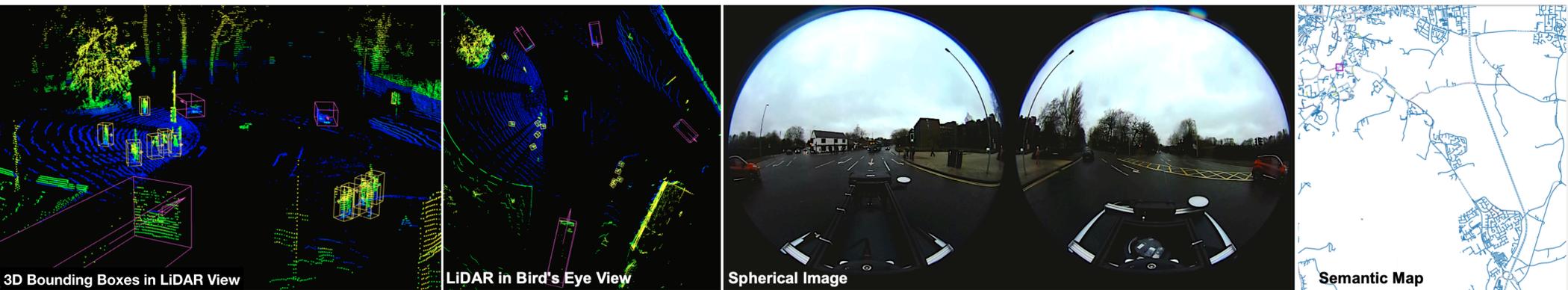


Dur360BEV: A Real-world 360-degree Single Camera Dataset and Benchmark for Bird-Eye View Mapping in Autonomous Driving

Wenke E, Chao Yuan, Li Li, Yixin Sun, Yona Falinie A. Gaus, Amir Atapour-Abarghouei and Toby P. Breckon
Durham University, UK

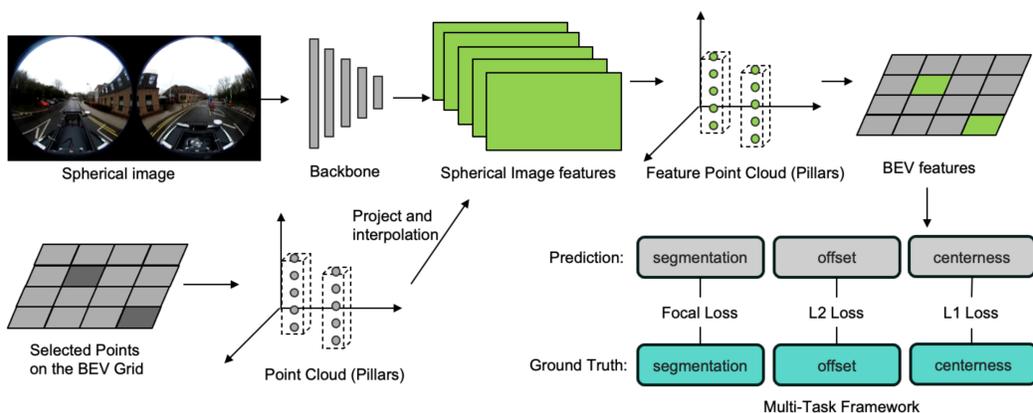


Dur360BEV Dataset and Benchmark

- ▶ A novel large-scale **real-world** autonomous driving dataset comprising a (360°) **spherical RGB camera**, a **high-fidelity 3D LiDAR** (128 channels), and a **GNSS/INS system**.
- ▶ The first autonomous driving dataset with **full 3D bounding box annotation** that features spherical camera modality.
- ▶ A **high-detail semantic map**, constructed using OpenStreetMap in a geospatial database format, provides detailed environmental information surrounding the ego vehicle.
- ▶ A **benchmark** for generating **BEV maps** from spherical images.
- ▶ A novel **spherical-image-to-BEV module** that handles spherical distortions and maps 2D features onto a 3D sparse volume for accurate BEV representation.

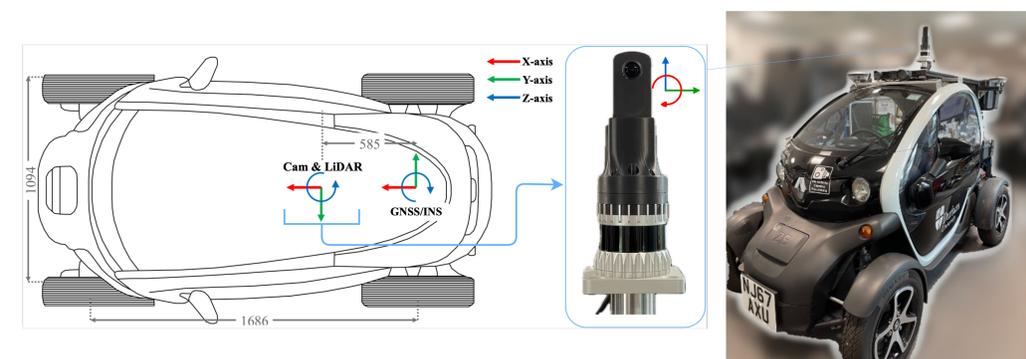
Benchmark Architecture

Our benchmark architecture effectively addresses the challenges of spherical imagery to produce accurate BEV maps.



