RET Site: Cyber Security Initiative for Nevada Teachers (CSINT)

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Introduction

Students in Damonte Ranch High School's Computer Science students will be provided opportunities to access Cyber Security concepts at all four levels of their program of study.

CS1: "Is Communication Vulnerable?"

CS2: "What's Behind the Image?" (Steganography)

CS3: "How can I Work in Cybersecurity?"

Advanced Studies: Career Exploration, Ethics of Hacking & Linux

Is Communication Vulnerable?

Multi-day Lesson Essential Questions

- What's a packet?
  - > What makes up a packet?
  - > What's its place within a network?
  - > What's its place within communications?
- Why do we encrypt communication?
- What's a Three-Way Handshake?

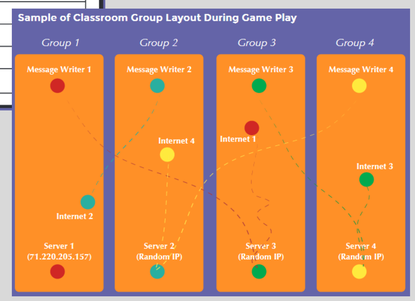
Unplugged Packet Activity

Essential Questions

- What is a packet?
- Why is sending messages over the internet so complex?
- How are web addresses translated into IP addresses?

Sample of DNS Table

#	URL	IP ADDRESS
1	www.code.org	
2		
3		
4		
5		



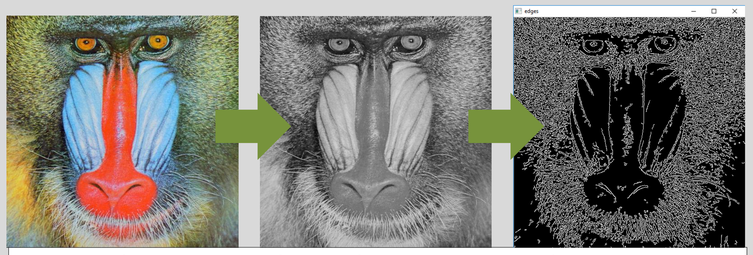
code.org/curriculum/course3/18/Activity18-Internet.pdf

Unplugged Three-Way Handshake Activity

- Three-way communication scenario:
  - > Hello? You there? (Syn)
  - > Yes! Are you still there? (Syn/Ack)
  - > Yes! Here it comes! (Ack)
- Students learn the basics of the TCP Three-Way Handshake
- Students play both roles: Initiator & Responder
- Students pass items overhead standing back-to-back so that they can't see each other

Steganography

- Essential questions on steganography:
  - > How are images created by a computer?
  - > How are secret messages stored within computer images?
- Students will process a color image into a grayscale image using OpenCV.
- Students will conduct several different image processing strategies using OpenCV.
- As semester projects, students will write a program in Python that will decode a message hidden in a gray scale image and then a second program to encode their own messages in gray scale images.



Color to Grayscale to Edge Detection with OpenCV

Cyber Security Capture the Flag

- Information security competitions for all levels:
  - > How are images created by a computer?
  - > How are secret messages stored within computer images?
- Jeopardy-style CTFs. Teams gain points for solved tasks in a range of categories. E.g. web, forensics, cryptography etc.
- Computer Science 1: eCybermission. A CTF for grades 6 – 9
- Computer Science 2: NICE Challenge
- Computer Science 3: NICE Challenge & picoCTF
- Advanced Studies: NICE Challenge, picoCTF, Red Team, & HP Code Wars

Career Exploration

Students will begin exploring career path options in Cyber Security:

- > EdX course: Finding your cybersecurity career path
- > Cyberseek.org

- Students will create an electronic career portfolio answering the following questions:
  - Who am I, Who do I want to be, & How will I get there?

Evaluation

- Pre-Assessment: Will be given at the beginning of the semester. This will be in multiple choice format using Schoology. Assessment will measure both concepts and attitude towards cybersecurity careers.
- Post-Assessment: Will be given at the end of the semester as a stand-alone assessment or may be embedded into the final exam. The post-assessment questions will be the same as the pre-assessment.