Week 1 progress report
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ELE 547
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Setting up Vehicle:

      The vehicle being used is the Rover V2 and came as a kit. This kit has been assembled and a program has been written to receive directional inputs wirelessly using XBee modules. This program will be expanded later on when environmental and collision sensors are included.
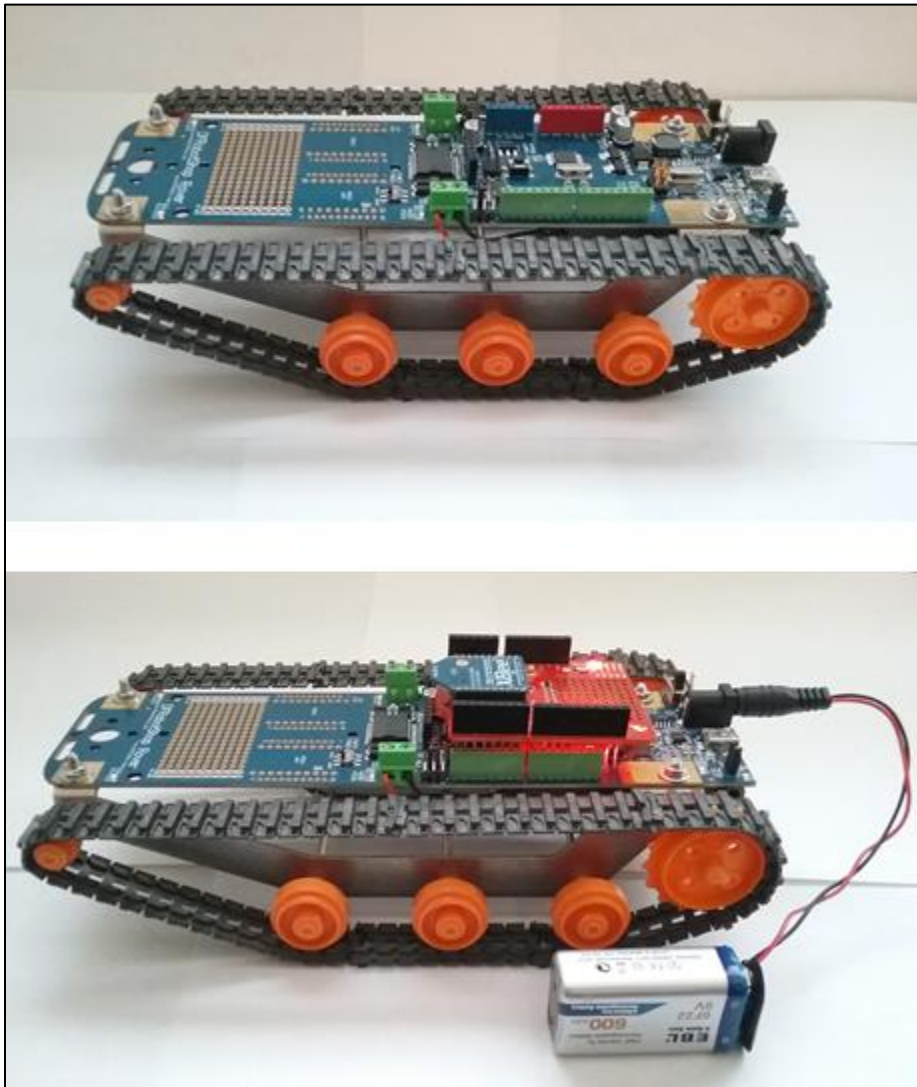

Fig. 1: Photo of the assembled vehicle (top) and the vehicle with an Arduino XBee shield for wireless communications (bottom).

XBee communication:

XBee wireless transceivers are being used to send directional inputs to the tank and will also be used to send sensor information later on. Communication between two XBee modules was first established using the XCTU which is a DIGI software. The XBee modules behave as serial data black boxes but their addresses were configured so that they could only send/receive messages from each other. This was relatively straight forward and now characters or strings can be sent back in forth by just connecting the TX/RX lines of the MCU to the TX/RX lines of the XBee's.

Basic tank controller:

