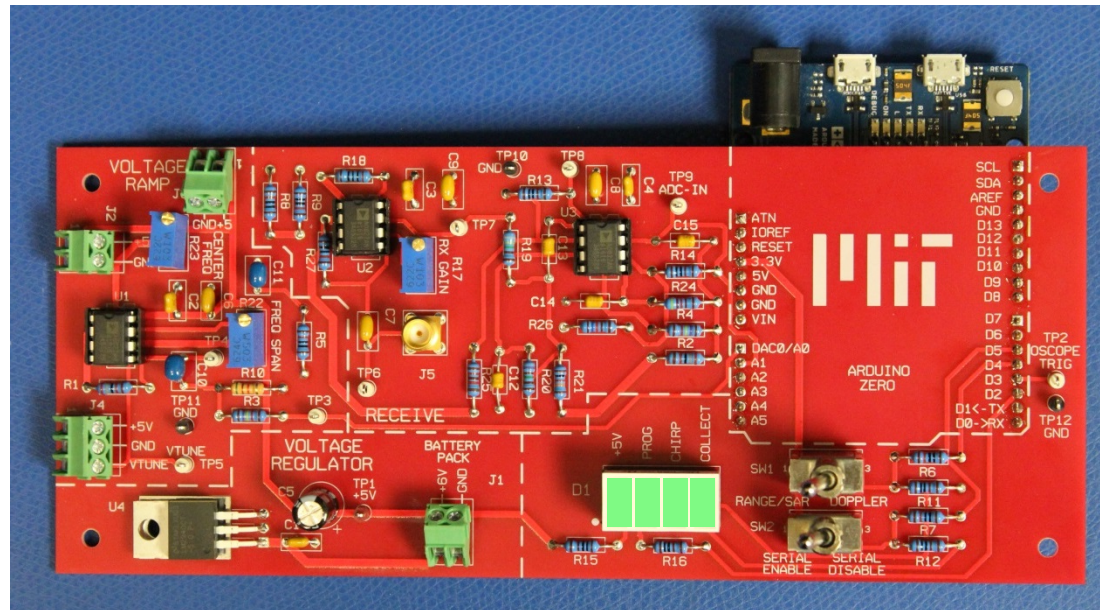# Ranging Mode Hardware Set-Up

- **Connect USB cable from the Arduino Zero "Debug" port to your laptop**

- **Turn the battery pack ON**

- **Set SW1 to RANGE/SAR and SW2 to SERIAL ENABLE**
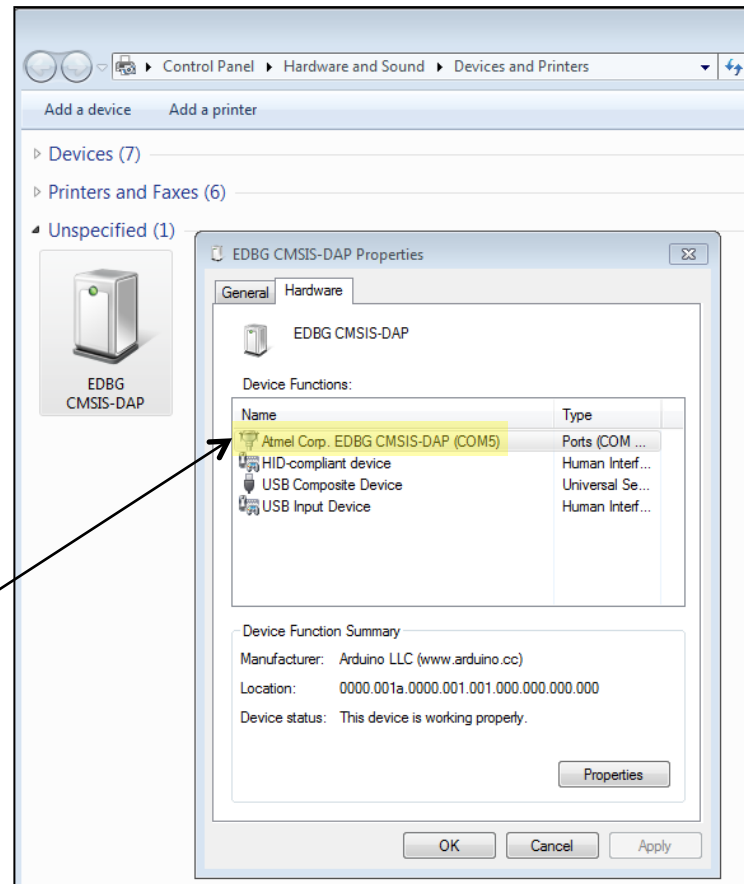   - **All LED's should be ON**

