

NAVAL CAREERS

CRYPTOLOGIC TECHNICIAN

INTRODUCTION

Much about the role of Cryptologic Technician is classified. What we can tell you is, the job requires personnel to intercept signals so they can provide tactical and strategic intelligence, technical guidance information to ships and special warfare units. The Navy is looking for someone whose brain is built for solving puzzles and picking out patterns others miss. In this activity students will try out their utilize tools to help them encode and decode secret information.



OBJECTIVES:

- Students will gain knowledge of the history of cryptology, with an emphasis on the American Indian Code Talkers during WWII and current day Navy Career: Cryptologic Technician.
- Students will construct secure system patterns for information sharing.
- Students will deconstruct patterns of secure systems for information sharing.
- Students will (MISSING CONTENT?)

TARGET AUDIENCE | GRADES 6-12



FOR MORE INFORMATION, VISIT RECF.ORG

STANDARD

Common Core St Standards		6 th - 8 th Standard
Standards	SL - Speaking and Listening	1,2,4
	RH - History/Social Studies	2,3,4,7
National Curriculum Standards for Social Studies		
Themes	1 Culture	Middle Grades
	2 Time, Continuity, and Change	Middle Grades
	3 Individual Development and Identity	Middle Grades
	4 Science Technology and Society	Middle Grades
Computer Science Teachers Association		
1A-AP-09	Model the way programs store and manipulate data by using numbers or other symbols to represent information	

PREPARATION/MATERIALS:

For each pair of students:

- 1 Copy of VEX Robotics Code A Code Activity
- 2 each Green, Blue, Red and Black (Pen, Marker, or Pencil Colors)
- 2 Copies of Mission 1 - Code Key
- 1 Copy of Mission 2 - Confidential (Sealed)
- 2 Copies of Mission 3 - Code Intercept
- 1 VEX IQ robot brain
- 1 Touch LED sensor
- 1 smart cable
- Computer or tablet with access to the internet

For whole group

- [Navy Recruitment Careers: Cryptologic Technician](#) - job description website
- [An Unbreakable Code](#) (There are many videos on this topic, please choose one that is appropriate for your audience. This is just one example)
- [Navy Cryptologic Technician Recruitment Video](#)

Teacher

- Familiarize yourself with VEXcode
 - [VEXcode](#)
 - [VEXcode Knowledge Base articles for VEX IQ](#)

BACKGROUND

For over 200 years governments, armies, and individuals have wanted to protect messages from the “enemy”
The most notable account was during WWII.

WWII was basically made up of two “teams”, The Allies and the Axis. The United States, Great Britain, and the Soviet Union were the 3 main countries that made up the Allies. The main Axis were Germany, Japan and Italy. However, over 100 other countries were involved. Top secret information needed to be shared. Every country involved has secrets they wanted to keep safe and information they wanted to steal from the enemy. The United States military was very successful in keeping their messages secret because of the Code Talkers.

Code Talkers were Native American men who served in the US military and used their native tribal languages as means of secret communication during the war. These men transmitted secret tactical information over military telephone or radio networks. The use of Native American languages worked so well because few people outside of the tribes had learned to speak the languages.

The methods utilized by the Code Talkers was before the invention of computers, cell phones, and other modern communication devices. These new means of communication provide options for new complex secret communications, but also better tools for deciphering those communications. Secret communications among governments, military, and individuals still continue today and may pose a threat to national security.

Today we will utilize a VEX IQ robot brain, touch led sensor and VEXcode to model cryptology. The science of cryptology is made up of two areas: Cryptography and Cryptanalysis.

Cryptography is the study of how to create secure systems for communication.

Cryptanalysis is the study of how to break those systems to understand the communication.

We will also introduce you to the Naval Career: Cryptologic Technician.

