

# Harshitha Belagavi Rajaprakash

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## EDUCATION

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### Master of Science in Computer Science (GPA : 4.0/4)

University of Southern California, Los Angeles [ Aug 2023 - May 2025 (expected) ]

Courses: Analysis of Algorithms ; Applied Natural Language Processing ; Robotics ; Machine Learning

### Bachelor of Engineering (Computer Science and Engineering) - 90.01% (GPA : 4.0/4) (1st Rank)

University Visvesvaraya College of Engineering, Bangalore University, Bengaluru [ Aug 2017 - July 2021 ]

Relevant Coursework: Data Structures, Design and Analysis of Algorithms, Database Management Systems, Artificial Intelligence and Machine Learning, Data Mining

## SKILLS

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Python(pandas, numpy, scipy, scikit-learn, opencv, PyTorch), Java, SQL, Node.js, Unity

## AREAS OF INTEREST

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Computer Vision, Machine Learning, Robotics, Artificial Intelligence, Human Computer Interaction.

Open to work on other Research Fields in Computer Science.

## WORK EXPERIENCE

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### Research Assistant, SLURM Lab, University of Southern California, LA

Jan 2024 - Present

- Working at Sensing, Learning, and Understanding for Robotic Manipulation (SLURM) Lab at University of Southern California (USC) on Caregiving Robots, Plant Manipulation
- Working on robotic manipulation in contact-rich scenarios and leveraging trajectory optimization for planning.
- Building a simulation for scooping particular particles in a clustered environment.
- Building a solution to enable robotic assistance for dressing patients with muscular dystrophy and other neuro-immune conditions, as well as working on assistance for sponge bathing a patient to ensure maximum coverage.

### Research Assistant, Indian Institute of Science, Bangalore, India

Nov 2022 - Aug 2023

- Worked at Indian Institute of Science, CPDM, Intelligent, Inclusive Interaction Design (I3D) Lab on HCI solutions powered by AI/ML and computer vision techniques.
- Performed a Comparative study across Mixed reality and Virtual reality based remote welding Digital twin applications and mapping the coordinates defined for welding movement to the robot coordinates using regression technique.
- Built an assistive Assembly Process Instruction tool in collaboration with Collin's Aerospace, where Computer Vision is used to detect the components. Involved extensively in this stage of the project, which enabled me to understand various types of object detection algorithms in Computer Vision, study various object detection models(YOLO V5, YOLO V7, DETR, YOLOV8) and different versions of the same. Instructions and warnings based on a defined Assembly Process are provided to the user in a mixed reality application; after the detection of the components.
- Built a custom dataset for the components in hand and got experience in the various pre-processing steps involved with creating the dataset, with real and synthetic images. Tried different augmentations on the dataset created.

### Developer Associate, SAP Labs India

July 2021 - Oct 2022

- Built reuse services in Data Privacy and Protection kernel service team at SAP that enables businesses to be compliant with GDPR and similar regulations. Built Springboot, Java, Node.js applications that were deployed on Cloud Foundry with a strong process driven team that followed Agile methodologies. Part of Devops activities in the team, by ensuring deployment ready code-base at the end of the sprints, orchestrating the release of the services and sanitization of the code base through multiple scans(Blackduck, WhiteSource, ec) and new data centre deployments for release of services.

### Developer Associate Intern, SAP Labs India

Feb 2021 - July 2021

- Worked on various reuse services( including Personal data Manager and Data Privacy Integration) built to archive and handle data of end users, analysed various consumption scenarios along with supporting customer incidents.

## PROJECTS

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### Caregiving and Assistive Robotics

Developing a solution to enhance robotic aide for people with neurological disorders like muscular dystrophe to help with Dressing and Bathing

### Plant manipulation

Retrieval of fruits by a UR5 robotic arm, and using Theseus for trajectory optimisation to compare with Inverse Kinematics, achieved 2 percent hugher success of reaching the target using our optimiser

### Dextrous Bi Manual Manipulation for Scooping

Development of a simulation for facilitating scooping of a sphere from a cluster of particles, and designing corresponding reward function to trai with PPO

### IROD - Object detection

Designed a novel model for object detection for Indian Road Dataset. Benchmarked the model against state of the art models(MRCNN, DRN, FCN, etc) on IROD and Cityscapes Datasets.

### Development of Instructive Assembly Process Application

Development of an application to initially identify different components of an Assembly Process using Computer Vision and then display instructions to the user on how Assembly must be carried out through Mixed Reality at IISc, Bangalore

### Development and Study of XR interface in Remote Welding Scenarios

Development and Comparison of remote welding through Mixed reality interface and Virtual reality application. Development of the Application for Hololens and used Regression Model to map the coordinates from Mixed Reality space to Robot workspace. at IISc, Bangalore

## PUBLICATIONS

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### I-ROD: An Ensemble CNNs for Object Detection in Unconstrained Road Scenarios

Abhishek Mukhopadhyay, Harshitha BR, Prashant T Gaikwad, Imon Mukherjee, Pradipta Biswas, Signal, Image and Video Processing Journal, Springer (In Review)

### Investigating Swimming Effect of Holograms in Mixed Reality

Subin Raj, Harshitha B R, Amaresh Chakrabarti, Pradipta Biswas, International Conf on Pattern Recognition 2024, July 2024

### Harnessing Learn Rate Schedule for Adaptive Deep Learning in LoRaWAN-IoT Localization

R. Swathika; S. M. Dilip Kumar; N. N. Srinidhi; B. R. Harshitha, IEEE Access, May 2024

[Link](#)

### Development and comparison studies of XR interfaces for path definition in remote welding scenarios

Ananthram Rao M C; Subin Raj; Aumkar Kishore Shah; Harshitha B R; Naveen R Talawar; Vinay Krishna Sharma; Sanjana M; Himanshu Vishwakarma; Pradipta Biswas, Multimedia Tools and Applications, November 2023

[Link](#)

### Multiple Multicast Architecture for XMPP based Applications

Harshitha B R, Niyati B Mehta, Shivangi Rai, Deepti , S M Dilip Kumar, S Sheela, 3rd International Conference for Emerging Technology (INCET), IEEE, 2022

[Link](#)

### IoT-enhanced Extensible Messaging Presence Protocol:A Multiple Multicast Architecture for Diverse Applications

S Sheela, B R Harshitha and S M Dilip Kumar, IC-ICIC-2023; International Conference on "IOT, Communication, Intelligence and Computing", 2023

[Link](#)

## ACHIEVEMENTS

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1. Secured 1st Rank and 3 Gold Medals including Best Student Award, Batch of 2021, UVCE, Bangalore University.
2. First place in SAP-CSR Hackathon by developing app to get measurements for prosthetics using CNN, OpenCV, Mediapipe

## EXTRA CURRICULAR

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1. Core team member of IEEE UVCE Student Branch as Representative Committee and Executive Committee Member and founder of IEEE SIGHT at UVCE.
2. Handled many events and took care of the logistics of organising hackathons and other technical and non technical events that were conducted as a part of IEEE
2. Member of Rotaract Bangalore West and volunteered for multiple educational, food and hygiene social drives.