

OISHI LAB.

Spatiotemporal Modeling and Visualization



Department of Informatics and Electronics, Food Production Technology Research Center
Interspace Research Center, Center for Integrated Underwater Observation Technology

Department of Electrical Engineering and Information
Systems, Graduate School of Engineering
Interfaculty Initiative in Information Studies

Spatiotemporal Media Engineering

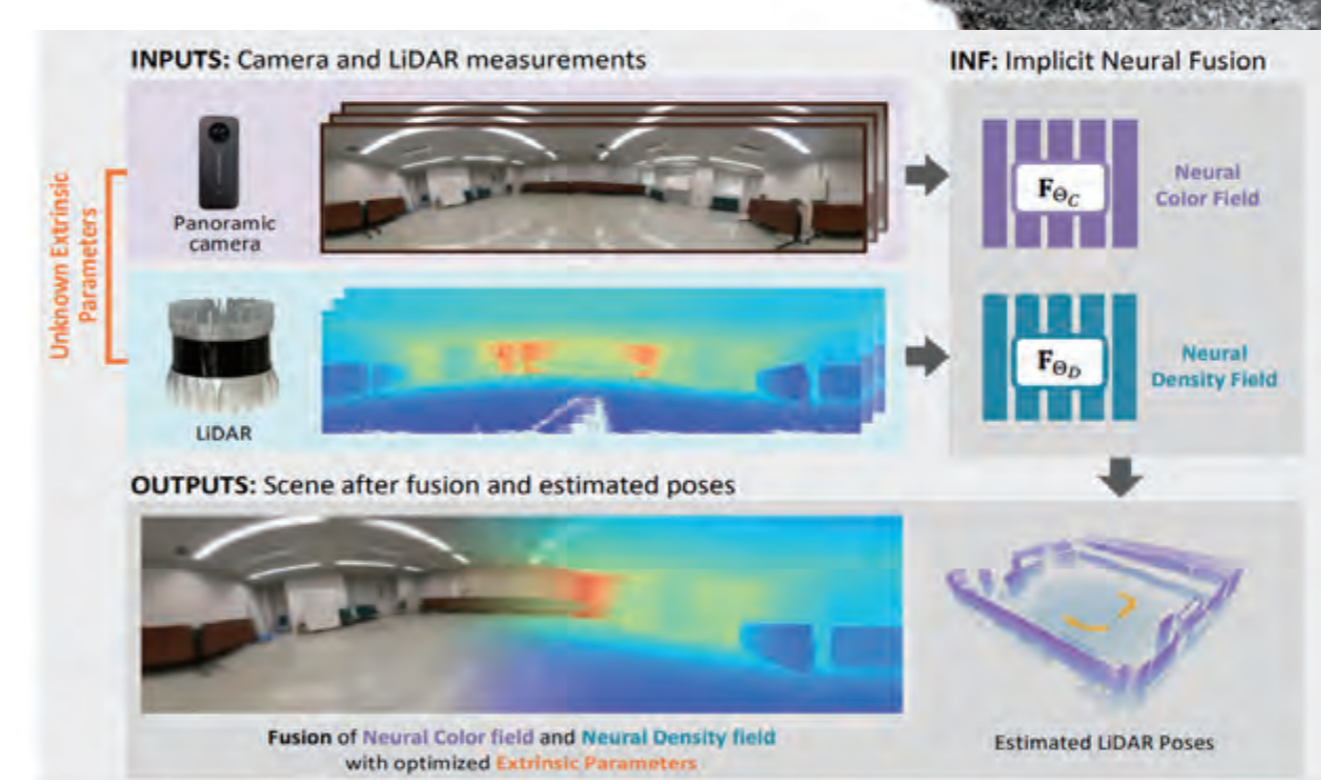
<https://www.cvl.iis.u-tokyo.ac.jp/en/>

3D Vision and Robotics

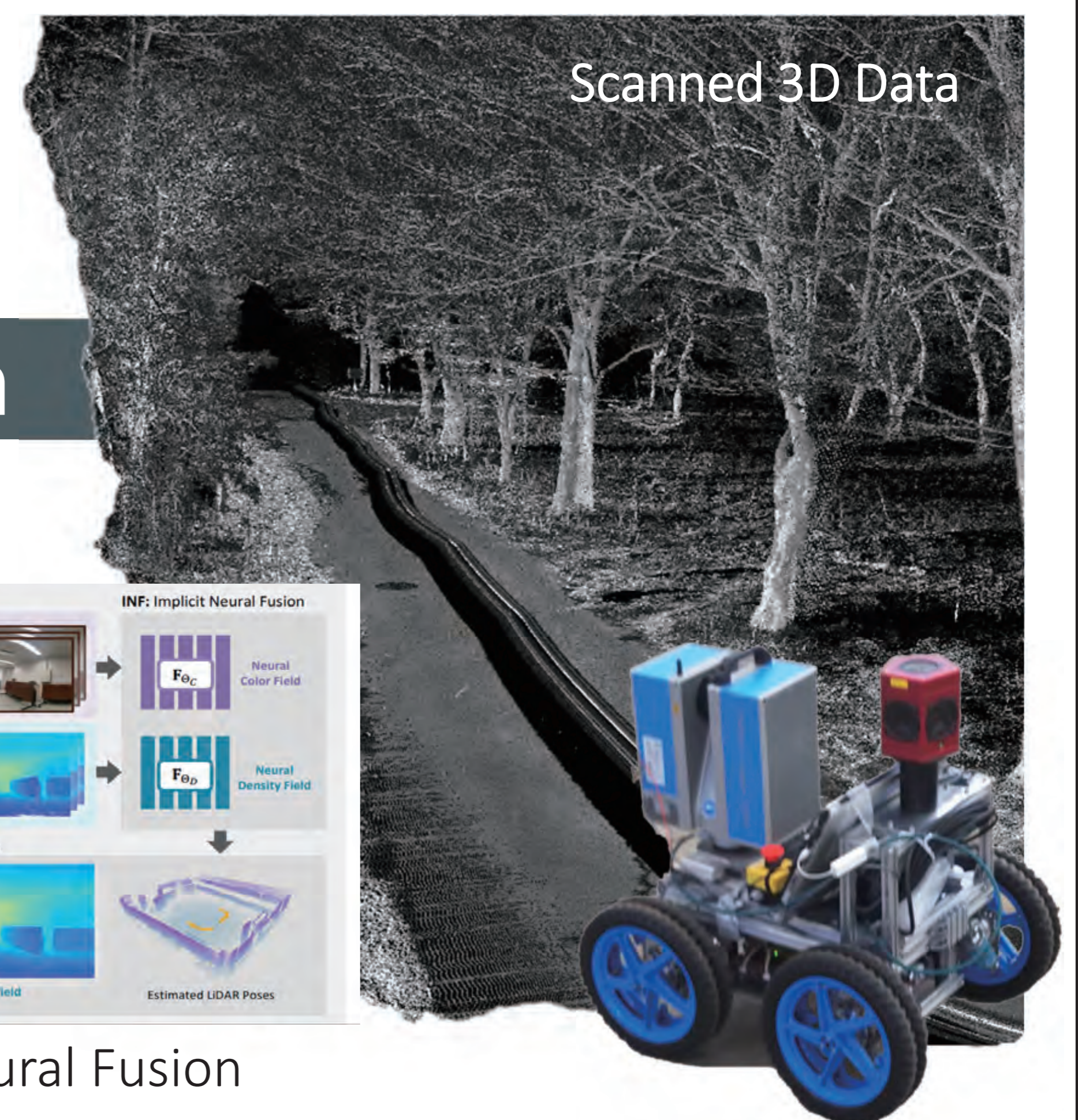
We have been developing the technologies of modeling, recognition, and analysis of 3D data by using optical sensors such as LiDAR and camera to realize the autonomous robot and mobility systems.

