Robotics and Cyber Security Curriculum Integration Plan

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Introduction

During the 2016-2017 school year I will be teaching a robotics and introduction to computer science class, 2 sections of biology honors and 2 sections of physical science, at Archie Clayton Middle School in the G.A.T.E. program. The class where I will be primarily integrating the cybersecurity curriculum is the Robotics course. I will include cybersecurity information in my physical science class when we get to the NGSS standard MS-PS4-3 which involves comparing analogue and digital waves and how those waves are coded. At Clayton MS we also have an advisory class period where I plan to teach digital literacy and during that time I will teach additional cybersecurity content about scams, phising, and secure passwords.

Technical Overview

A. In my classroom we have laptops, NXT robots, EV3 robots, a 3-D printer, and a NAO robot.
B. The students have all signed up for the robotics class so it is assumed that they are already interested in robots and related fields. The class will be very individualized and student led to allow working at their own pace.
C. I plan to assess the students by having them complete basic coding benchmarks in each specific programs and projects will be completed using different coding platforms, there will also be weekly quizzes and a multiple choice test, which will also be the pre-test.
D. Data will be collected by having students email their final projects and their code can be ran to check that it is done correctly; there will also be presentations to the class of their programs and videos.

Robotics Course

The learning goals for this course will be competency in using all programming software and awareness in how computers communicate and how to protect your privacy while maintaining security of your data.

This course will also meet the engineering standards and cross curricular concepts set in the NVACSS and NGSS.

Science and Engineering Practices
o Asking questions (for science) and defining problems (for engineering)
o Developing and using models
o Planning and carrying out investigations
o Analyzing and interpreting data
o Using mathematics and computational thinking
o Constructing explanations (for science) and designing solutions (for engineering)
o Engaging in argument from evidence
o Obtaining, evaluating, and communicating information

Crosscutting Concepts
1. Patterns
2. Cause & Effect
3. Scale, Proportion, & Quantity
4. Systems & System Models
5. Energy & Matter
6. Structure & Function
7. Stability & Change

Course Overview

The class will be 18 weeks which is approximately 82 classes

The course will begin with computing basics; Wireshark, Ascii Table, Privacy vs Security, Robots in the media. Then we will move onto multiple robotics coding platforms; Hour of Code, Lego Robotics, Scratch, Python, NAO robots, and the course will end with human and robot interactions, now and in the possible future, human response to robots, the uncanny valley (robot appearance), and again discussing privacy vs security.
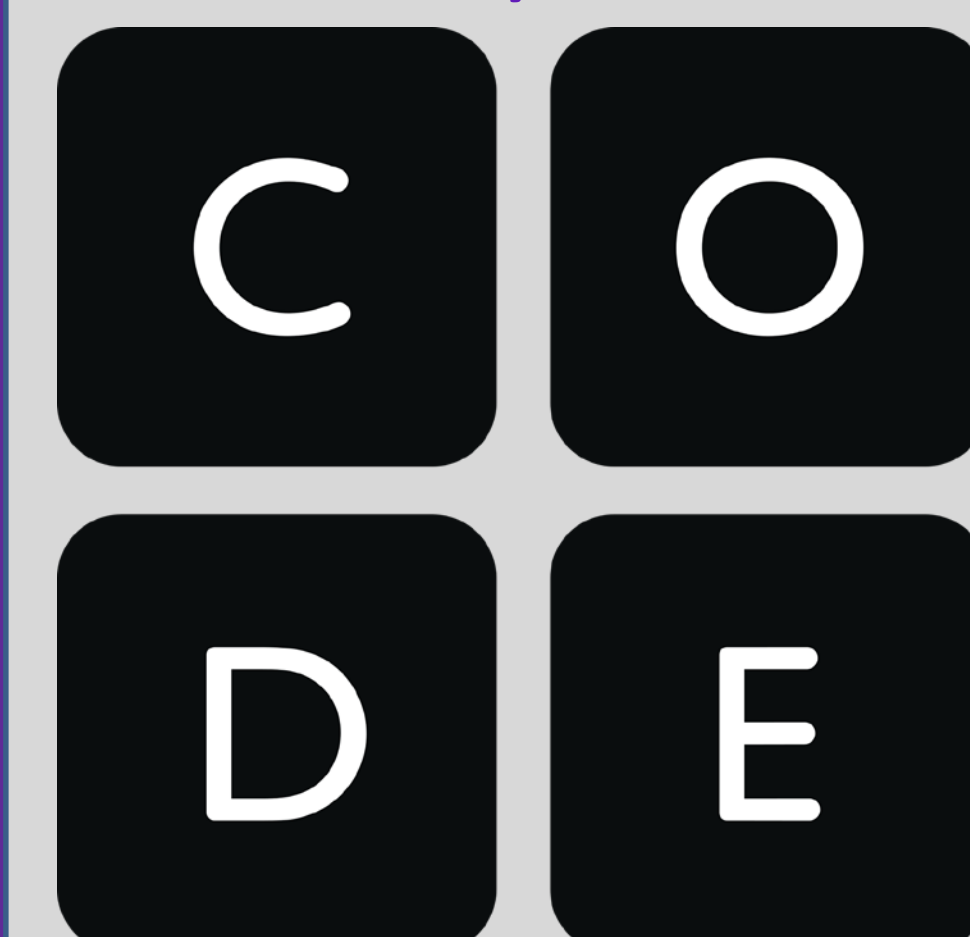
Privacy vs Security Lesson

Article Case Studies on current issues in Privacy and Security. Students will conduct at least five case studies on different current issues that have involved privacy and security of data.
1. Hacking into locked iPhones via the government
2. Drone use and public safety/security
3. Hacking into car computer systems
4. Attacks on personal emails or online web storage (iCloud, Dropbox)
5. Why are your apps free? What are they getting that you don't realize? What are you giving up?

During each case study students will complete a jigsaw activity where they read different articles on the same topic.

Individually students will answer general questions about cybersecurity and how it pertains to the topic. Then in four to five different groups students will each read the same article and analyze the article's tone, keywords, and determine how it relates to privacy and security.

After each group has completed their article analysis they will join a new group in which each person has read and analyzed a different article.

In the new mixed groups students will share their review of the article with the group. Once all students have shared their articles they will have to re-answer the questions to include information from all articles, in order to paint the bigger picture of the privacy and security issues that occur during this issue.

Once each student has come up with a big picture overview of how cybersecurity relates to this case study we will have a whole class discussion to determine what issues dealing with privacy and security were present in the case study.

Using articles for case studies like the one above will be my primary method of teaching cybersecurity in the classroom.