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Prof. Lin Zhang received the B.Sc. and M.Sc. degrees from the Department of Computer Science and Engineering, Shanghai Jiao Tong University, in 2003 and 2006, respectively, and the Ph.D. degree from the Department of Computing, The Hong Kong Polytechnic University, in 2011. From March 2011 to August 2011, he was a Research Associate with the Department of Computing, The Hong Kong Polytechnic University. In August 2011, he joined the School of Software Engineering, Tongji University, Shanghai, where he is currently a Full Professor. His current research interests include environment perception of intelligent vehicle, pattern recognition, and computer vision. He published more than 70 technical papers on first-class journals or conferences. He serves as an Associate Editor for IEEE RA-L and JVCI. He is an IEEE Senior Member. In 2021, he received the First Prize of Shanghai Science and Technology Progress Award. He was awarded as a Young Scholar of Changjiang Scholars Program, Ministry of Education, China.

Speech Title: “Visual Perception Practices for Autonomous Parking”

Abstract: This report will share some research results of the reporter’s group on visual perception for autonomous parking, including high-precision parking-slot detection, online correction of the cameras’ poses of the surround-view system, and tightly-coupled semantic SLAM fusing multi-sensor information. The reporter modeled the parking-slot detection problem as a data-driven problem, and proposed a solution, DeepPS, based on DNN. In addition, the reporter has constructed a large-scale, fully annotated surround-view image dataset, which now can be accessed at https://cslinzhang.github.io/deepps/. Poses of calibrated cameras in a surround-view system sometimes may change. How to correct cameras’ extrinsics in an online manner without using re-calibration is still an open issue. The reporter first designs a Bi-Camera error model, measuring the photometric discrepancy between two corresponding pixels on images captured by two adjacent cameras. Then, by minimizing the system’s overall Bi-Camera error, cameras’ extrinsics can be optimized. How to estimate the pose of the vehicle in an indoor parking environment is another key issue. To this end, the reporter establishes a tightly-coupled semantic SLAM system by integrating Visual, Inertial, and Surround-view sensors, VIS_{SLAM} for short. In VIS_{SLAM}, apart from low-level visual features and IMU motion data, parking-slots in surround-view images are also detected and geometrically associated, forming semantic constraints.