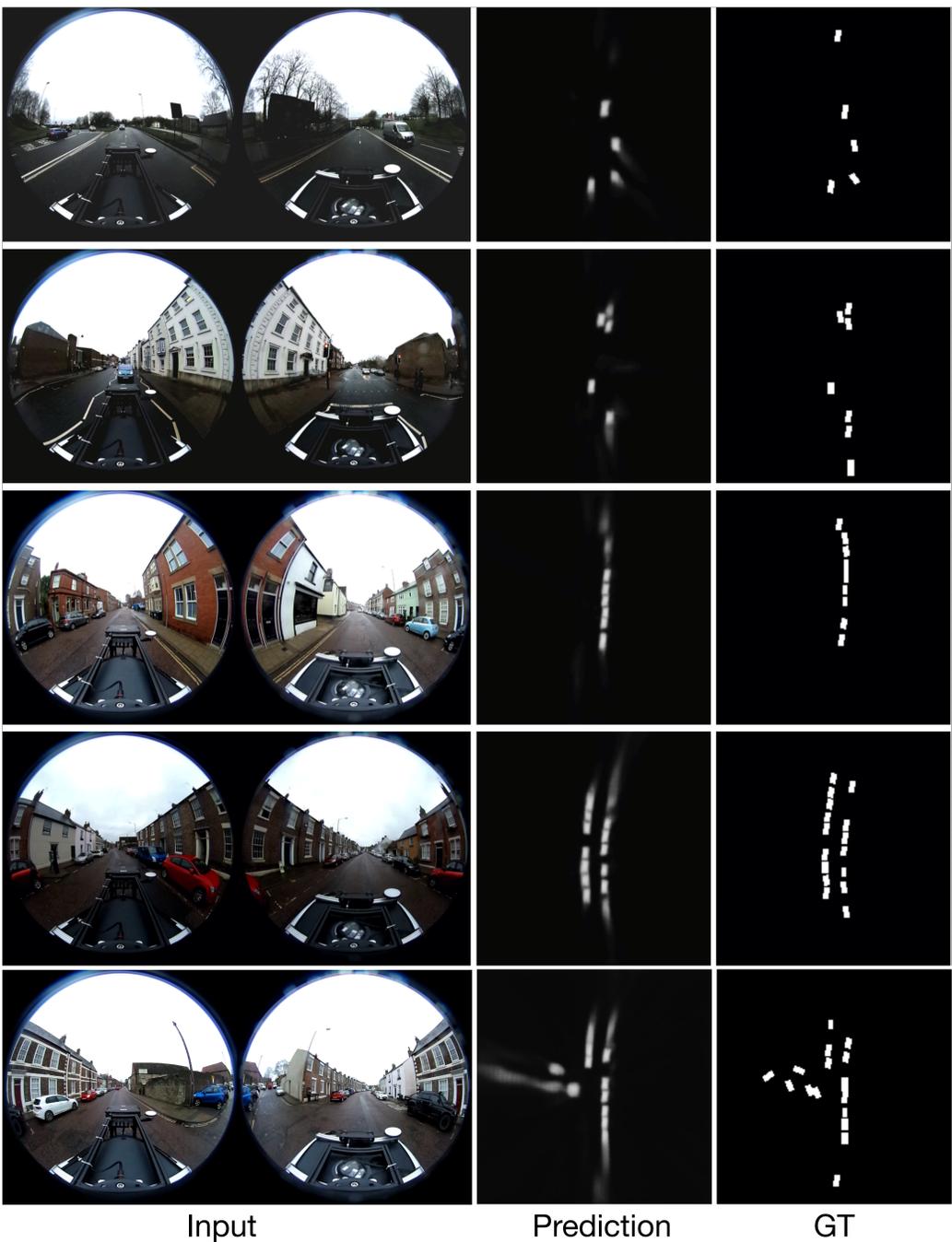
On-vehicle Sensor Configuration

Sensor	Details
Camera	Spherical dual-fisheye camera (i.e., 360-degree camera, model: Ricoh Theta S), 15Hz capture frequency, 1280x640 resolution, JPEG compressed.
LiDAR	Ouster OS1-128 LiDAR sensor, 128 channel as vertical resolution, 2048 horizontal resolution, 10Hz capture frequency, 360 degree HFOV, -21.2 to 21.2 degree VFOV, 0.3cm range resolution.
GNSS/INS	OxTS RT3000v3 global navigation satellite and inertial navigation system, 100Hz capture frequency, 0.03 pitch/roll accuracy, 0.15 slip angle accuracy, centimeter level accuracy (with RTK corrections via NTRIP).



Results Evaluation

Our contributions provide a robust, low-cost sensing solution that simplifies setup for autonomous driving, while still achieving competitive performance [Mean IoU: 32.6 for our Dur360BEV benchmark].



128-Channel LiDAR Annotation

High-resolution 3D bounding box annotations on dense, 128-channel LiDAR point clouds in Dur360BEV enable accurate scene understanding.

