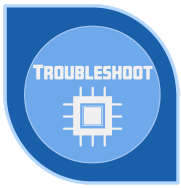
Computer Science Careers Across Virginia

Autonomous Cars: Human-computer Interaction

Computer Science Strands

 Algorithms & Programming	 Computing Systems	 Cybersecurity	 Data & Analysis	 Impacts of Computing	 Networks & the Internet
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Overview

The CS Careers Across Virginia video explores autonomous cars with a research scientist, engineer, and team lead at the Virginia Tech Transportation Institute (VTTI). Computer scientists are needed to program the computing devices that are part of the complex systems of automated vehicles. Human-computer interaction is also a critical component to the design, development, and use of autonomous cars.

Discussion

- What makes a robot a robot?
- How does an autonomous car "see"?
- How are robot sensors different from the way humans sense the world around them?
- What is something a robot can do now or may do in the future that you are looking forward to?
- What is ethical behavior and why is it important to think about ethics when designing and programming automated cars?

Activity: Create a Robot Zine[1]

In this activity, students will design a robot to help solve a real-world problem. They will share their design by creating a "robot zine". A zine is a self-made publication. *"It allows people of all interests and agendas to voice their opinions, art, and rants to a wide audience in a relatively cheap and fun way,"* writes Matt Holdaway. The future of robotics is definitely a subject that needs a diverse set of voices thinking about and sharing their ideas. This zine activity can be independently or in small groups (2-3). Ideas can be conveyed in written form and/or images.

Pick a Robot Assistant Design Challenge

Design Challenge 1:
Japan has a high percentage of individuals over 75. Because there is insufficient staffing for elder care, many Japanese citizens must leave their jobs to take care of aging family members. Those who do work in nursing and healthcare often face high stress and fatigue.

Design Challenge 2:
Social companion robots help fight against social isolation and loneliness, especially as one-person households are on the rise. Studies in the U.S. and U.K. find that the prevalence of loneliness among people older than 60 ranges from 10% to 46%.

Design Challenge 3:
Children with autism can often feel overwhelmed with face-to-face interaction and may find it difficult to learn social skills. Learning social cues through robotics may be the answer as they simplify the task.

Design Challenge 4:
Construction robot assistants can learn from humans by watching and listening and eventually help to make construction work less dangerous and strenuous for humans.

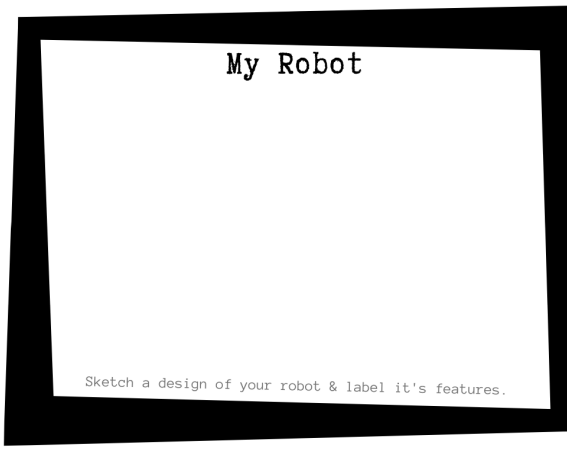
Print template or use a blank piece of paper

- Watch Robot Zine folding instructions (it's easiest to fold first and then draw)

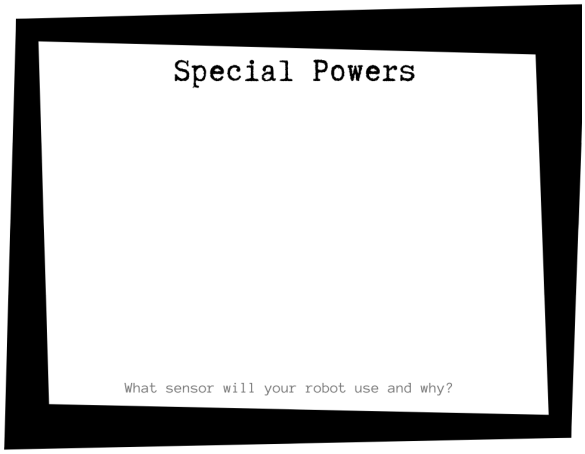
Create the Robot Zine

[1] Inspired by the #TechGirlsChallenge

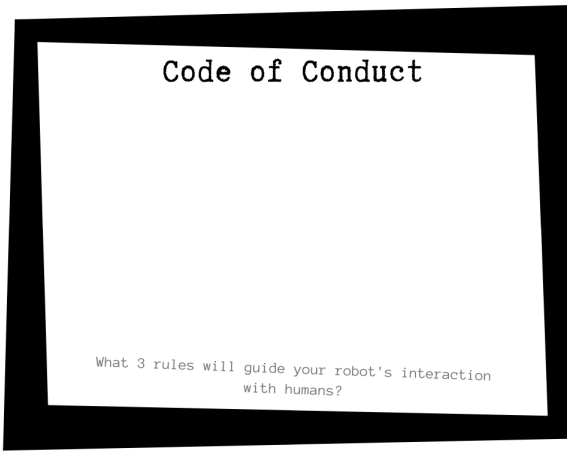
- Sketch a design of your robot and label it's features



- What sensors will your robot use and why?



- What rules should govern how your robot interacts with humans? This will be your code of conduct.
- Write 3 rules to guide your robot's interaction with humans?



Learning Resources

- Crash Course Computer Science
- CS2N robot activities
- Developing AI Literacy (MIT)
- Ethical Concerns Mount as AI Takes Bigger Decision-Making Role in More Industries (Harvard Gazette)
- Robotics: Crash Course AI
- So, What Is a Robot Really?
- Where to? A history of autonomous vehicles

Career Resources

- Computer hardware engineers (Bureau of Labor Statistics)
- Human-Computer Interaction (HCI)
- Software developers (Bureau of Labor Statistics)