A Wearable Data Acquisition System for Studying the Behavior of e-Scooter Riders
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**Background**
- Number of E-Scooters have been increasing at high rates in U.S cities
- Features of e-scooters include:
  - Runs alongside vehicles, faster than pedestrians, slower than cars, small and less visible, quick and unpredictable movements
- This new mobility option generates safety risks for other vehicles

**Research Goal**
- Develop a wearable data acquisition system to support the systematic study the behavior of e-scooter riders

**Research Method**
- Development and evaluation of e-Scooter based data collection system with visual and distance sensors

**Data Acquisition System Features**
- Supports continuous operation for 5 hours
- Total FOV: 200°
- Frame rate: 10/sec
- GPS accuracy is 2cm (Base corrected)
- Can wear in front or back of the rider
- Weight: 9 Kg

**Data Acquisition System**
- Three Logitech c290 HD pro camera
  - Resolution: 1920 x 1080, Frame rate: 10fps
  - Horizontal FOV: 78°, Vertical FOV: 48°
- Ouster OS1-64 LIDAR + IMU
- RTK (Real Time Kinematic) GPS – Emlid M+
- Jetson TX2 Developer board (NVIDIA Pascal™ Architecture GPU, 8 GB memory, 32 GB flash storage, SATA)
- Samsung SSD 860 evo 1TB SATA
- Battery - 50 Ah 20V, 12V, 5V

**Software Structure**
- ROS Real-Time Operating System – Ros-Kinetic
- Device Drivers:
  - Cameras – usb_cam / pointgrey_camera_driver
  - LiDAR – ouster_ros
  - GPS – reach_ros_node
- ROS Real-Time Operating System – Ros-Kinetic
- UBUNTU – 16.04 LTS (Linux)

**Sensor Output**
- Sensor messages are recorded as bag files (ROS file format for storing messages) as one-minute blocks

**Speakers**
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