YELLOW CIRCLE

CYBER SECURITY BOOT CAMP

Encryption

Session 4

inductive automation

intel

City of SACRAMENTO

ARC AMERICAN RIVER COLLEGE

TRAITWARE

Introductions

Instructors

- Name
- Job / Company
- Industry Experience
- Something interesting

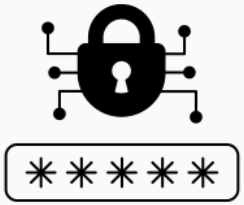
Volunteers

- Name
- Job / School
- Something interesting

Session Overview

Encryption

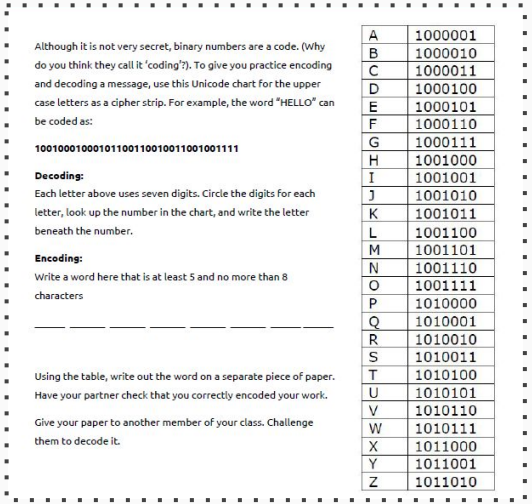
- What is encryption?
- Why do we need encryption?
- When is data encrypted?
- How is it encrypted?
- Encoded vs Decoded



Student Activity

Simple encryption with Binary

- Pass binary encryption worksheets
- Create a secret word using binary
- Pass the sheet to someone else
- Time to decrypt the word
- Use table to decrypt
- Keep your words respectable



Although it is not very secret, binary numbers are a code. (Why do you think they call it 'coding'?). To give you practice encoding and decoding a message, use this Unicode chart for the upper case letters as a cipher strip. For example, the word "HELLO" can be coded as:

1001000100010110011001001100100111

Decoding:
Each letter above uses seven digits. Circle the digits for each letter, look up the number in the chart, and write the letter beneath the number.

Encoding:
Write a word here that is at least 5 and no more than 8 characters

____ ____ ____ ____ ____ ____ ____ ____

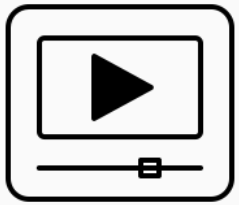
Using the table, write out the word on a separate piece of paper. Have your partner check that you correctly encoded your work.

Give your paper to another member of your class. Challenge them to decode it.

A	1000001
B	1000010
C	1000011
D	1000100
E	1000101
F	1000110
G	1000111
H	1001000
I	1001001
J	1001010
K	1001011
L	1001100
M	1001101
N	1001110
O	1001111
P	1010000
Q	1010001
R	1010010
S	1010011
T	1010100
U	1010101
V	1010110
W	1010111
X	1011000
Y	1011001
Z	1011010

PBS NOVA LABS / Cyber Codes

- Discuss: Codes are used to keep messages secret
- Lets watch it:
  - *https://www.youtube.com/watch?v=q6FanLhvsEs*
  - *Teacher materials: video-4.1*
- Discuss with students



Student Activity

Secret Messages

- Messages are encrypted using a key
- Key is needed to read the message
- https://codemoji.org

Types of Encryption

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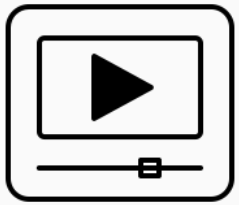
Different ways

- Goal is to go from plaintext to ciphertext
- Encryption algorithms
- Encryption keys
- Symmetric Encryption
- Asymmetric Encryption

Symmetric Key and Public Key Encryption

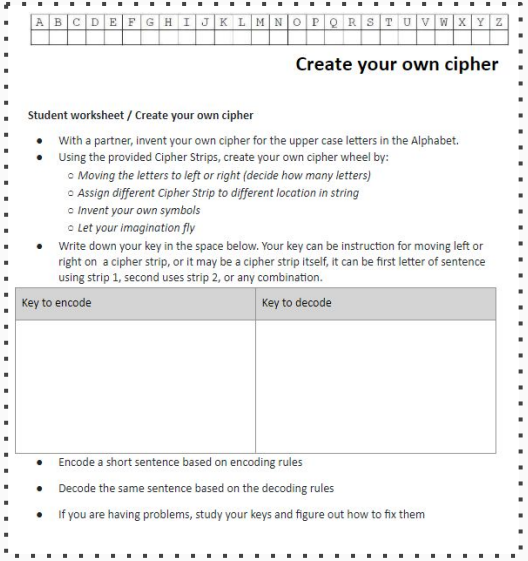
- Different forms of Encryption
- Lets watch it:
  - *https://www.youtube.com/watch?v=AQDCe585Lnc*
  - *Teacher materials: video-4.2*



Student Activity

Cipher Strips

- Pass cipher strips sheets / worksheet
- Creating keys by moving characters
- Make a harder key
- Write down key method
- Encrypt a simple sentence



A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

Create your own cipher

Student worksheet / Create your own cipher

- With a partner, invent your own cipher for the upper case letters in the Alphabet.
- Using the provided Cipher Strips, create your own cipher wheel by:
  - *Moving the letters to left or right (decide how many letters)*
  - *Assign different Cipher Strip to different location in string*
  - *Invent your own symbols*
  - *Let your imagination fly*
- Write down your key in the space below. Your key can be instruction for moving left or right on a cipher strip, or it may be a cipher strip itself, it can be first letter of sentence using strip 1, second uses strip 2, or any combination.

Key to encode	Key to decode

- Encode a short sentence based on encoding rules
- Decode the same sentence based on the decoding rules
- If you are having problems, study your keys and figure out how to fix them

Public Key / Private Key

Public Key / Private Key Demo

- Public key to encrypt
- Private key to decrypt

Public Key / Private Key

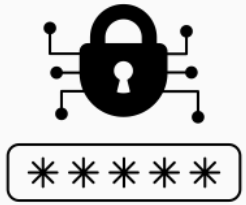
Modern Encryption

- Using PKI
- How are keys exchanged
- Private key to decrypt
- Public key to encrypt

Closing / Wrap-up

What we learned...

- Encryption / Decryption
- Ciphers / Codes / Keys
- Protecting data / documents



What's next...

This is end of session 4

- This is end of day one of boot camp
- Don't forget to bring:
  - Backpack
  - Badge / Name Tag
  - Raffle Tickets
- Meet in Cafeteria at 8:30 am tomorrow
- Prizes, giveaways : tomorrow at 3:15pm