

Robotics

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Outline

Introduction to robotics

Activity: navigating a maze

Q&A with FRC students

Activity: navigating around a wall

Q&A with FLL coach

Programming with Mindstorms

Programming with Finch

HS CS Curricula and Robotics

AP CSP: Does not mention robots specifically as a learning objective, but as a tool to achieve the learning objectives

ECS: Examines applications of robots, ethical considerations, interplay of hardware and software

Robots for Education

Enables interactive feedback

Allows students to test ideas in a familiar environment

Inherently interdisciplinary

including many social science/humanities elements too!

Unique Challenges

Interacting in a noisy environment

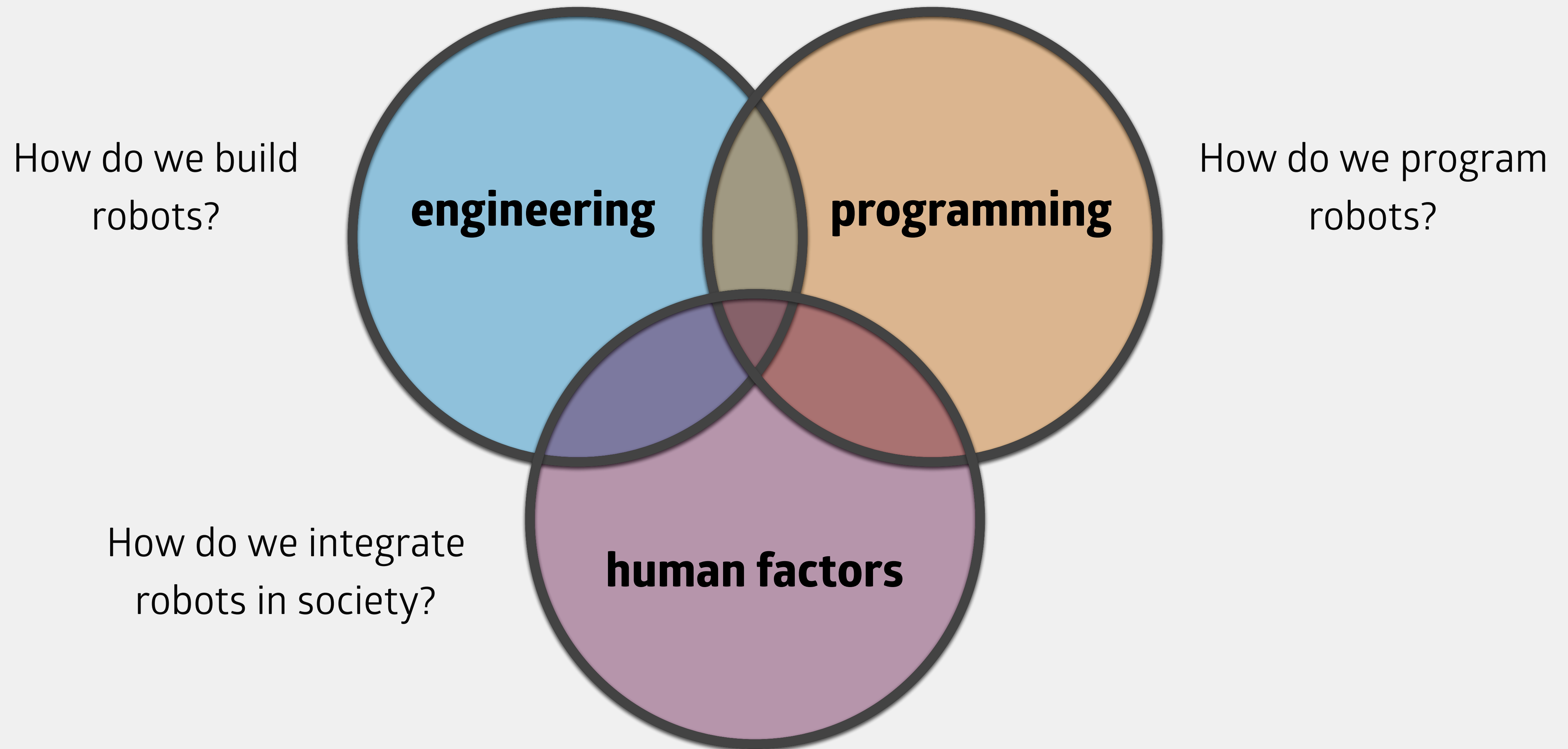
Utilizing information from many sensors

Understanding the world using math

event-action architecture

“move forward until...”

