

Computer Vision Smartphone and Tablet Robot Specification

Written by John Choi, May 30, 2018

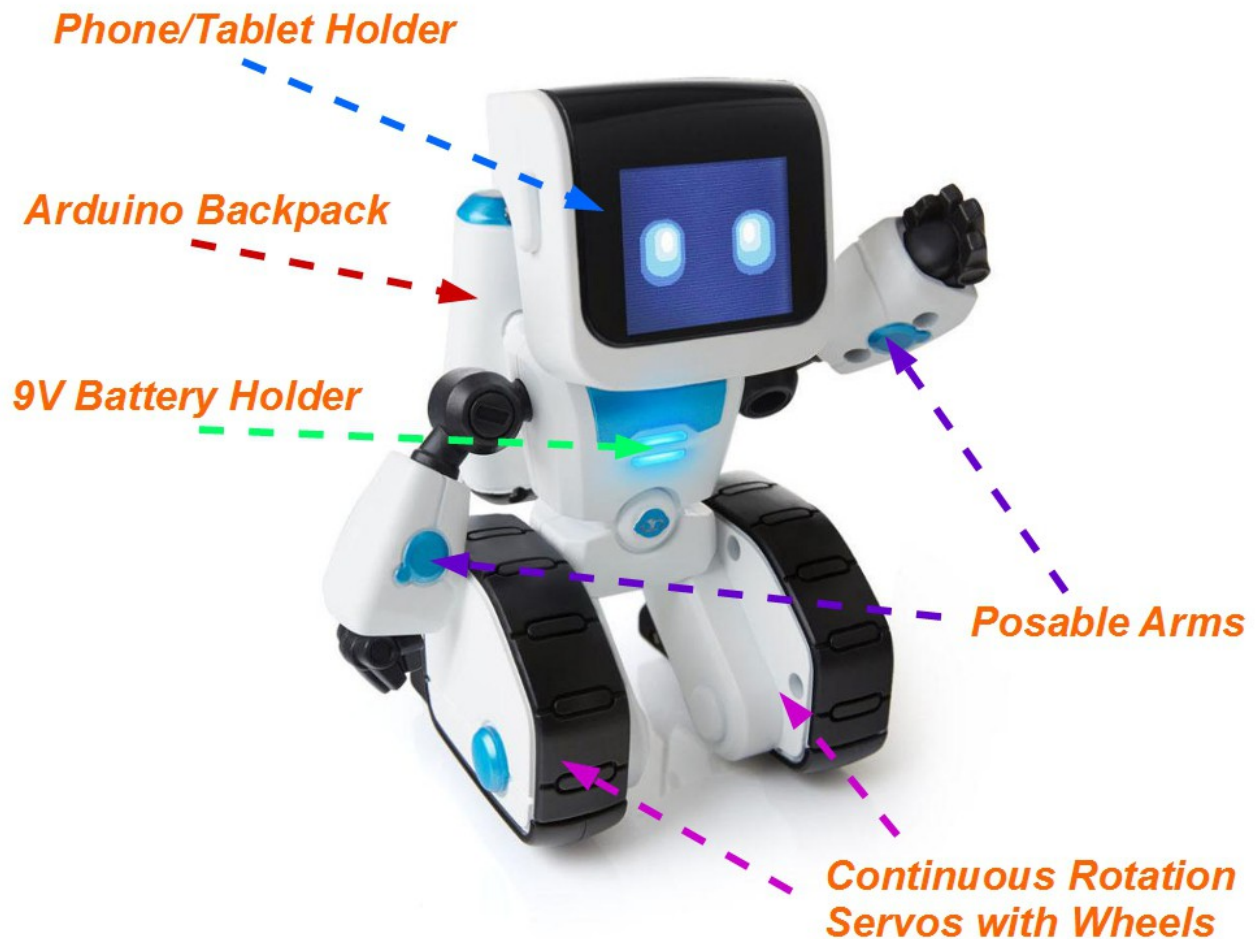
Summary:

The objective of this project is to provide a unique and engaging STEM experience for K-8 students by combining introductory programming, robotics and state-of-the-art computer vision AI into a user-friendly form factor that elementary and middle school students can work with and learn from.

We will do this by developing a small, hackable robot toy with an Android or iOS smartphone or tablet for a face. The smartphone or tablet will serve as the robot's artificially intelligent "eye", which will be loaded with a variety of computer vision algorithms, such as face tracking and marker detection.

The robot will be programmable in [Scratch](#), a free programming language and online community where one can create interactive stories, games, and animations. In particular, [S4A](#) is a Scratch modification that allows for simple programming of the [Arduino](#) open source hardware platform.

By using Scratch, Arduino, and our own custom Computer Vision AI module, students will be able to program the robot to navigate complex environments to follow objects of interest as part of a more advanced, yet still beginner-friendly, introduction to modern artificial intelligence methodologies.



The robot will look similar to WowWee's Coji Robotic Toy (above) with custom modifications.

Hardware:

Here is a tentative list of hardware components that will be used in the final device:

2x Continuous Rotation Servo and Wheel
2x 3/8 Plastic Ball Caster
1x 9V Battery Holder
1x 9V Li-Ion Battery
1x Arduino UNO
1x HC-06 Bluetooth Module
1x Phone / Tablet Clamp Holder
1x Android Phone (4-6 inches) or Tablet (7-10 inches)

TOTAL PER UNIT: \$149.99 USD

Software:

There will be 3 software integrations as a part of this project, of which one will be custom developed.

- Powered by Scratch for Arduino (<http://s4a.cat/>). Requires Windows, Mac or Linux computer.
- Uses Arduino for wheel motor control, with Bluetooth Connection
- Custom Computer Vision Sensor App for Android / iOS

Computer Vision Sensor Software:

The computer vision app will be made with [Unity](#) and [OpenCV](#), with the following planned features:

Miscellaneous User Interface Options:

- Computer Vision Configuration Mode
- Direct Arduino Bluetooth Control
- Speech-To-Text Console Log
- Scratch for Arduino Options
- Cute Animated Robot Face

Computer Vision Capabilities:

- Face Tracking
- Motion Detection
- Colored Blob Detection
- Colored Line Following
- Fiducial Marker Tracking
- Optical Character Recognition

Other Sensors:

- Speech Recognition
- Accelerometer
- Buttons
- GPS

**Note: This specification may be updated over the course of development.*