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Vancouver, British Columbia
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Shivam Thukral

SKILLS

Languages: C++, Python, MATLAB, Julia, OpenCL, CUDA, Java, Bash, SQL, R, Haskell.

Technologies: ROS, PyTorch, OpenVINO, ONNX, PCL, Open3d, OpenCV, Git, AWS, Tensorflow, Grafana, Telegraf

EXPERIENCE

Senior Software Engineer - Perception and Robotics, Locus Robotics   April 2024 – Present
- Designed & implemented depth + LiDAR filtering to exclude carts, cutting mission time by 14% (Video)
- Performed transfer learning with YoloX to detect LocusBots, persons, forklifts and carts in real-time in a warehouse.
  - Ported model inference from Python to C++ to reduce inference time by 15% and CPU load by 35%
  - Single-handedly integrated the object detector into the existing Locus framework for all robot types.
  - Contributed to end-to-end MLOps pipeline including training, packaging, and robotic deployment.
- Integrated a state-of-the-art Multi Object Tracker, ByteTracker, in LocusBots to track and avoid forklifts.

Software Engineer - Perception and Robotics, Locus Robotics   April 2022 – March 2024
- Built a fiducial-based forklift detection and tracking system, reducing robot-forklift collision costs by 0.5M.
- Reduced robot deployment time by alleviating the need to perform per-camera calibration for each robot.
- Upgraded the fiducial marker detector to use AprilTag3, to increase frame processing speed (22%) and recall (28%).

Graduate Research Assistant, UBC Vancouver   May 2020 – February 2022
- Developed vision-based algorithm, ApproachFinder-CV, to find docking locations for a wheelchair in indoor scenes.
  - Each location is accompanied by a desirability weight based on visibility, relative position and heading.
- Proposed a real-time deep network, ApproachFinder-NN, that predicts docking spots using just geometric information.
  - This end-to-end differentiable, Hough voting based architecture is 15x faster than the traditional vision pipeline.
- Proposed a method to integrate the network output as a 3D temporal desirability cost map for wheelchair navigation.

Researcher (Software Engineer), Innovation Labs, TATA Consultancy Services   August 2017 – August 2019
- Long Distance Container (LDC) Packing (Video)
  - Patent US12307405B2, "System and method for autonomous multi-bin parcel loading system," TCSL, 2025.
  - Achieved target fill rate of 12 secs/LDC by designing an efficient pose estimation and motion planning modules.
- Chitrakar: Robot Artist (Video, Paper)
  - Programmed a robotic arm to draw human faces as a recognizable, non-self-intersecting loop (Jordan curve).
  - Used Mask R-CNN trained on MSCOCO dataset for instance segmentation and background removal.

SELECTED PROJECTS

Applied Computer Vision & AI Models (Code) [In progress]
- Implemented CV models for segmentation and detection, including UNet, YOLO, ViT, ResNet-18, AlexNet, and VGG-16
- Explored generative AI models such as DDPM, cGAN, and CLIP for representation learning and image generation.

Image-based Visual Servoing using Industrial Manipulator (Report, Code)
- Proposed a framework to track moving visual features with occlusion using a 6-DoF robotic arm in 3D.
- Showcased dexterous manipulation capability with 85% hit rate while playing ping pong using the manipulator.

Modelling Human Behaviour in Chess (Report, Code)
- Developed three predictive models (linear, neural net & transformer) to play human like chess moves.
- The transformer-based model performed best with an accuracy of 76.4% on its top 5 ranked moves.

3D Pose Estimation from Single RGB Camera (Report, Code)
- Developed a method to estimate the 3D kinematic pose of a human using an RGB camera video stream.
- The fully-connected CNN yields 2D and 3D joint positions simultaneously and eliminates expensive BB computation.

EDUCATION

Master of Science in Computer Science   September 2019 – February 2022
University of British Columbia (UBC), Vancouver, Canada   **GPA:** 88.8 / 100
Bachelor of Technology in Computer Science and Engineering.   August 2017
Indraprastha Institute of Information Technology (IIIT), Delhi, India   **GPA:** 9.4 / 10.0

PUBLICATIONS

N. Sharma, S. Thukral, S. Aine, and P.B. Sujit, *"A virtual bug planning technique for 2D robot path planning,"* in *IEEE American Control Conference*, ACC , Milwaukee, June 2018.