Ranging Mode Software Set-Up

**Find out which COM port the radar is connected to by:**

– **On Windows:**

- **Go to START > Devices and Printers**

- **Look for "EDBG CMSIS-DAP" under 'Unspecified'**

  o **Right click EDBG CMSIS-DAP, and go to Properties**

  o **In this example, the radar is connected to COM5**

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Data Collection

- **Run <u>DataCollection.m</u>**

- **Select the COM port for the radar.**

- **Select the directory and file name you want the raw data to be saved to (*.mat format).**

- **To start collecting data, click "Start Data Collection."**

- **Click "Stop Data Collection" when you are done.**

- **Once Data Collection is stopped, you should see a plot of the raw data.**

Close-up of Raw Data

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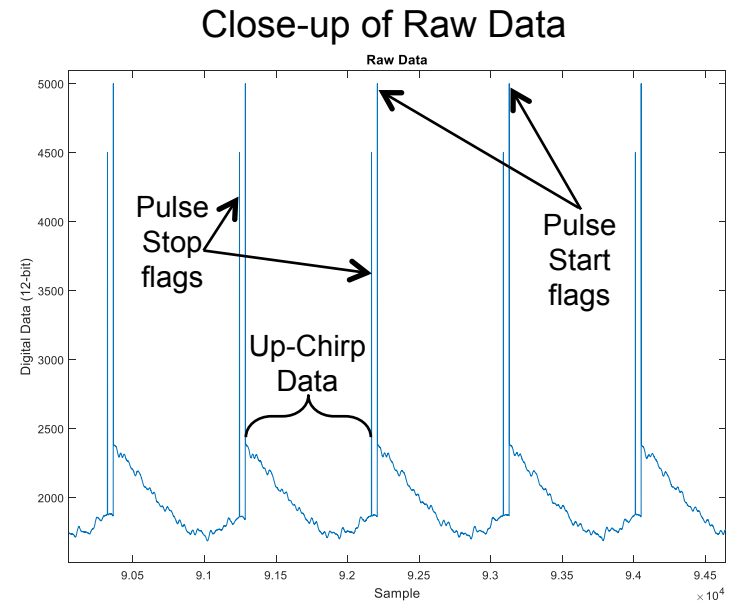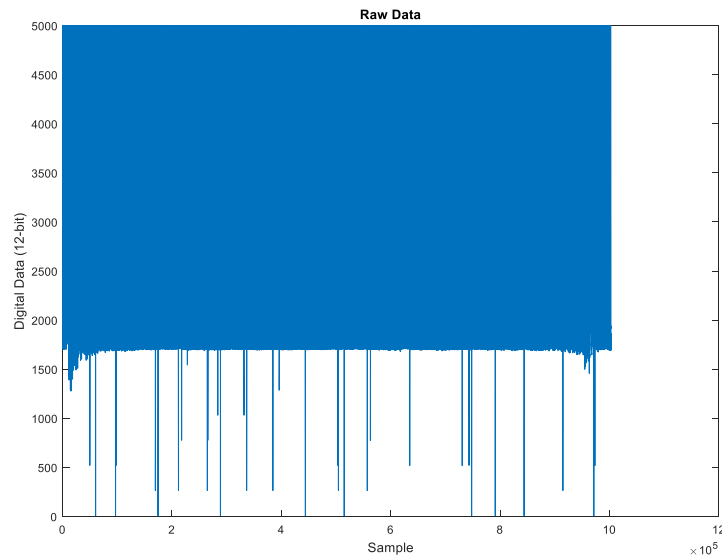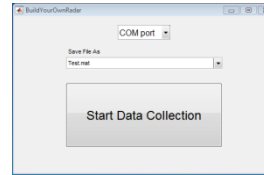
Ranging Digital Signal Processing