3D measurement: optical sensor fusion

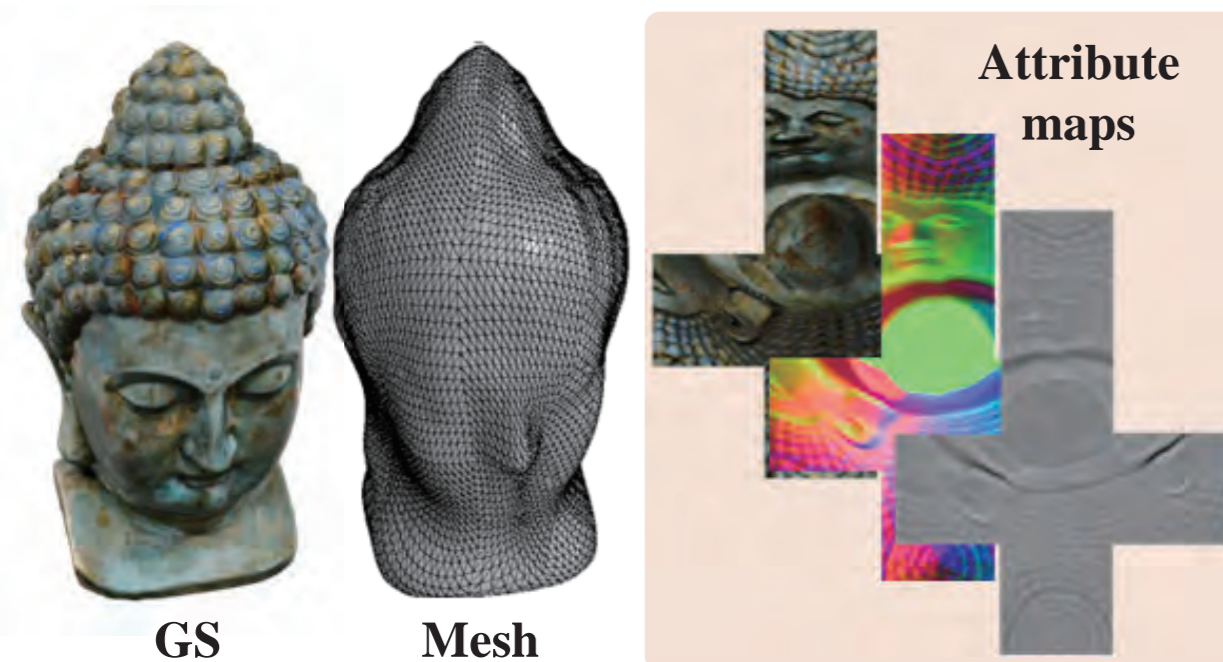
Autonomous mobility systems require various sensors with different measurement ranges and accuracy according to the scenes. We have been developing systems that use multiple optical sensors, such as LiDAR and cameras, to generate dense and accurate 3D maps of the surroundings. We have also developed precise calibration methods between multiple sensors and pose estimation methods by fusing the camera and the laser profiler.



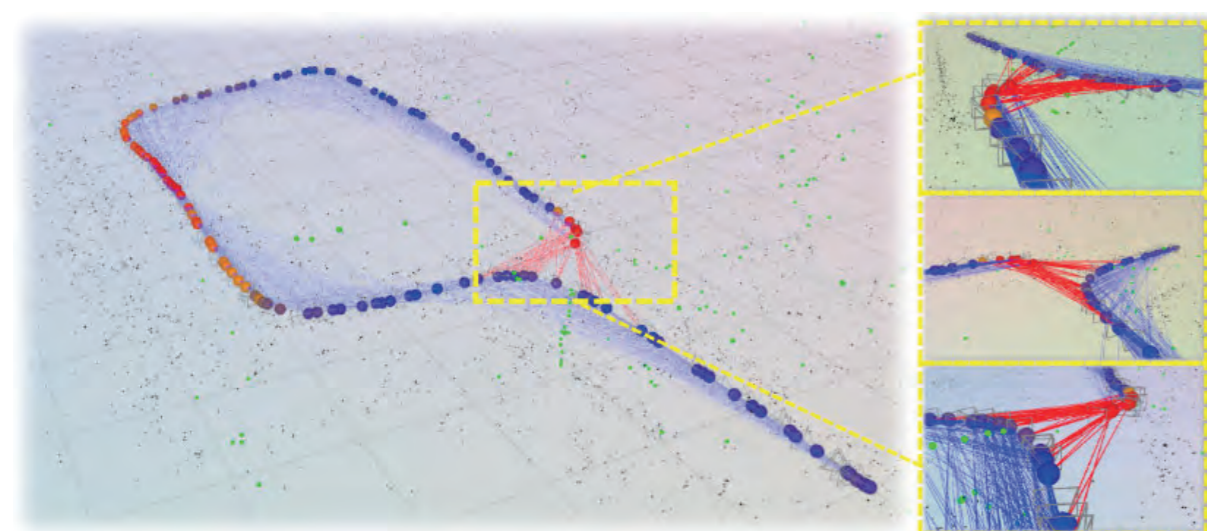
Implicit Neural Fusion



Scanned 3D Data



Deformable Mesh GS



Pose Graph Topological Integrity

3D image processing: depth map estimation



Agricultural support robot
(pest detection, pesticide spraying)

SLAM technology is essential for autonomous robots. We are developing basic techniques for SLAM, such as depth estimation from the camera, depth map completion through LiDAR-camera fusion, and 3D map enhancement for SLAM by loop closure. In addition, we are developing application systems for autonomous mobile robots, such as agricultural support systems, using a quadruped robot.

Robot control via deep reinforcement learning

We explore techniques for robot control through deep reinforcement learning (DRL). Our research aims to enable bipedal and quadrupedal robots to navigate challenging terrains and to perform autonomous 3D scanning. As part of our core work in DRL, we also focus on enhancing learning efficiency for robots performing complex tasks.

