ADHEESH CHATTERJEE

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Skills: SLAM, Object Detection and Tracking, 3D Reconstruction, 3D Mapping, Sensor Fusion, Optimization

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EDUCATION

University of Maryland, College Park   *July 2018 - May 2020*
M. Eng Robotics | GPA: 3.63/4.0 | **Roles**: Teaching Assistant for ENPM 690 (Robot Learning)
Vellore Institute of Technology, India   *July 2014 - May 2018*
B. Tech Mechanical Engineering, Minors in Computer Science | GPA: 3.6/4.0

SKILLS

- **Programming**: Python, C, C++, C#, Swift, MATLAB, CMake, Unity, ROS
- **Libraries and Tools**: OpenCV, Open3D, PCL, OpenGL, Eigen, g2o, Sophus, Pytorch, TensorFlow, TFLite, YOLOv5, Git, Docker
- **Patent**: Chatterjee, Adheesh, 2023. Generating 3D facial models & animations using computer vision architectures. U.S. Patent 18/342,493 filed June 27, 2023. Patent pending.

WORK EXPERIENCE

VanGogh Imaging Inc   **McLean, Virginia**
3D Computer Vision Engineer   *Nov 2021 – Dec 2023*
- Migrated the indoor scene reconstruction software from Android (w/sensors - Structured light/TOF) to iOS (w/ sensors - RGB Camera, LiDAR and IMU) while ensuring seamless integration to work as a multi-threaded real time system.
- Improved the stability & feature tracking of the Visual SLAM system by integrating IMU while ensuring multi-threaded capability.
- Trained a neural network to detect a new set of 3D landmarks to be used as feature descriptors for the 3D Face Reconstruction software and ported it to iOS with sensors - RGB Camera, TrueDepth sensor and IMU
- Enhanced the existing Visual SLAM system by developing new modules to provide flat surface & wall detection using a RANSAC approach, and point cloud segmentation using a combination of PointPillars Encoders and classical approaches.
- Finetuned a pre-existing object detection model and deployed it as part of the Visual SLAM stack at 30fps on iOS/edge devices
- Collaborated with a client in the Medical Robotics space to provide solutions on surgical bed position and orientation detection, robot localization, foreign object detection in robot path, person detection & 3D point cloud generation using RealSense cameras
- Collaborated with a client in the Tele-Robotics space to provide SLAM solutions using their stereo sensors by performing stereo matching and multi-view stereo (MVS) for indoor scene reconstruction.
- Led the full-stack development of the company's demo GUI in Unity using C#, elevating core features to ensure cross-platform compatibility for android, iOS and client specific devices, and seamless integration with multiple libraries

Vidalign Inc (characterfacegen.com)   **Remote/New York**
Sr. Computer Vision Engineer   *Aug 2020 - Nov 2021*
- Developed a precise facial landmark detection and tracking module used for 3D mesh generation
- Designed features like facial segmentation and landmark redundant systems (FAN, 3DDFA, mediapipe) to improve the 3D mesh.
- Developed a parametric model for facial wrinkles & generated tension maps to match customer needs
- Deployed a texture acquire algorithm to extract albedo and lighting at an industry standard to be baked onto the mesh
- Supported in the development of a lip-syncing feature for our product by modifying our final 3D mesh to seamlessly pick up lip movement and facial expressions from an existing mesh/image

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PROJECTS

- **SfM** - Leveraged the Structure from Motion (SfM) approach to reconstruct a high-fidelity 3D point cloud, employing advanced techniques such as RANSAC-based outlier rejection, PnP estimation, & Bundle Adjustment for optimal accuracy
- **FastSLAM** - Developed and implemented the FastSLAM algorithm using a particle filter and low-level EKF to accurately track dead reckoning and estimate robot paths based on obstacle detection in dynamic environments
- **Semantic Segmentation** - Developed an encoder-decoder CNN architecture for semantic segmentation and depth estimation of RGB-D images, with a focus on Cityscapes and Kitti datasets
- **Object Detection -** Created an object detection system using RCNN, implementing selective search & region proposal techniques, & extending it to support multi-class object detection. Demonstrated image classification capability on the ImageNet dataset
- **Misc. Computer Vision Projects -**Developed various computer vision techniques, including Visual Odometry, Lane Detection, Traffic Sign Recognition and Classification, Lucas Kanade Object Tracker, Color segmentation using Gaussian Mixture Models
- **Sensor Fusion -** Processed Lidar Point Cloud, Radar, and Camera data to calculate total time to collision from preceding vehicles and 3D object tracking in C++ using Point Cloud Library
- **ROS -** Developed a ROS interface for localization on the motion capture workspace using raw sensor data (IMU, Camera, Magnetic Encoders) for tracking a non-holonomic differential drive robot using a Raspberry Pi and an Arduino Nano. Deployed the RTAB-Map ROS package on the mobile robot to generate a high-fidelity 3D map