

# SENTHIL PALANISAMY

## Applied Research Engineer (Computer Vision)

@ senthilpalanisamy2020@u.northwestern.edu    +1 872 985 1814    1401, Red Hawk Circle, Fremont    senthilpalanisamy.github.io/  
in linkedin.com/in/senthil-palanisamy    github.com/senthilpalanisamy

\*More details about some of my projects are available in my portfolio [senthilpalanisamy.github.io](https://senthilpalanisamy.github.io) and my daily medium posts - [multi-view image stitching](#), [debugging neural networks](#)

## PROFESSIONAL EXPERIENCE

### Applied Research Engineer

#### Geomagical labs- Augmented Reality

September 2021 - Present    Mountain View, USA

- Worked on Kinect style SLAM that, given a sequence of depth images, estimate the camera trajectory as well as a 3D mesh of indoor rooms.
- Worked on TSDF (Truncated Signed Distance Function) volumetric fusion to generate 3D mesh of indoor doors from known camera poses.
- Built infrastructure to support depth data in an Augmented Reality pipeline, which includes depth compression schemes, projection of 3D meshes into known camera poses, and stitching depth maps together to generate a composite depth image for a stitched panoramic image
- Investigated self consistency metrics that can help analyse if the pose quality is good from Colmap SFM (structure from motion).
- Deep dive into recent works on Nerf (Neural radiance fields) and trying out some of them for indoor 3D reconstruction.

### Computer Vision Engineer

#### Softwear Automation- Robotics

Dec 2020 - June 2021    Atlanta, USA

- **Camera Localisation** : Estimated the pose of the camera with respect to the robot end effector based on offline marker based calibration.
- **TShirt Pose Estimation** : Estimated the pick up pose for T-Shrit stacking using weighted least mean square optimisation

#### Soliton Technologies- Smart Camera and Robotics

May 2016 - July 2019    Bangalore, India

- Worked on several computer vision problems like seat belt detection using HoG features, Image depth classification using deep learning, hand written character recognition using deep learning and deployed algorithms on an ARM-based smart camera platform
- Weed detection and Localisation - TartanSense: This work was a part of start-up collaboration for an agricultural rover. Trained a deep learning weed detection model and localised its 3D position by calibrating camera extrinsics and intrinsics and deployed in Jetson TX2.

## ACADEMIC PROJECTS

### Northwestern

August 2019 - Now    Evanston

- **SLAM experience**: Built a kinematic model for wheeled robot navigation and EKF filter based SLAM from scratch and tested on a turtlebot. Coded project in C++ inside RoS framework. Read 51 visual SLAM papers, spanning across different frameworks, complementary sensing modalities (like depth sensors, IMU), and wrote a report by summarizing knowledge gained.

## SKILLS

**Areas:** SLAM, SFM, Robotics perception, Depth fusion, Computer Vision, 3D vision, Machine learning, Deep learning, Algorithms, and Data Structures, Augmented Reality

**Languages:** Python, C++

**OS known:** Linux

**Tools:** Vim, Bash, Git, RoS

**Libraries:** Pytorch, OpenCV, numpy

## EDUCATION

M.S. in Robotics - (3.93/4)

Northwestern, Illinois

2019 - 2020

B.E. in Electronics & Communication

Anna University, Chennai

2012 - 2016

## LAB PROJECTS

- **Online Extrinsic camera calibration in a wheeled chair platform**: Calibrated the position of the camera with respect to robot base frame by measuring ego motions of camera (visual odometry) and robot base frame (robot odometry) based on AX=XB calibration model and Gauss-Helmert optimisation.
- **Mice Pose tracking using a 4 camera system**: Built a 4 camera high speed image stitching system and integrated models trained on deeplabcut - A resnet-50 based network for tracking the trajectory of a mice.
- **Zero shot imitation**: Applied a self supervised deep learning technique to reinforcement learning problem of estimating an effective policy in pytorch to enable a Baxter to manipulate non-rigid bodies (tying a knot).

## LEADERSHIP SKILLS

→ **Team Leader - Card Reader**: Guided an intern to develop a government card reader application and deployed it in a cloud based service.

→ **Project Coordinator, Science**: Built and managed a team of 30 volunteers for teaching science to about 150 underprivileged kids