Soumo Roy

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EDUCATION

Vellore Institute of Technology, Vellore, India　　　　　　　　GPA:8.74/10 | 2021-2025
BACHELOR OF TECHNOLOGY IN ELECTRONICS AND COMMUNICATION ENGINEERING
Coursework: Robotics

SKILLS

<u>Languages:</u> C++, Python, R, Matlab, LaTeX, HTML, JavaScript, CSS
<u>Simulation packages and IDE:</u> ROS1, ROS2, Gazebo, RVIZ, STMcubeide, pybullet, openAI gym
<u>Technology:</u> Git, Gitlab, Docker, Linux(Ubuntu), Shell scripting, Docker, openCV, Tensorflow, keras, pytorch
<u>Boards :</u> nvidia jetson nano(2gb), intel atom, Arduino uno, raspberry pi 3b,stm32 black pill, blue pill, esp 32

WORK EXPERIENCE

NIT SILCHAR | SN BOSE SUMMER RESEARCH INTERN　　　　　　Silchar | June 2024 – July 2024

- Worked under Dr Yogesh Singh at Advanced Robotics Research Lab, NIT Silchar
- Worked on MATLAB simulation of shape memory alloy(SMA) based assistive robotic glove simulation for patients with wrist mobility issues which reduced strain by 78%.

IIT KANPUR | SURGE RESEARCH INTERN　　　　　　　　　Kanpur | May 2024 – June 2024

- Worked under Dr. Tushar Sandhan at Intelligent System Control Lab, IIT Kanpur
- Worked on a human robot collaboration project using imitation learning with UR5 collaborative robot and intel realsense camera for the collaborative action of heavy object lifting with an efficiency of 68%.

UNBOX ROBOTICS | ROBOTICS SYSTEM VALIDATION INTERN　　　Pune | Aug 2023 – Nov 2023

- Worked on multi-agent robotics system for industrial automation and logistics solutions
- Worked on validating hardware components: conveyor belt, battery management system and scissor lift mechanism with a linear actuator.
- Worked on a project to automate the testing of the web page used for controlling robots using webdriver.io and JavaScript, Docker and deployed it on GitLab CI/CD pipeline

G.D NAIDU ROBOTICS LAB VIT | UNDERGRADUATE RESEARCHER　　Vellore | Jan 2023 – Aug 2023

- Worked in the Robotics Lab in VIT Vellore under Dr. Kalairassan G on mobile robots(turtlebot 2) and UR5(collaborative robot).
- Guided undergraduate students towards robotics and AI.

TESSOLVE PVT LTD | MACHINE LEARNING INTERN　　　　　Vellore | June 2023– July 2023

- Worked on brain tumor detection with CNN.
- Implemented ML algorithms and Deep Learning techniques like RNN and LSTM using tensorflow for improving the accuracy of the tumor detection by 17%.

IIT BOMBAY(E-YANTRA) | ROBOTICS COMPETITION　　　　　Vellore | Sep 2022 - Jan 2023

- Worked on Cosmo logic theme where me and my team worked on a collaborative application of UR5 serial manipulator robot and a mobile robot
- Worked on a sentinel drone theme where I and my team had to build an autonomous drone in a gazebo simulator platform to detect a yellow block kept on a map and return its location coordinates after detecting it.

PROJECTS

SPOON FEEDER ROS ⬈　　　　　　　　　　　　　ROS1,OPENAI GYM,PYTORCH

- faculty guide : Prof Budhaditya Bhattacharyya
- Developed and evaluated an advanced robotic manipulator system designed for feeding and drinking assistance, particularly for individuals with physical impairments.

- Jaco, Sawyer, and Baxter, each equipped with customized grippers and spoon-like attachments.
- Did a comparative analysis of reinforcement learning algorithms like PPO, SAC, and DDPG across different robotic arms in simulated feeding and drinking tasks.

SENSOR FUSION ON TURTLEBOT2 ⬈   Python,openCV,ROS1,RVIZ

- faculty guide : Prof Kalaiarassan G
- Working in the G.D Naidu Robotics Lab in VIT Vellore on creating a fusion algorithm for turtlebot 2 combined with sensor fusion technology to combine the data coming from LIDAR and RGBD camera to create a high clarity 3-D map with depth information.
- Used ROS and RVIZ for the map implementation.This project was done on Linux operating system version 16.04.6 LTS, and implemented on Turtlebot2 robot, ROS which is a middleware operating system in Kinetic version.
- Used Orbec astra depth camera and 2D rplidar.

UR5 ROBOTIC GRASPING ⬈   Python,ROS1,RVIZ,Moveit,openCV

- faculty guide : Prof Kalaiarassan G
- This project was done as a part of a consultancy based project in G.D Naidu robotics lab .
- 3-D pose estimation was done with 3 depth camera(kinect v1,kinect v2 and orbec astra depth camera) to detect a human in the vicinity of the UR5 collaborative robot.
- The grasping of an object was done using rg2 gripper attached to the tool centre point (TCP) of the UR5 collaborative robot.
- I worked on Image Based Visual Servoing techniques (IBVS) for detecting objects in the bin with high precision by detecting image features using CNN.

REAL-TIME AUTOMATION OF TITERATION ⬈   Python,linux(shell),openCV

- faculty guide : Prof Gopi Ragupathy
- Worked in PRP chemistry lab to automate titeration using openCV and to deploy it on an open source embedded micro-controller called raspberry pi.
- implemented a HSV-based image processing algorithm to detect the solution and then later we deployed the algorithm on jetson nano 2gb variant GPU for better performance.
- Filled a process patent for automation procedure with computer vision and embedded system

PUBLICATIONS

- S. Roy,J. Viju,B. Bhattacharya,"**Adaptive Robotic Manipulator Simulation for Enhanced Feeding and Drinking Assistance** ", 21st IEEE India Council International Conference (INDICON-2024) (submitted) (link)

- S. Chowdhury,S. Roy,D. G. Chowdhury,S. Chakraborty,K. P. Jain,B. Bhattacharya,"**SKIDS: An Object Classification and Smart Communication based Waste Bin** ", 2024 IEEE International Conference on Artificial Intelligence for Internet of Things (AIIoT 2024) DOI : 10.1109/AIIoT58432.2024.10574647 (link)

- S. Chowdhury,S. Roy,M. John, VRC. Chathurvedi, D. Das, A. Mohanty,"**Novel Ensemble Sentiment Classification through Speech Processing and Stacking Generalization** ", 2024 IEEE International Conference Electronics, Communication and Signal Processing (ICECSP 2024) DOI : 10.1109/ICECSP61809.2024.10698242 (link)

ACHIEVEMENTS

- Won a seed grant of Rs 1.5 lakh ($1790) from VIT faculty-student sponsored project fund for a medical assistive robot project under Dr. Budhaditya Bhattacharyya at Advance Digital Signal Processing Lab (link)
- I was one among 42 students selected under the institute project funded category at the IIT Kanpur SURGE internship program
- I was also an embedded system lead at IEEE-RAS (Robotics and Automation Society) Vellore Chapter