

## Radar/Camera Test Plan

**Summary:** MIT LL has a program with a US DOD sponsor, whereby a camera/radar system is required. The “sensor” will be placed on the side of a road from 1-20 meters away, and will be monitoring different vehicles traveling past it. The vehicles will be driven by MIT LL employees at varying test speeds. There will also be a low powered laser pointed that will be aimed at the middle of the car.

### Equipment:

- POVs
- High Speed Camera – Chronos 2.1 HD Camera or equivalent
- Raspberry Pi Camera
- Radar: Two types
  1. 24 GHz Analog Devices Demorad (see details below)
  2. 77 GHz Texas Instruments AWR1642 (see details below)
- Laser diode (low power laser pointer): 650nm, 5mW
- Laptop
- Battery Power for sensor and other test equipment

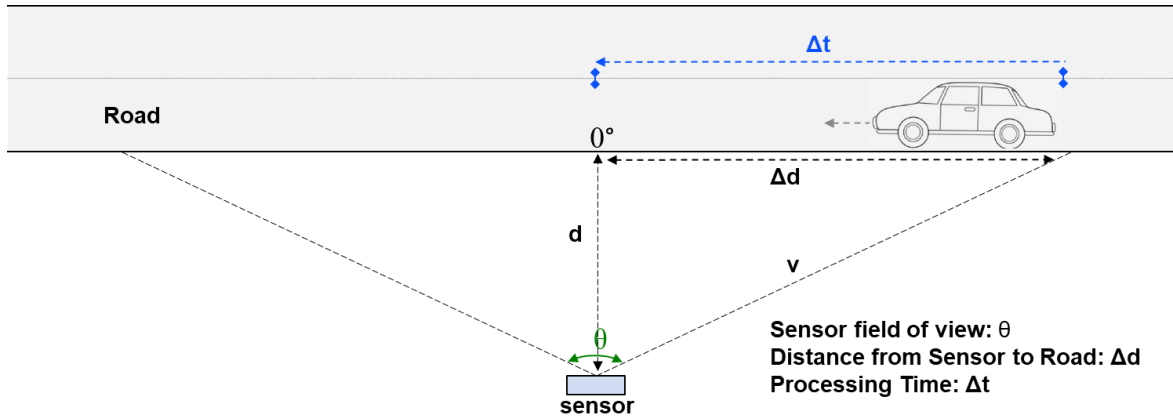
Description /website	Details
24 GHz low power automotive Radar: <a href="https://www.analog.com/en/design-center/evaluation-hardware-and-software/evaluation-boards-kits/eval-demorad.html#eb-overview">https://www.analog.com/en/design-center/evaluation-hardware-and-software/evaluation-boards-kits/eval-demorad.html#eb-overview</a>	FMCW Radar 250 MHz bandwidth 8 dBm transmit power
77 GHz low power automotive radar: <a href="https://www.ti.com/tool/AWR1642BOOST-ODS?utm_source=google&amp;utm_medium=cpc&amp;utm_campaign=epd-rap-null-prodfolderdynamic_awr-cpc-pf-google-ww&amp;utm_content=prodfolddynamic&amp;ds_k=DYNAMIC+SEARCH+ADS&amp;DCM=yes&amp;gclid=Cj0KCQjw4dr0BRCxARIsAKUNjWR2Si-kkQ6DhxO7NJrIid-WiQz2Mg4sscxl4yb2WtOAB_tg03LazsaAotPEALw_wcB&amp;gclsrc=aw.ds">https://www.ti.com/tool/AWR1642BOOST-ODS?utm_source=google&amp;utm_medium=cpc&amp;utm_campaign=epd-rap-null-prodfolderdynamic_awr-cpc-pf-google-ww&amp;utm_content=prodfolddynamic&amp;ds_k=DYNAMIC+SEARCH+ADS&amp;DCM=yes&amp;gclid=Cj0KCQjw4dr0BRCxARIsAKUNjWR2Si-kkQ6DhxO7NJrIid-WiQz2Mg4sscxl4yb2WtOAB_tg03LazsaAotPEALw_wcB&amp;gclsrc=aw.ds</a>	FMCW 4 GHz Bandwidth 12.5 dBm Tx power
Low power laser diode: <a href="https://www.digikey.com/product-detail/en/adafruit-industries-llc/1058/1528-1403-ND/5638298">https://www.digikey.com/product-detail/en/adafruit-industries-llc/1058/1528-1403-ND/5638298</a>	650nm, 5mW

### Personnel:

3-10 MIT LL Personnel, depending on the level of testing required  
1 person will act as the OIC, 1 person will be the safety officer

### Test Plan:

The test setup is shown below.



The team will set up the sensor at varying distances from the road ( $d$ ). At each distance from the road, vehicles will be traveling along the road at a set speed, and data will be collected from the sensor. Variations will occur in the number and types of vehicles travelling, the direction of travel, vehicle spacing, and the speed of the vehicles. Initial testing will consist of one vehicle from either direction at varying speeds. As the system matures, the testing will need to mature to include a myriad of realistic test cases, similar to a typical road.

The OIC will manage the overall test, while the safety person will ensure that personnel understand the safety hazards have properly mitigated risks. Small Handheld Radios will be used between the drivers and the tester to ensure personnel can hear commands to start and stop the tests.

### Safety:

Seat belts will be worn at all times

Personnel not in vehicles, will be located behind the sensor to ensure personnel are not near the road.

The OIC and/or Safety Officer will maintain contact with Range Control at all times via the Range Radios.

Vehicle spacing, speeds, and direction of travel will comply with normal driving behavior.