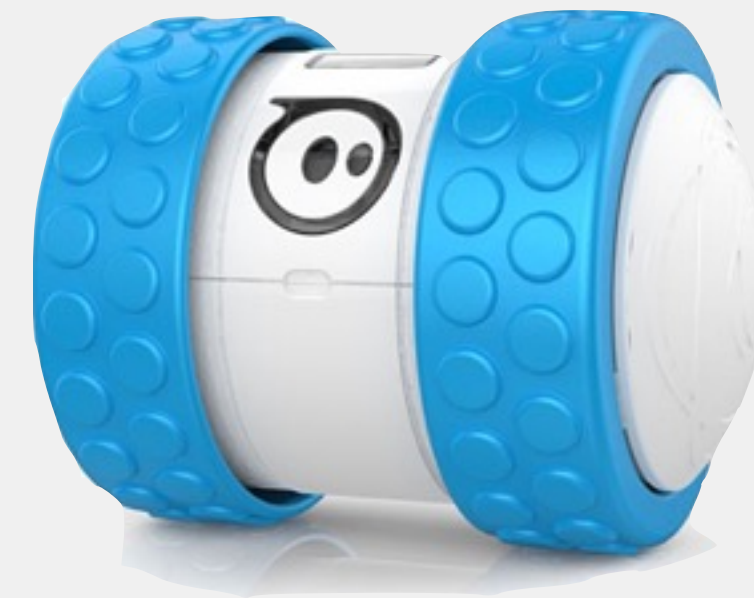
Interdisciplinary Use



Platforms



Lego Mindstorms (\$350)



Sphero (\$100)



Dash and Dot (\$200)



Edison (\$50)



Sphero (\$119)



Finch (\$99)

Platforms

CESA 4 has 40 EV3 Mindstorms

Finch has a loan program¹

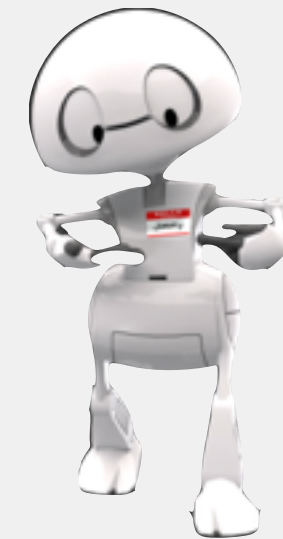
Many offer educational or bulk discounts