- **Run <u>RangingProcessing(‘*yourfilename*.mat’)</u>**
  - **NOTE: running RangingProcessing with no input arguments uses example data**

- **Output is three plots demonstrating:**
  1. **Range x Time Intensity (RTI) image of the radar recording WITHOUT clutter rejection.**
  2. **RTI image of the radar recording WITH clutter rejection.**
  3. **RTI image of the radar recording with Moving Target Indicator (MTI) and Constant False Alarm Rate (CFAR) Thresholding.**

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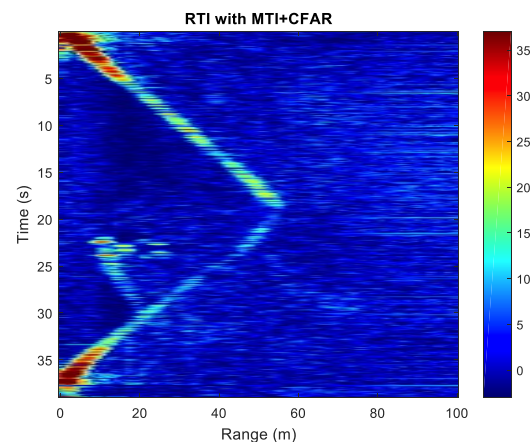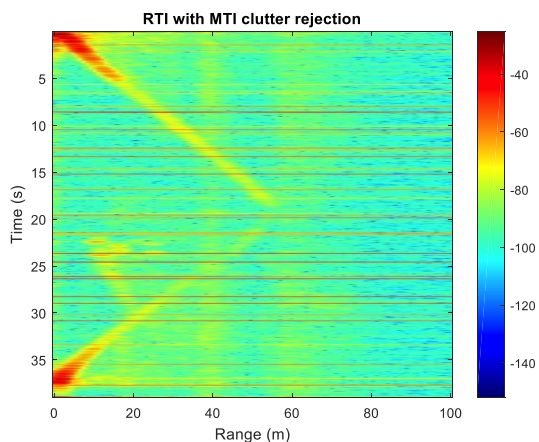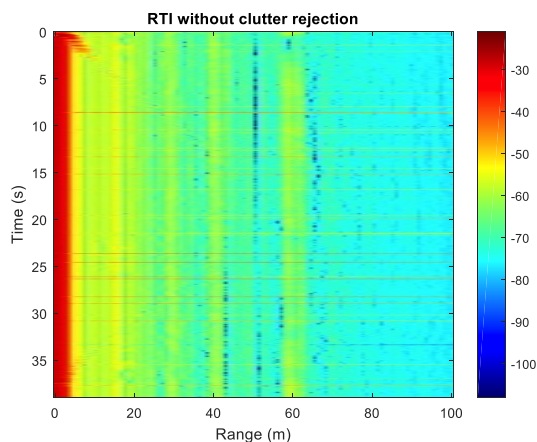
Ranging Digital Signal Processing

Example Data: Target 1 walks away from the radar, to the end of the parking lot and turns around, maintaining the same pace in both directions. The slope of the path is velocity. As Target 1 is walking back towards the radar, at ~ 22sec, Target 2 enters the field of view from ~10meters away and walks away from the radar.

Radar Location

Measure distance
Click on the map to add to your path
Total distance: 181.12 ft (55.21 m)

Measure distance
Click on the map to add to your path
Total distance: 35.20 ft (10.73 m)

Imagery ©2016 Google

Walking Back and Forth
RTI with MTI+CFAR

Target 1 starts walking away from radar

Target 1 reaches end of the lot

X: 56.06
Y: 19.2

Target 2 exits building door

X: 11.21
Y: 22.2

Target 1 starts walking back towards radar

Target 2 walks away from radar along walkway

Time (s)

Range (m)

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