In order to test the vehicle motion, a separate Arduino was programmed and coupled with an XBee transceiver. This Arduino was connected to a computer and using "Putty", serial data was sent to the Arduino and then the Arduino transmitted the information wirelessly to the vehicle (Fig. 2). Next week the Raspberry Pi 4 will take the place of this controller but certain aspects are still being worked out for compatibility.
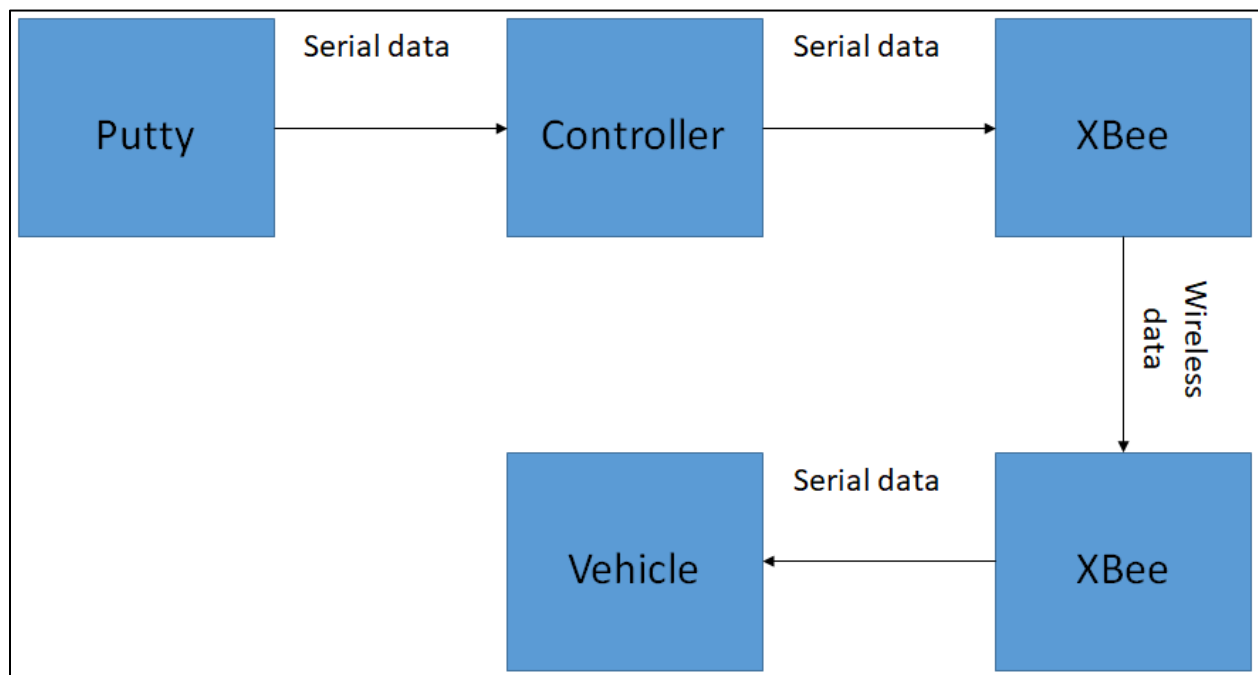

Fig. 2: Schematic of communication between the vehicle and basic controller.

RPi Zero + Camera setup:

A Raspberry Pi Zero was setup with the latest Raspberry Pi OS using the Win32DiskImager and instructions provided on the Raspberry Pi Foundation website. The camera was interfaced successfully and a basic script was used to view real time footage (Fig. 3 and 4). This script will be replaced later on to facilitate the object detection that will be implemented using OpenCV or other resource.
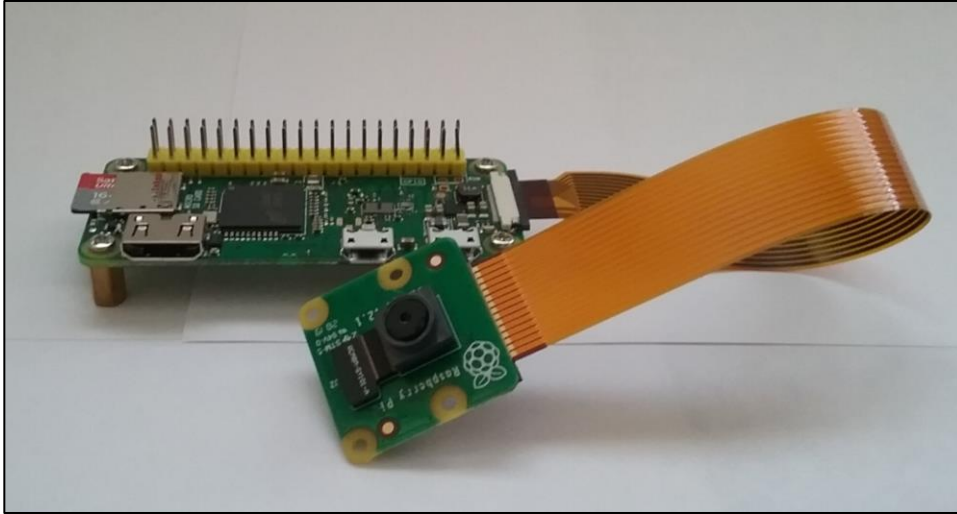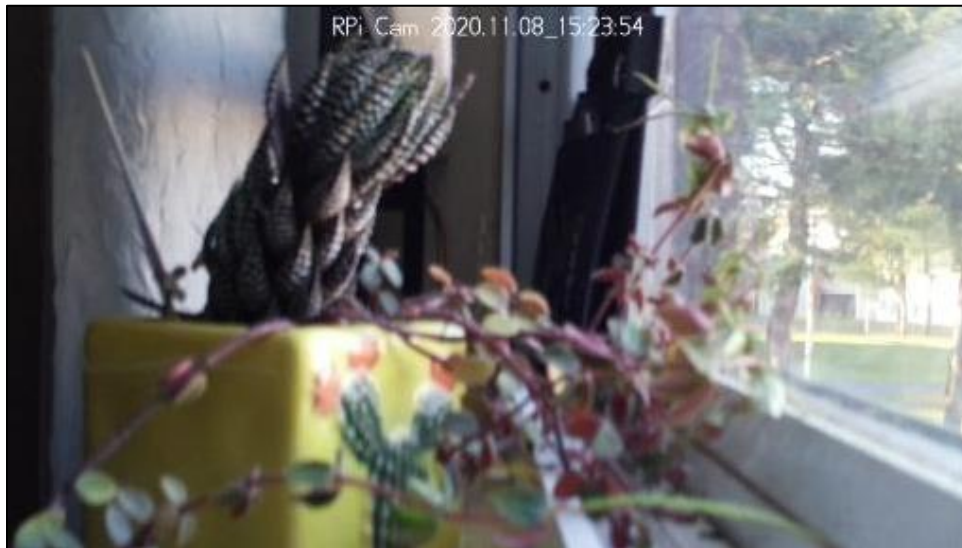
Fig. 3: Raspberry Pi Zero and camera.

Fig. 4: Snapped image of cactus near my window from video footage captured by the camera.