App State
  - **Student Success in room ??????**
    - Extra curricular activities help our students succeed!
    - Get the student perspective of our program!
  - **Student Research Lab in room 312-W**
    - See what research some of our students are working on!