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EMPOWERING THE NEXT GENERATION OF STEM INNOVATORS

MEET GRACIE ERMI, A RESEARCH SOFTWARE ENGINEER

Gracie is a research software engineer in Seattle, Washington, who writes code to aid wildlife conservation. She holds both a B.S. and an M.S. in computer science from Western Washington University. Every day Gracie gets to write code that makes it easier for wildlife experts to do their job.

Gracie works at <u>Vulcan Inc.</u>, where she builds machine learning technology - training computers to do the most tedious aspects of conservation work so that experts can focus on more critical tasks. Her work focuses specifically on saving endangered animals and preserving ocean health. A super exciting project she has been working on recently is helping to protect endangered killer whales.

<u>SeaLife Response, Rehabilitation, and Research (SR3</u>) is an organization that researches sea-life and then uses that research to aid and advocate for those animals. Gracie and her team are the ones building new technology to try to make SR3's work easier for them. Specifically, they are working on technology that can assist SR3's scientists as they use drone images to do health check-ups on killer whales without disturbing the animals at all. This new technology will automatically do some parts of the health check-up, like identifying individual whales in the images, and will allow scientists to more quickly learn information about the whales to then share with governments to make better laws to protect these amazing animals.



CLICK TO WATCH OUR INTERVIEW WITH GRACIE

Anyone can be a software engineer! If you are interested in solving big problems, not only is software engineering a fun and attainable job, it can also help save the world! - Gracie Ermi

A DAY IN THE LIFE OF GRACIE ERMI



Gracie is a research software engineer and is part of a team who creates technology and software to aid in wildlife conservation!

Can you find some of the terms she uses everyday?

 Animal Health Coding Computer Science Conservation Droid 					Engineering Imagery Killer Whale Ocean Health Operating Systems				• • •	 Orcas PNW Preserving Programming Research 				 Sea Life Software Technology Vulcan Inc Wildlife 			
		Н	W	В	В	J	D	Ρ	v	М	т	U	G	J	А	R	0
		G	N	Н	G	N	I	М	М	А	R	G	0	R	Ρ	Р	С
		Е	Ρ	L	Т	N	G	L	G	Е	D	G	K	Н	Ε	N	0
		L	Ε	F	I	L	D	L	I	W	Ρ	K	I	R	М	S	М
		A	V	U	L	С	A	N	I	Ν	С	0	А	С	I	Н	Р
		Η	Ν	С	0	N	S	Е	R	V	A	т	I	0	N	G	U
		W	0	I	V	т	Q	Η	Η	I	I	Μ	U	N	Ν	Ρ	Т
		R	т	Q	М	0	Е	С	Z	Ν	D	R	0	I	D	R	E
		Е	S	Z	0	А	R	С	G	K	A	U	R	S	S	Е	R
		L	R	Е	В	А	L	S	Η	I	J	Ε	Z	В	Е	S	S
		L	В	А	Ε	С	Y	Н	Μ	Ν	Ε	U	С	G	А	Е	С
		I	Q	S	W	S	0	A	Е	Ν	0	S	G	0	L	R	I
		K	Ε	W	Т	Т	G	D	I	A	A	L	В	V	I	V	E
		R	U	Е	K	Е	F	G	I	С	L	Н	0	Q	F	I	Ν
		L	Μ	S	R	Н	N	0	R	Ν	С	т	K	G	Ε	N	С
		S	R	Y	Х	Ε	L	0	S	R	G	Η	Η	Κ	Y	G	Ε

Please note: some words are found when spelled backwards!

ENCODING LANGUAGE

Coding, sometimes called computer programming, is how we communicate with computers. Code tells a computer what actions to take, and writing code is like creating a set of instructions. By learning to write code, you can tell computers what to do or how to behave in a much faster way. Computers don't speak our language, but we can convert information into a simple alphabet every computer can read: **binary**.

Binary is a way to represent information using only two options. A computer uses the options "off" and "on" as wires send it information in the form of electricity. Information can also be stored in binary - DVDs store information as either reflective or non-reflective. How can we convert real-life things that we want to store in a computer into binary?

Let's start with letters in the alphabet. Explore the American Standard Code for Information Interchange, or ASCII, to see how the English alphabet is encoded into a series of eight boxes with two options: colored in or not colored in.

A	SCII A	LPH	ABET	ENCO	DER
Α			Ν		
В			0		
С			Р		
D			Q		
Е			R		
F			S		
G			Т		
Н			U		
1			V		
J			W		
Κ			Х		
L			Y		
Μ			Z		

YOUR NAME IN BINARY

Create a necklace or keychain that spells your name in binary.

Materials:

- String
- Pony beads (two different colors)
- Pencil
- ASCII Alphabet Encoder

1. Find the letters of your name on the Alphabet Encoder and copy the 8 digit binary code for each letter into the boxes below. Use a pencil to color in the squares.

- 2. Tie a knot on one end of your string.
- 3. Choose two colors of beads, and assign one color of bead to the filled in squares and the other color to the blank squares.
- 4. String beads in order of the code, one letter at a time, until you spell your name.
- 5. Tie the other end of your string so the beads cannot fall off.
- 6. Enjoy your name in binary as a necklace or keychain.

LETTER:	BINARY CODE:
	This activity is adapted from the code.org "Binary Bracelets" lesson

RESEARCHING WHALE HEALTH

Researchers at <u>SeaLife Response, Rehabilitation, and Research (SR3)</u> have been collecting aerial images of orcas, or killer whales, over the past twelve years, shifting from manned aircraft (e.g. helicopters) to **unmanned aerial vehicles** (UAVs), or drones in 2014. After the aerial images are collected, they are analyzed by scientists to identify individual whales from unique saddle patches on their backs. This allows the scientists to link measurements to whales of known age and gender. Then, using these aerial images, researchers can estimate the size and monitor growth and body condition of each whale, without disturbing them, to track their health over time.

Performing this analysis manually, while valuable and accurate, is also very time intensive. It can take up to several months for annual updates, which makes it difficult to quickly take action for killer whales who need it the most. In order to help streamline this process, <u>Vulcan Inc.</u> is working on developing machine learning, the study of finding patterns in data, to automate some of the labor-intensive work of processing these images. The goal of this work is to help scientists at SR3 work even faster as they take action to improve killer whale health.



Just how each of us has a unique thumbprint, Orcas have a unique **saddle patch**. This white marking on their back helps scientists identify each whale. Thanks to technology, we are able to track the whale's health, as shown in these photos of the same whale spanning four years.

Want to learn more? Visit these Links!

[Video] <u>How Can Coding Save Orca Whales?: youtu.be/jluE0x4hK88</u> [BLOG] <u>Learn more about Vulcan Engineering: engineering.vulcan.com/blog</u> <u>Learn more about how SR3 helps Sea Life and how you can help: www.sealifer3.org</u>

Information adapted from Vulcan Inc. and SR3 publications.