FACILITATION:

Whole Group:

1. Ask students to share a time they may have created a secret code or language to communicate.
2. Share background information
3. Show clip of Code Talkers
4. Introduce the VEX IQ robot and identify the sensor and smart cable.
 - a. Walk students through connecting the brain and sensor
 - b. Walk students through how to open a new project on VEXcode
 - c. Walk students through how to save a project in VEXcode
5. Have students complete steps 1-4 of Code A Code Activity.
6. Use Mission 1- Code Key worksheet to complete step 5 of Code A Code Activity.
 - a. Each Student has their own worksheet but will work with their partner to create a color pattern for each letter of the alphabet.
 - i. Encourage students to take care not to duplicate patterns. Each letter should have a unique pattern of colors associated with it.
7. Have students locate Mission 2- Confidential Worksheet. Here they will find their confidential word they will need to encode. Students will document the color pattern on the worksheet for each letter of the secret message. They are then to create a code in VEXcode so that the touch LED will flash the appropriate colors for the code.
 - a. Remind students that Mission 2 -Confidential worksheets are for their eyes only. They are to take great care to keep it hidden.

FACILITATION (CONT.)

- b. Encourage students to double check that their code is correct and flashes the correct patterns for each letter.
 - c. Encourage students to utilize the protip at the bottom of the code a code worksheet.
 - d. Encourage students to save their project.
 - e. Code can be in block or in python
8. Make sure Worksheet 2 is properly stowed, then combine two groups of students.
9. Have students locate Mission 3- Code Intercept worksheet.
 - a. Have students take turns running their program for their new partner teams.
 - b. Partners are to use the Mission 3 Code Intercept worksheet to copy the patterns
 - c. Students are to switch - 2nd teams runs their program while partner teams copy the patterns
 - i. Programs can run multiple times.
10. Have students separate into the original pairs again and attempt to decode the other team's secret word.
 - a. Teacher notes- depending on your students level and your time, students may share worksheet 1 with the partner teams to assist with the decoding. We recommend letting them attempt without the aid first.

Whole Group

11. Show the Navy Career Video
 - a. Option to invite local Navy Recruiter to answer any questions students may have about the career path.
 - b. Share Naval website for more information with students.

Check for Understanding:

- Ask students which activity represents cryptography? Cryptanalysis?
- Ask students to explain how the activities today might relate to the naval career.

MISSION 1 | CODE KEY

CONFIDENTIAL

In pairs, encode the alphabet in specific color patterns for each letter.

Take care to make sure each letter's color pattern is unique. You may utilize blue, red, and green.

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

MISSION 2 | TRANSMIT

CONFIDENTIAL

Work with your partner to encode the following message and download to the VEX IQ Brain for transmission.

Step 1	Use write your patterns out for each letter using your code key from Mission 1 worksheet.
Step 2	Utilizing what we learned in the "Code A Code" activity, build a code that will transmit the proper message to the touch LED.
Step 3	Take the time to ensure your code runs correctly, we can not afford our message to be decoded improperly.

NAVY

N _ _ _ A _ _ _ V _ _ _ Y _ _ _

MISSION 2 | TRANSMIT

CONFIDENTIAL

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BOAT

B _____ **O** _____ **A** _____ **T** _____

MISSION 2 | TRANSMIT

CONFIDENTIAL

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SHIP

S _____ **H** _____ **I** _____ **P** _____

MISSION 2 | TRANSMIT

CONFIDENTIAL

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SALT

S _____ **A** _____ **L** _____ **T** _____

MISSION 2 | TRANSMIT

CONFIDENTIAL

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SEAS

S _____ **E** _____ **A** _____ **S** _____

MISSION 2 | TRANSMIT

CONFIDENTIAL

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Step 3	Take the time to ensure your code runs correctly, we can not afford our message to be decoded improperly.

CODE

C _____ **O** _____ **D** _____ **E** _____

MISSION 2 | TRANSMIT

CONFIDENTIAL

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Step 2	Utilizing what we learned in the "Code A Code" activity, build a code that will transmit the proper message to the touch LED.
Step 3	Take the time to ensure your code runs correctly, we can not afford our message to be decoded improperly.

SAIL

S _____ **A** _____ **I** _____ **L** _____

MISSION 2 | TRANSMIT

CONFIDENTIAL

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Step 3	Take the time to ensure your code runs correctly, we can not afford our message to be decoded improperly.

