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# Project Requirements

1. System
   - 1.1. **Network Exchange**: The phone and host computer shall exchange information over local network.
     *Requirement Level:* B
     *Prerequisite(s):* None
     *Estimated Difficulty:* 3
   - 1.2. **LiDAR Transfer**: The phone application software shall communicate with the host computer through network to receive LiDAR data from the host computer.
     *Requirement Level:* B
     *Prerequisite(s):* 1.1
     *Estimated Difficulty:* 1
   - 1.3. **Output Settings**: The phone application software shall be capable of changing the host computer's Velodyne LiDAR data output settings through network communication.
     *Requirement Level:* B
     *Prerequisite(s):* 1.1
     *Estimated Difficulty:* 2
   - 1.4. **Trajectory Transfer**: The phone application software shall send vehicle trajectories to the host computer through network communication.
     *Requirement Level:* B
     *Prerequisite(s):* 1.1
     *Estimated Difficulty:* 1
   - 1.5. **Manual Data Refresh**: The phone application software shall be capable of refreshing the displayed Velodyne LiDAR data manually based on user input.
     *Requirement Level:* B
     *Prerequisite(s):* 2.1
     *Estimated Difficulty:* 2
   - 1.6. **Auto Data Refresh:** The phone application software shall be capable of refreshing the displayed Velodyne LiDAR data automatically through a set refresh rate.
     *Requirement Level:* B
     *Prerequisite(s):* 2.1
     *Estimated Difficulty:* 1
   - 1.7. **Mesh Display**:The phone application software shall be capable of displaying LiDAR data as a mesh.
     *Requirement Level:* A

*Prerequisite(s):* None
*Estimated Difficulty:* 4

1.8. **Dynamic LiDAR Driver Settings**: The phone application software shall be capable of changing the LiDAR driver settings through network communication.
*Requirement Level:* A
*Prerequisite(s):* None
*Estimated Difficulty:* 4

1.9. **Vehicle Control**: The phone application software shall send phone trajectories to the host computer where it is converted to vehicle control commands sent to CAT Vehicle.
*Requirement Level:* A
*Prerequisite(s):* None
*Estimated Difficulty:* 3

2. Phone Application

2.1. **Display Data**: The phone application software shall load and display Velodyne LiDAR data on the phone.
*Requirement Level:* B
*Prerequisite(s):* None
*Estimated Difficulty:* 4

2.2. **Draw Trajectory**: The phone application software shall read a trajectory selected by the user through touch events on the phone.
*Requirement Level:* B
*Prerequisite(s):* 2.1
*Estimated Difficulty:* 6

2.3. **Trajectory Reachability**: The phone application software shall reject unreachable trajectories selected by the user.
*Requirement Level:* B
*Prerequisite(s):* 2.2
*Estimated Difficulty:* 3

2.4. **Perspective Change**: The phone application software shall be capable of changing the perspective of the displayed image on the phone.
*Requirement Level:* A
*Prerequisite(s):* 2.1
*Estimated Difficulty:* 1

3. Host Computer Application

3.1. **Convert Data**: The host computer software shall convert the Velodyne LiDAR PCAP file to an XYZ-coordinate file with a limited complexity that will be established.
*Requirement Level:* B
*Prerequisite(s):* None
*Estimated Difficulty:* 3

3.2. **LiDAR Driver Settings**: The host computer software shall be capable of reducing the field of view and the range of Velodyne LiDAR data provided to the

phone.
*Requirement Level:* B
*Prerequisite(s):* 3.1
*Estimated Difficulty:* 2

3.3. **JAUS Compatible**: The host computer software shall be capable of sending JAUS messages containing converted LiDAR data.
*Requirement Level:* A
*Prerequisite(s):* 3.1
*Estimated Difficulty:* 4

3.4. **Dynamic LiDAR Conversion**: The host computer software shall be capable of processing and converting the PCAP files to XYZ-coordinate files as they are received within a bounded delay that will be established.
*Requirement Level:* A
*Prerequisite(s):* 3.1
*Estimated Difficulty:* 4