Ananya Agarwal

Portfolio: github.com/aawizard

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Education

- **Northwestern University** — Illnois, USA
  Master of Science Robotics — *Sept 2023 - Present*
- **Indian Institute of Information Technology, Allahabad** — Prayagraj, India
  Bachelor of Technology - Electronics and Communication Engineering: GPA: 9.02 — *July 2019 - June 2023*

Skill

- **Languages**: Python, C++, C
- **Robotics**: ROS/ROS 2, Gazebo, CoppeliaSim, MoveIt!, Computer Vision (OpenCV), Machine Learning, Deep Learning
- **Frameworks**: Scikit, SpaCy, Darknet, Pytorch , TensorFlow, Flutter
- **Platforms**: Linux, Git, Bash, Arduino, Raspberry, Colab, Firebase

Projects

- **Hangman Assistant** :
  - **Platform**: 7 DoF Franka Emika Panda robot arm
  - **Objective**: To create a ROS2 package to assist the hangman game by writing on a whiteboard and take in user guesses using a camera.
  - **Approach**: Realsense camera and April tag were used to localize the board and decide where to write a given letter. Force Control at the end-effector was implemented for smoother writing. Paddle-OCR was used to recognize the hand-written guesses. A custom MoveIt library was created to guide the end effector along Cartesian paths via inverse kinematics, calculate feasible joint positions, and simulate an environment for collision avoidance and force control.
  - **Networks used**: Paddle OCR
  - **Tech**: Python, ROS2, Moveit, Realsense
- **Voice Assisted Pick and Place using a Mobile Manipulator** :
  - **Platform**: Kinova Gen 3 lite arm mounted on a mobile jackal base
  - **Objective**: Select object of interest using voice command and perform pick and place using a manipulator arm mounted on a mobile base.
  - **Approach**: The image is taken through a realsense stereo camera and YOLOv5 is used to classify and localize the object in the scene. Then user select the object of intrest through voice command. The Cartesian coordinates are found for the object in the real-world using intrinsic camera parameters. The motion of arm is calculated using RRTConnect and the mobile base taken the object to the specified goal location once the object is grasped.
  - **Networks used**: YOLOv5 to implement object detection
  - **Tech**: Python, PyTorch, ROS, Moveit, Realsense
- **Robotic Grasp Prediction for Selective Objects in a Cluttered Environment using Object Centric Masking**:
  - **Platform**: Collaborative Robot Baxter
  - **Objective**: Perform selective grasping in an cluttered environment, picking object of interest out of multiple objects
  - **Approach**: Implemented an object-centric white masking technique for the isolation of the ROI from the rest of the portion of an image. And developed of a novel center passing algorithm for object-centric pre-processing of the image during grasp prediction.
  - **Networks used**: YOLOv5 to implement object detection and grasp prediction network GR-ConvNet
  - **Tech**: Python, Cuda Toolkit, PyTorch, ROS

Experience

- **Center of Intelligent Robotics, IIITA** — NSF-IHFC Project
  Research Intern — *May 2022 - May 2023*
  - **Project Course - Robotic Grasp Prediction for Selective Objects in a Cluttered Environment using Object Centric Masking**:
- **Yo-machines**
  MLOps intern — *Sep 2021 - Nov 2021*
  - **Project Course - Find clips in a video with the given keyword**: Created project based on speech recognition and finding relevant words from the video
- **Neuroinformatics Group,Universität Bielefeld** — DST DAAD funder project
  Research Intern — *January 2023 - May 2023*
  - **Project Course - Finding Machine Learning solutions for autonomous driving in a simulated environment**:

Publications

- **Presented**: Ananya Agarwal, Vandana Kushwaha, Aditya Singh, G.C. Nandi ,"Robotic Grasp Prediction for Selective Objects in a Cluttered Environment using Object Centric Masking" in UPCON 2023
- **Presented**: Ananya Agarwal, Vandana Kushwaha Rahul Kala, G.C. Nandi ,"Voice Assisted Pick and Place using a Mobile Manipulator for Warehouse Scenarios" in UPCON 2023