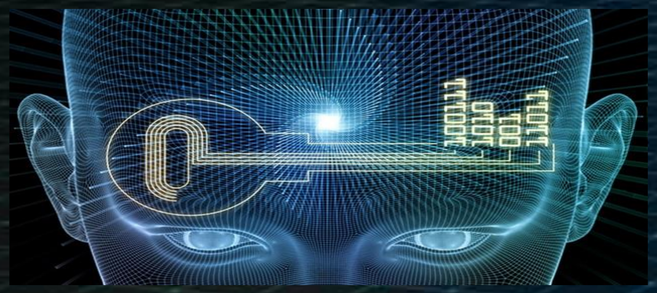
UCF Center for Research in Computer Vision

Integrating Computer Vision into CyberSecurity

presented by: Halima Fisher, UCF RET Participant
Crooms AoIT, Applied Technology Teacher

CROOMS Academy of Information Technology





Curriculum Integration Goal:

CyberSecurity students will be able to identify the significance of learning and understanding Computer Vision for Vehicle CyberSecurity.

Computer Vision Unit's Goal:

The goal of this unit is to provide a basic foundation in computer vision & artificial intelligence so that students can see where computer vision, artificial intelligence and cybersecurity meet and can potentially create a whole new career path in cybersecurity.

Students will ultimately demonstrate how Computer Vision relates to and integrates with CyberSecurity.

Computer Vision Lessons :

Lesson 1: Learn the History of Autonomous Cars.
Lesson 2: Introduction to Computer Vision & Object Detection
Lesson 3: Understanding Neural Networks & Machine Learning
Lesson 4: Understanding different types of Car Sensors
Lesson 5: Utilizing EV3 Lego Mindstorms, explore autonomous cars.
Lesson 6: Identifying vulnerabilities in autonomous vehicles
Lesson 7: Research Vehicle CyberSecurity & Auto-ISAC
Lesson 8: Create a brochure: "How secure is your Autonomous Vehicle?

Exploratory Computer Vision & Fieldtrip to UCF:

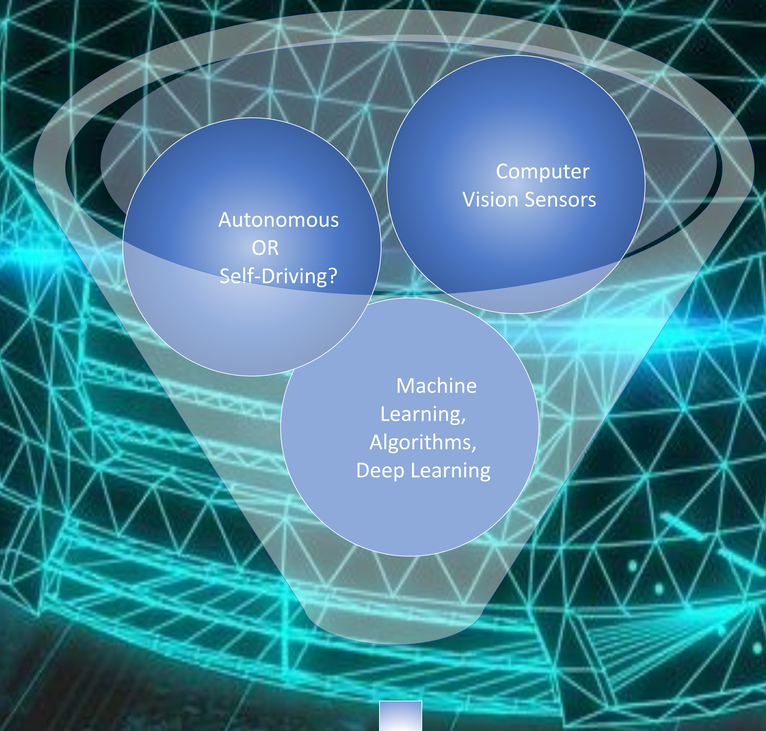
- Research UCF and explore other areas of Computer Vision.

Computer Vision Relevant Terminology

Computer Vision is a field of Computer Science that aims at giving computers a visual understanding of the world. (Hayo)
Artificial Intelligence (AI) is the science of computers emulating humans and training machines to perform human-like tasks. (SAS)
Machine Learning is a method behind how machines learn from data. It is a specific subset of AI that trains a machine how to learn. (SAS)
Deep Learning is a type of machine learning that trains a computer to perform human-like tasks. Deep learning sets up basic parameters about data and trains the computer to learn on its own by recognizing patterns using many layers of processing. (SAS)

Big Question

How secure is your autonomous/self-driving vehicle?



Vehicle Artificial Intelligence

CyberSecurity Prerequisites:

The students prior knowledge of CyberSecurity concepts necessary for the integrated Computer Vision lessons will be the students :

- Demonstrating an understanding of trends in CyberSecurity and how it evolves as technology evolves.
- Introduction to vulnerabilities and securing OS vulnerabilities
- Understanding of confidentiality, integrity, availability and authentication

FL DOE-Computer & Network Security Fund. Standards:

18.0 Demonstrate an understanding of cybersecurity, including its origins, trends, culture, and legal implications.
18.03 Describe the individual elements that comprise the CIA triad (i.e., Confidentiality, Integrity, Availability).
22.0 Demonstrate knowledge of different operating systems.
26.0 Demonstrate an understanding of basic security concepts.
27.0 Demonstrate an understanding of legal and ethical issues in cybersecurity.
29.08 Identify vulnerabilities associated with authentication.
36.0 Solve problems using critical thinking skills, creativity and innovation.

Acknowledgements & Works Cited:

Thank you to:

- Dr. Mubarak Shah, CRCV Director
- Dr. Niels Lobo, CRCV Associate Professor
- Dr. Josue Urbina, RET Leader
- Dana Singer, RET Leader
- Rodney LaLonde & Kishan Athrey, Graduate Students

Works Cited:

- Hayo: https://hayo.io/computer-vision/
- SAS: https://www.sas.com/en_us/insights/analytics/what-is-artificial-intelligence.html (Video Included)
- SAS: https://www.sas.com/en_us/insights/analytics/machine-learning.html ; https://www.sas.com/en_us/insights/analytics/deep-learning.html

Images: Microsoft's Creative Commons Images; Google Reusable

Computer Object Detection ■ Machine Learning ■ Vehicle Sensors



Vehicle Artificial Intelligence + CyberSecurity = Vehicle CyberSecurity

Waymo ■ Telsa ■ Otto Truck ■ Mercedes