TRAIN

T____**R**____**A**____**I**____**N**_____

MISSION 2 | TRANSMIT

CONFIDENTIAL

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Step 2	Utilizing what we learned in the "Code A Code" activity, build a code that will transmit the proper message to the touch LED.
Step 3	Take the time to ensure your code runs correctly, we can not afford our message to be decoded improperly.

EQUIP

E_____**Q**_____**U**_____**I**_____**P**_____

MISSION 2 | TRANSMIT

CONFIDENTIAL

Work with your partner to encode the following message and download to the VEX IQ Brain for transmission.

Step 1	Use write your patterns out for each letter using your code key from Mission 1 worksheet.
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Step 3	Take the time to ensure your code runs correctly, we can not afford our message to be decoded improperly.

TEST

T _____ **E** _____ **S** _____ **T** _____

MISSION 2 | TRANSMIT

CONFIDENTIAL

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Step 3	Take the time to ensure your code runs correctly, we can not afford our message to be decoded improperly.

BUILD

B_____**U**_____**I**_____**L**_____**D**_____

MISSION 2 | TRANSMIT

CONFIDENTIAL

Work with your partner to encode the following message and download to the VEX IQ Brain for transmission.

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Step 3	Take the time to ensure your code runs correctly, we can not afford our message to be decoded improperly.

STARS

S _____ **T** _____ **A** _____ **R** _____ **S** _____

MISSION 2 | TRANSMIT

CONFIDENTIAL

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Step 3	Take the time to ensure your code runs correctly, we can not afford our message to be decoded improperly.

FLEET

F _____ **L** _____ **E** _____ **E** _____ **T** _____

MISSION 2 | TRANSMIT

CONFIDENTIAL

Work with your partner to encode the following message and download to the VEX IQ Brain for transmission.

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Step 2	Utilizing what we learned in the "Code A Code" activity, build a code that will transmit the proper message to the touch LED.
Step 3	Take the time to ensure your code runs correctly, we can not afford our message to be decoded improperly.

FORCE

F _____ **O** _____ **R** _____ **C** _____ **E** _____

MISSION 2 | TRANSMIT

CONFIDENTIAL

Work with your partner to encode the following message and download to the VEX IQ Brain for transmission.

Step 1	Use write your patterns out for each letter using your code key from Mission 1 worksheet.
Step 2	Utilizing what we learned in the "Code A Code" activity, build a code that will transmit the proper message to the touch LED.
Step 3	Take the time to ensure your code runs correctly, we can not afford our message to be decoded improperly.

LINE

L _____ **I** _____ **N** _____ **E** _____

MISSION 2 | TRANSMIT

CONFIDENTIAL

Work with your partner to encode the following message and download to the VEX IQ Brain for transmission.

Step 1	Use write your patterns out for each letter using your code key from Mission 1 worksheet.
Step 2	Utilizing what we learned in the "Code A Code" activity, build a code that will transmit the proper message to the touch LED.
Step 3	Take the time to ensure your code runs correctly, we can not afford our message to be decoded improperly.

POWER

P_____**O**_____**W**_____**E**_____**R**_____

MISSION 2 | TRANSMIT

CONFIDENTIAL

Work with your partner to encode the following message and download to the VEX IQ Brain for transmission.

Step 1	Use write your patterns out for each letter using your code key from Mission 1 worksheet.
Step 2	Utilizing what we learned in the "Code A Code" activity, build a code that will transmit the proper message to the touch LED.
Step 3	Take the time to ensure your code runs correctly, we can not afford our message to be decoded improperly.

UNIT

U _____ **N** _____ **I** _____ **T** _____

MISSION 2 | TRANSMIT

CONFIDENTIAL

Work with your partner to encode the following message and download to the VEX IQ Brain for transmission.

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Step 3	Take the time to ensure your code runs correctly, we can not afford our message to be decoded improperly.

TROOP

T____**R**____**O**____**O**____**P**_____

MISSION 3 | CODE TRANSMIT

CONFIDENTIAL

Your mission is to decode the transmission from your partner group. Each group will take turns.

Pattern	Letter

Message: _____