

Mohamed Fazil

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Education

University at Buffalo, School of Engineering and Applied Science, Buffalo, NY Spring 2020 – Summer 2021
Master of Science, Robotics

Vellore Institute of Technology, School of Mechanical and Building Science, Chennai, India Fall 2015 – Winter 2019
Bachelor of Technology, Mechanical Engineering

Technical Skills

Software: Solidworks, MATLAB, Fusion 360, Gazebo, Simulink, Unity 3D, Mujoco, Vicon Nexus

Hardware: Jetson, Raspberry Pi, IMU, UART, Microcontrollers, Lidar, PCL, EMG, Vicon

Technology Areas: LLM, Embodied AI, Motion Capture, Mechatronics, Deep Learning, SLAM, Perception, Mobile Robots, Docker Container, Kubernetes, Motion Planning

Programming Fields: C++, Python, OpenCV, Keras, ROS, Tensorflow, OpenVR, PyTorch, CUDA, JAX

Work Experience

Robotics Engineer at [Hello Robot Inc.](https://hello-robot.com) ([hello-fazil](https://hello-fazil.com)) 01/2022 – Present

- Contributed to the core open-source software development of the mobile manipulator robot platform Stretch which is light weight research robot that is designed with the focus of safe human interaction and usage in home environments.
- Managed the low robot controls stacks (Python/C++), URDF management, robot production software and have active contributions to communication systems, ROS interface and perception systems.
- [Microsoft Build 2025 Conference: Guest Talk on research robot Stretch 3](#) - Gave a product centric guest talk in MS Build's final on-stage developer with 800+ audience.
- [Stretch Mujoco](#) - Wrote the first Mujoco simulator with physics accurate XMLs package for Stretch 3 with RoboCasa Kitchen scenes integrated into the sim for data collection and training applications.
- [Stretch AI](#) - Embodied AI library for Stretch robot which uses different AI pipelines to interact with the robot and complete tasks. My major contribution is the Rerun based Visualization module, apart from that involved in: manipulation policy deployments such as Diffusion Policy, RUMs, VLA; DL perception pipelines such as GraspNet, Detic, DinoV2, SAM and LLM agents such as Llama, Qwen & Open-AI client.
- Designed the Normalized Velocity Controller that is used in the [Visual Servoing Based Grasp demo](#) and Gamepad based teleoperation SW which we ship with the robot as a product offering.
- Designed the Production Software Framework that enables bringing up the robot for shipping that includes a 30+ robot calibration steps. Using the framework enabled us to ship 300+ robots with a week of lead time per robot compared to a month previously.

Graduate Research Assistant: [AI-Based Wearable Robotics Lab](#), University at Buffalo 06/2020 – 8/2021

- Developing a Virtual Reality based simulation of prosthesis arm using Mujoco physics engine and Deep learning.
- Using data collection systems such as Vicon Motion capture system, Delsys EMG sensor system, HTC VR

Lab Supervisor 3D Printing and Tinkering - Digital Manufacturing Lab, University at Buffalo 02/2020 – 8/2021

- Handling university/external research work orders for fabricating parts using industrial 3D printers (Stratasys, 3D Systems, Markforged series printers and Formlabs printers)
- Creating study modules and training students on Reverse Engineering, Product design, Tinkering projects.

Summer Researcher – Artificial Intelligence Institute, University at Buffalo 06/2020 – 8/2020

- Developed Face Recognition and Deep learning-based web deployed applications using Google Cloud Platform.
- Application's framework involved GCP tools (Compute Engine, App Engine), Angular, Python Flask, MongoDB

Publications

Mohamed Fazil M. S.*, Dr. Jiyeon Kang, "[CNN based Approach to Continuous Prosthetic Wrist Control using EMG Signals](#)" published in **2022 9th IEEE RAS/EMBS International Conference for Biomedical Robotics and Biomechatronics (BioRob)**

Mohamed Fazil M. S.*, Dr. Arockia Selvakumar A., Dr. Daniel Schilberg, "[Stereo Vision Based Robot for Remote Monitoring with VR Support](#)" presented at **Indiana Summit 2019, Indiana University Purdue University** and published in **International Journal of Engineering and Advanced Technology (IJEAT, Scopus Indexed)**

Achievements

- Consecutive University Best Project Award – 2018, 2019 (Vellore Institute of Technology, Chennai, India)
- IIT Madras International Accessibility Summit 2017 – Delegate (IIT Madras, Chennai, India)
- IOT Challenge Winner - Pragyan 2017 (National Institute of Technology, Trichy, India)

