BinBot
Milestone Demonstrations

REVISION HISTORY

Revision #	Author	Revision Date	Comments
1.0	Sean Reddington	October 13, 2019	Initial draft and demo 1
2.0	Jose Silva	October 27, 2019	Demo 2
3.0	Jose Silva	November 10, 2019	Demo 3

Table of Contents

Milestone Demonstration 1

For the BinBot team's first demo, we will be focusing on the machine learning and waste identifying/classification features of BinBot. This will include TensorFlow implementation of the machine learning model training done in the *BinBot_MachineLearning* repository as well as the OpenCV object classification portion done in the *BinBot_Processing* repository. Both of these repositories can be found on the capstone course's GitHub page.

The machine learning model will have trained on images taken by the BinBot team and preexisting data from TensorFlow. The training should then allow the object classification to detect 5 types of waste. This includes paper scraps, crushed cans, chip bags, plastic bags, and small cardboard boxes. The object classification will be demonstrated by feeding the model images containing these waste types. The results will be a modified version of the image containing rectangles surrounding which objects it detected, as well as a label describing the type of waste the object was classified as.

Milestone Demonstration 2

The second demo for BinBot will demonstrate the mobility feature of the robot kit, RaspTank from Adeept using a Raspberry Pi and the waste identifying aspect from Demo 1. These features will include manipulating code from the GitHub repo Adeept_RaspTank found in the BinBot_Robot repository. As well as the integration required for the data processing server and Android operator mobile application also found in the BinBot_Processing and BinBot_OperatorMobileApp repositories. All these repositories can be found on the capstone course's GitHub page.

The focus of this demo is to show that the robot kit was successfully built, and the movability is functioning. Another focus of this demo is test if our machine learning model and the robot are integrated/work successfully together. This includes simple movements of the robot's treads via instructions sent from the processing server and having the robot move towards identified waste object(s). The demo will also include the ability to control the robot via the Android application. The app will have start and stop buttons, which when pressed, will send a command to the processing server; instructing the Raspberry Pi to change the robot to a moving or standby state.

Milestone Demonstration 3

The third demo will feature the waste collecting abilities of BinBot using its arm/claw. This will require unified integration between all BinBot's components this includes utilizing the treads, the arm/claw, raspberry pi camera, server, machine learning model, and Android app to fulfill its overall purpose. The main requirements for this demo revolve around computing the waste collection instructions for BinBot and successfully accomplishing set instructions which will include identifying a waste object, maneuvering its way towards that object, and picking up the object. BinBot will send an image taken by the camera to the processing server to identify any waste in its surroundings based on the photo. If waste has been found within the photo, the processing server will compute the location and size of the target waste based off the results found by the object identification machine learning model. Then the server will translate this into instructions for BinBot to move towards the object. Once within range of the identified object BinBot will have to calculate if it needs to rotate its claw based on the position of the waste object. Once this is accomplished BinBot will attempt to pick up the waste object. The user will be able to see the most recent photo taken by BinBot using the Android app and be able to send a command to the processing server, instructing the robot to a moving or standby state.