# ICRA20

# Relevant Papers

- General
  - *Towards Noise Resilient SLAM*
  - *DeepFactors: Real-Time Probabilistic Dense Monocular SLAM*
  - *Redesigning SLAM for Arbitrary Multi-Camera Systems*

- Dynamic/Object centric SLAM
  - *Dynamic SLAM: The Need For Speed*

- LiDAR Maps/Segmentation
  - *Global visual localization in LiDAR-maps through shared 2D-3D embedding space*
  - *Instance Segmentation of LiDAR Point Clouds*
  - *Learning to Optimally Segment Point Clouds*

# Relevant Papers

- LiDAR SfM/Reconstruction
  - *Large-Scale Volumetric Scene Reconstruction using LiDAR*
  - *LiDAR-enhanced Structure-from-Motion*
  - *LiStereo: Generate Dense Depth Maps from LIDAR and Stereo Imagery*

- LiDAR SLAM/Odometry
  - *Intensity Scan Context: Coding Intensity and Geometry Relations for Loop Closure Detection*
  - *Unsupervised Geometry-Aware Deep LiDAR Odometry*

# Intensity Scan Context: Coding Intensity and Geometry Relations for Loop Closure Detection

- Han Wang (NTU), Chen Wang (CMU), and Lihua Xie (NTU)
- Contributions
  - Intensity Scan Context (ISC): geometric + intensity feature descriptor
  - Loop closure detection strategy
- Method
  - Calibrate intensity measurements based on distance measurement
  - Map points to 2D matrix, angle and distance
  - ISC is downscaling of this mapping
  - Geometric similarity: XOR binary ISCs
  - Intensity similarity: dot product of ISC columns
  - Verification: temporal consistency by checking adjacent scans, geometric consistency with FPFH features from raw scans

# Intensity Scan Context: Coding Intensity and Geometry Relations for Loop Closure Detection

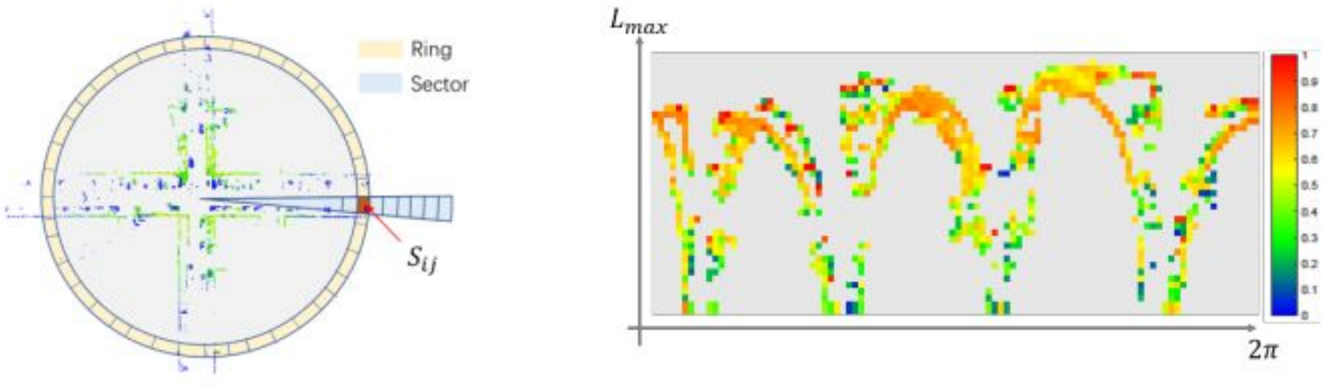


Fig. 3: A visual illustration of the proposed intensity scan context. Left figure: original point cloud is decomposed into subspace based on geometry characteristics. Right figure: derived intensity scan context by intensity projection on the subspace.

# LiStereo: Generate Dense Depth Maps from LIDAR and Stereo Imagery

- Junming Zhang, Manikandasriram Srinivasan Ramanagopal, Ram Vasudevan and Matthew Johnson-Roberson (University of Michigan)
- Contributions
    - Produce dense depth maps from stereo images and LiDAR scans
    - Self supervised training
- Takeaway
    - Compared to monocular, stereo input more robust to sparse LiDAR
    - Allows use of lower resolution LiDAR

# LiStereo: Generate Dense Depth Maps from LIDAR and Stereo Imagery

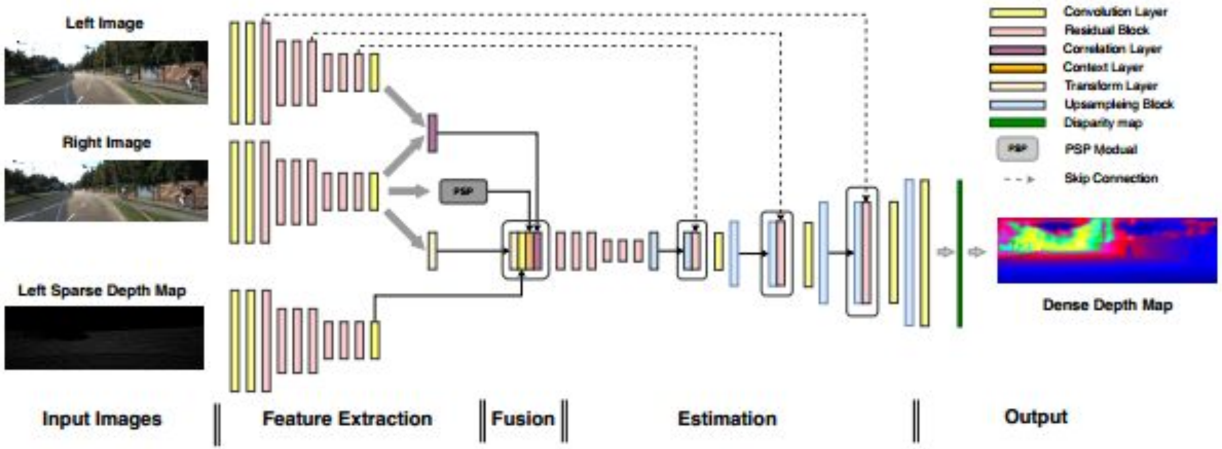


Fig. 1: Architecture of our proposed model. The pipeline of our model consists of following parts. (a) Inputs: rectified stereo images and corresponding left sparse depth map. (b) Feature extraction: features are extracted from stereo images and sparse depth map. The correlation layer computes correlation from one side of view to the other. Features from left color image are processed by transform layer to prepare for later sensor fusion. The PSP module is used to incorporate more contextual information. (c) Fusion: correlation information and features from the depth map are fused by concatenation. (d) Estimation: fused information is processed to perform depth estimation. (e) Output: a dense depth map and disparity map are generated. The output depth map is colorized for better visualization.