Projects (mohamedfazel.com/projects)

Autonomous Ground Vehicle with 3D Perception for Mapping / Multi-Object Pose Tracking ([GitHub](#)) Fall 2021

- Built a ground robot for environment exploration, a 3-DOF manipulator with **Realsense D435i** RGB-D camera mounted on a **Tracked differential drive mobile Robot** fully controlled with ROS using **Jetson Nano board**.
- The Robot uses EKF localization fusing the wheel odometry with IMU(MPU6050) for state estimation.
- Real-Time Appearance based mapping (RTAB-Map) is used for building 3D Space/2D grid maps and localization.
- Scripted a ROS Multi-Object Tracker node that projects objects in 3D space and broadcasts it to the main TF tree.
- Built an organized repo of ROS packages for the Robot's Configuration, Control, Perception and Navigation.

Deep Learning approach to Robotic Prosthetic Wrist Control using EMG Signals ([Publication](#)) Spring 2021

- Collected eight channel timeseries EMG data with wrist kinematics from 8 participants and trained CNN model using the state-of-the-art Inception-Time model architecture to predict the Motor intent of the subjects.
- Used Vicon motion capture system for data collection, 3D Reconstruction, Signal processing, body kinematics computation and generating datasets for multivariate Times-series Convolutional Neural Network training.
- Built Novel data processing pipelines with data augmentation techniques to improve the trained model.

3-DOF Desktop Robot for Autonomous Object Tracking in 3D space ([GitHub](#)) Fall 2021

- Built a 3-DOF desktop robot with Intel RealSense D435i as the perception hardware, which can perceive objects and 3D pose estimate multiple objects in space using a node for the pixel to point deprojection in ROS.
- Scripted controller node that tracks objects in space autonomously using its 3-DOF manipulator.
- The Object detection node uses deep learning (YoloV3), and deprojection nodes use Realsense SDK's functions.

ROS Autonomous SLAM with Rapidly Exploring Random Tree (RRT) ([GitHub](#)) Fall 2020

- Created ROS package using Navigation stacks to perform SLAM (GMapping) autonomously using RRT Algorithm.
- Generated a [detailed tutorial](#) of using Navigation stack with RRT algorithm and simulation in Gazebo.

Face Recognition based Touch-Less Clock in system deployed in GCP Summer 2020

- Designed and deployed a web based Touchless clock in a system which uses face recognition with deep learning.
- Built the web application in AngularJS and deployed through Google Cloud Platform with Python flask backend.
- Automated bash scripts inside the GCP virtual Linux machine to have a failproof system.

Singularity Analysis and simulation of Fanuc 6 DOF Industrial Robot Fall 2020

- This project consists of kinematic and singularity analysis of the 6-DOF industrial Robot Fanuc LRMate 200id.
- The 6 X 6 Jacobian matrix was decoupled into three systems to solve for three different equations that represent the singularity condition of the Robot with MATLAB simulation of singularity points in cartesian space.

Mujoco VR for prosthesis hand control build integrated with ZMQ ([GitHub](#)) ([GitHub](#)) Fall 2020

- This is the development repo of Virtual Reality rendering with Mujoco Physics Environment (C++) with help of OpenVR SDK and HTC Vive HMD hardware for prosthesis hand control simulation.
- Integrated ZMQ library with PubSub protocol within the Mujoco VR controller to introduce IPC communications.

Inverse Kinematics and Dynamics of SCARA Manipulator Fall 2019

- Computed DH parameters, forward kinematics and implemented First & Second order algorithms Incorporating obstacle avoidance control in Simulink.
- Implemented 'Inverse Dynamics Control' using Lagrangian dynamics & generated trajectory in joint/robot space.

"HapTap" - Haptics and Cloud integrated Medical Wearable Monitoring Device Fall 2019

- Fabricated a wearable IOT product for the elderly/disabled that helps track the health condition in addition to communicating using haptic feedback. Aimed for people having 'Cerebral Palsy' condition.
- Devised it as a standalone cloud device using (ESP32) managed by Node Red IOT platform.

Smart Rollator with Rocker Bogie mechanism with a IMU based Weight Distribution control Winter 2019

- Built an advanced rollator for elderly integrating the Rocker-bogie mechanism used in mars rovers with a rollator
- Developed a unique mechanical design, mechatronic system consisting of linear actuators, Arduino Mega board, BLDC motors with feedback control and IOT connectivity that can always be relied on by the elderly.