Teaching CyberSecurity Across The Disciplines
(with a focus on women and minorities)

Debasis Bhattacharyya
debasisb@hawaii.edu
maui.hawaii.edu/cybersecurity
HI-TEC 2019
AGENDA

- Background
- Cybersecurity Education – Traditional
- Cybersecurity Education – Across Disciplines
  - Overall Approach
- Case Study
  - USB Rubber Ducky
  - BLE Beacons
- Challenges/Benefits
- Q&A
Background - College

- University of Hawaii Maui College
  - Serves Maui County - islands of Maui, Molokai and Lanai
  - 150,000 or so resident population
  - 2 Million or so tourists per year!
  - 3000+ full-time commuter students
  - 20 or so Associate Degrees
  - 3 Baccalaureate Degrees
  - 66% or so women students
  - Median age of students ~25 years
  - Non-traditional students
  - Commuter island college
Cybersecurity Education - Traditional

- Certificates in Cybersecurity
  - Low Level - Intro, Network+, Security+
  - Higher Level - Ethical Hacking, Forensics
- Internships
  - Government, banks, utilities
- Baccalaureate Degree
  - Applied Business and Info Tech
  - Cybersecurity courses are embedded
- Cyber competitions, NSA GenCyber
- Supported by NSF Grants
  - ATE Program Award# 1204904 (2012-15)
  - SFS Program Award# 1437514 (2015-17)
- NSA/DHS CAE CDE - 2019 to 2024
Cybersecurity Education - Across Disciplines/Segments

- Cybersecurity educations cuts across various segments
  - Program disciplines
  - Gender
  - Minorities
  - Backgrounds - high schools, professionals, returning veterans etc
  - Various Industries
    - Accounting, Hospitality, Law Enforcement, Utility, Healthcare etc.
- One size education does not fit all types of students!
Cybersecurity Education - Across Disciplines

● Focus on 6 disciplines at Associate Degree level
  ○ Accounting
  ○ Healthcare
  ○ Electronics
  ○ Hospitality
  ○ Business
  ○ Administration of Justice

● Supported by NSF SFS Capacity Building and ATE Grant
  ○ ATE Award# 1700562
  ○ SFS Award# 1437514
Cybersecurity Education - Across Student Population

- Focus on students from a variety of backgrounds
  - Women
  - Minorities
  - Veterans
  - Working Professionals
  - High School Students
  - Remote students who rely totally on distance education
  - Economically disadvantaged
  - Low math/science proficiency
  - Non-technical
  - Non-traditional
  - Not interested in Cybersecurity as a career!
Diverse Cybersecurity Education - Overall Approach

- Obtain administration and other institutional support
- Identify key faculty leaders in key disciplines
- Engage faculty and students
  - Guest lectures in classes
  - Highlight high tech industry examples that involves cybersecurity
- Engage employers who will hire students with cyber skills
  - Hotels, banks, tourism, hospitals, law enforcement
- Identify one or two existing courses in each discipline
  - Explore cybersecurity modules that can be embedded
- Hold workshop with faculty from various disciplines
  - Stipend helps!
- Create modules and help faculty member teach it!
Case Study

● Target Disciplines
  ○ Accounting, Business, Electronics, Hospitality, Healthcare

● Fall 2017
  ○ Guest Lectures
  ○ Industry Examples – Hotel Digital Key, BLE Beacons, Kanisa Thermometer
  ○ Competitions – USB Rubber Ducky, USAF CyberPatriot, NSA GenCyber

● Spring 2018
  ○ Target two courses – introductory, intermediate/advanced

● Early June 2018
  ○ All Day Faculty Workshop (summer overload)
  ○ $300 stipend, supported by NSF ATE or SFS
  ○ Finalize target courses for Fall 2018, discuss security modules/labs

● Fall 2018 and Spring 2019
  ○ Create cybersecurity modules and embed in existing courses
  ○ Modules are based on KUs from NSA/DHS CAE CDE program
USB RUBBER DUCKY

Keystroke Injection Tool
By www.Hak5.org

Buy from ($45 each)
http://hakshop.myshopify.com/

YouTube Demo -
https://www.youtube.com/watch?v=sbKN8FhGngg
Micro SD Storage
Replay Button
LED Indicator
Type A Plug

60 MHz 32-Bit CPU
Covert Case
Optional Decal

Source: http://usbrubberduddy.com/
Ducky Script

Ducky Script. Simply Simple.

The USB Rubber Ducky's scripting language is focused on ease-of-use. Writing payloads is as simple as writing a text file in notepad, textedit, vi or emacs.

- Type "Hello World" with STRING Hello World
- Add pauses between commands with DELAY.
Use DELAY 100 for short 100 milliseconds pauses or DELAY 1000 for longer 1 second pauses.

- Combine specials keys. ALT F4, CONTROL ESCAPE, WINDOWS R, SHIFT TAB. They all do exactly as expected.
- Use REM to comment your code before sharing it.
  - That's it! You just learned Ducky Script!
Sample Student Competition: Quack-A-Thon

• Target Students
  ○ New to cybersecurity, basic computer knowledge, high interest level
  ○ High schools, middle schools, college students, non-IT students

• Competition Format
  ○ Form teams of 3-5 students
  ○ Set aside 4 hours for training/coding, plus 20 minute presentations
  ○ Provide grading and scoring rubric to all teams

• Provide basic training and one USB Rubber Ducky per team

• Students write, encode, load and deploy Ducky Script!
• Students present their payload and project to judges...
Introduction to Rubber Ducky

The Rubber Ducky is a microcontroller USB that acts like a keyboard when plugged into a computer. It executes a set of instructions that you load into it; however, it is not possible to load other kinds of executables into the Ducky and have the victim computer run them. When creating a Rubber Ducky executable, you have to pretend you’re at your victim’s computer typing. You can do anything with the Rubber Ducky that you could do with a keyboard, such as opening a command line or powershell and running a few commands for example, so the possibilities are nearly endless.
Repository for hosting the Rubber Ducky demo resources. — Edit

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Source: https://github.com/UHMC/Ducky_Demo
This is Duckkit NG! And is still under development. You can access the old site Here Until we complete the new version.

Welcome to the Duck Toolkit

This website allows you to choose from pre built payloads, create your own payloads and decode existing payloads for the Hak 5 USB Rubber Ducky.

The site contains 30 scripts you may select individually or combine to make whatever payload you require.

Source: http://www.ducktoolkit.com/
Overall Challenges

- Faculty members need to be open and interested!
  - Cybersecurity does not appeal to all
- Faculty members need to see value
  - Inserting course modules within an existing syllabus and timeframe
- Students need need to see value!
  - See cybersecurity as a means to enhance job/career opportunities
- Embedding new courses and projects takes time and work
  - Faculty member needs time off existing work to create new modules
- Ongoing training to ensure new faculty can learn InfoSec
  - Making this sustainable requires one-two years of effort
- Administration needs to be behind all this effort!
Benefits!

- Hands-on projects engage diverse students with fun work!
- Cyber savvy workforce can come from various disciplines
- Increase interest in cybersecurity from a diverse group
- Grow the overall awareness of cybersecurity defense
- Enhance ability of non IT faculty to teach cyber topics
- Requirement for NSA/DHS CAE application

6. Cyber Defense is a Multidisciplinary practice at the Institution
The institution must demonstrate that CD is not treated as a separate discipline, but integrated into additional degree programs within the institution.
Questions? Comments? Feedback?!

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