¹: <http://www.finchrobot.com/finch-robot-loan-program>

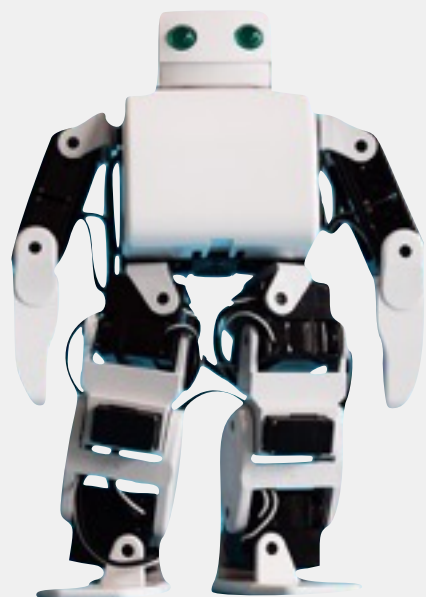
Platforms: DIY/3D Printed



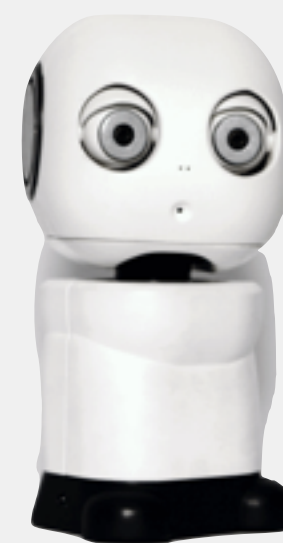
BQ Zowi¹



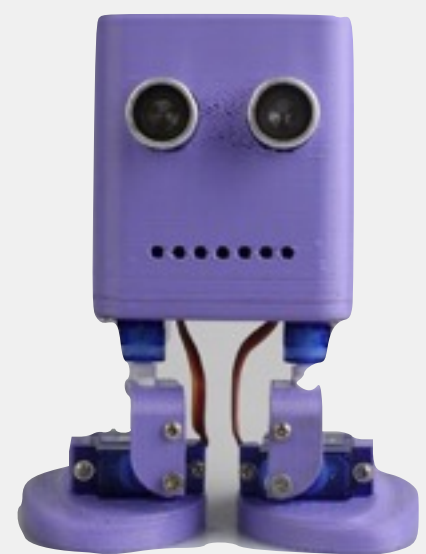
The 21st Century Robot⁴



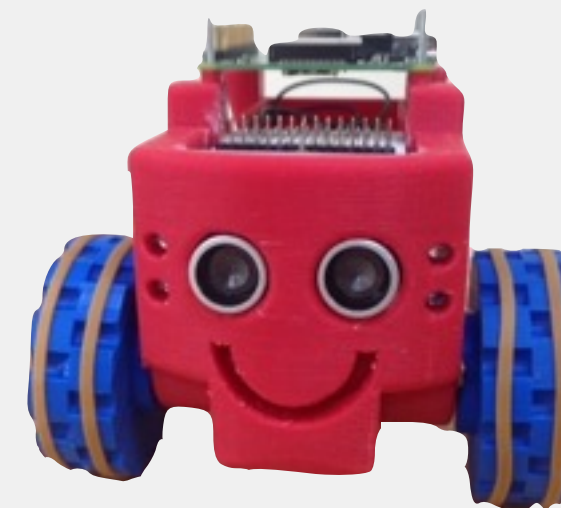
PLEN2²



Maki⁵



Bob the Biped³



Apogee⁶

1: <https://github.com/bq/zowi>

2: <https://github.com/plenprojectcompany/PLEN2>

3: <http://www.instructables.com/id/BoB-the-BiPed/>

4: <http://www.21stcenturyrobot.com/>

5: <https://www.hello-robo.com/maki>

6: <http://www.thingiverse.com/thing:648394>

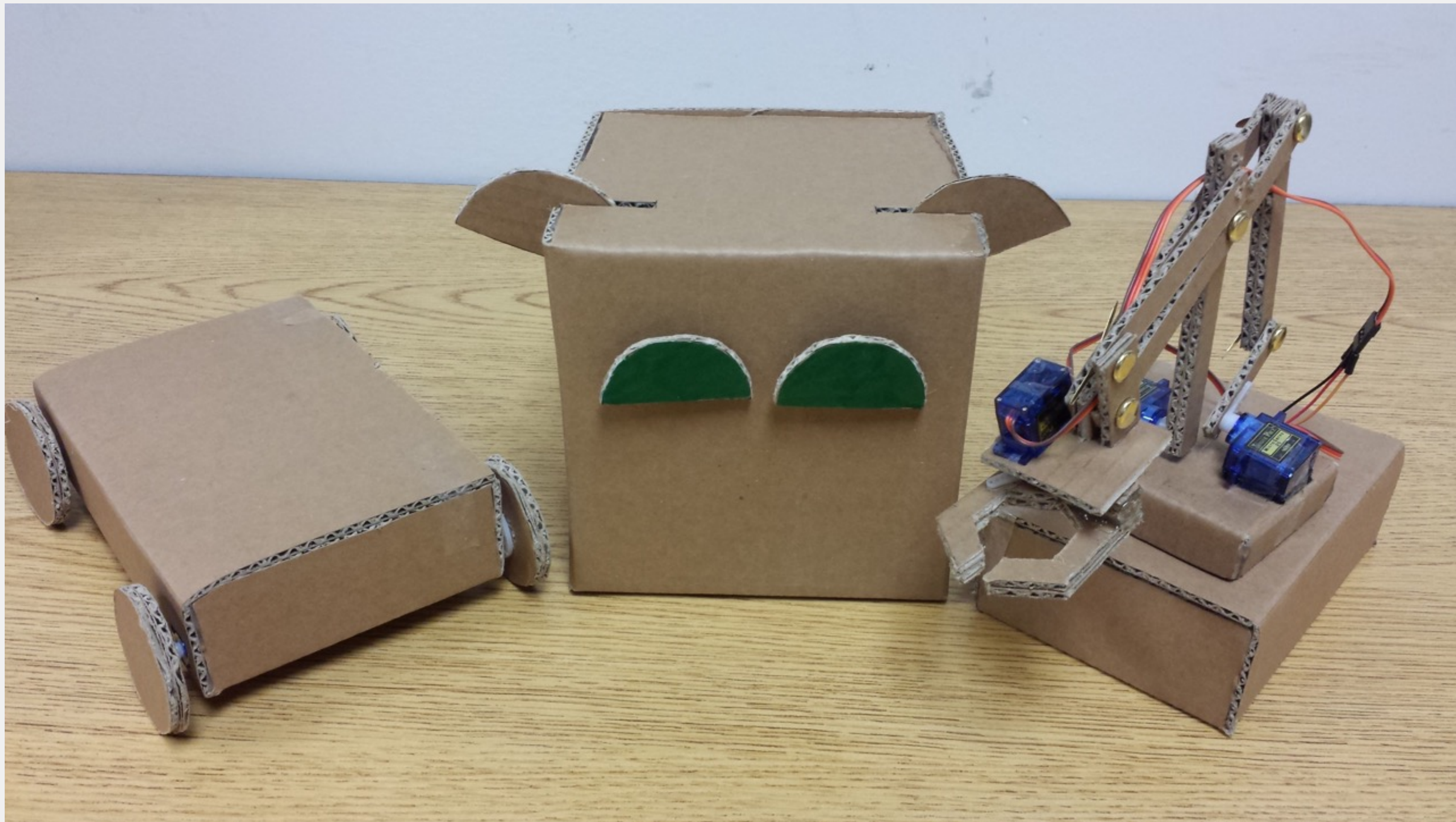
Platforms: Pypr Bots (Shameless Plug)

Contact Allie Sauppé if you're interested in these cardboard robots!



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Platforms: Pypr Bots (Shameless Plug)

Component	Quantity	Cost
Raspberry Pi Zero	1	\$5
9g Micro Servos	4	\$8 (\$2 each)
Wi-Fi Adapter	1	\$6
Micro USB Power Supply	1	\$3
Mini Breadboard	1	\$1
Jumper Cables	14	\$1
Hot glue, tape, velcro strips		free
Cardboard		free
Total		\$24

Robotics Competitions

Numerous competitions¹

BotBall

FRC/FLL

RoboCup

Large teams with multiple talents

7 Rivers Robotics Coalition (7RRC)²

1: https://en.wikipedia.org/wiki/Robot_competition

2: <https://www.7rrc.org/>

Maze

Groups of 3+

Will collectively program the robot

Then, swap the instructions

- one color sensor

 - can communicate what color they are on

- one touch sensor/engine

 - can communicate if there is a wall in front of them/how many blocks they have traversed

- one computer

 - can communicate the instructions

Maze

When the robot runs into a wall, it stops and...

red —> turn right

blue —> turn left

orange —> turn 180 degrees and go until you see green; stop; turn left

yellow —> turn 180 degrees and go until you see purple; stop; turn right

Finch Anatomy

