

SIDHANT DAS

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EDUCATION

Master of Science

Arizona State University

Research: Effect of Change of Pressure on Human Entrainment leveraging Soft Hip Flexion Assistance Device.

Concentration: Major in Robotics and Autonomous Systems

May 2023

Tempe, AZ

GPA: 3.74 / 4.0

Bachelor of Engineering

Ramaiah Institute of Technology

Project: Development and Analysis of an Autonomous Rotary Sewage Cleaning Robot.

Concentration: Mechanical Engineering

June 2019

Karnataka, India

GPA: 8.75 / 10

TECHNICAL SKILLS

Programming Languages and OS: C/C++ | Python | R | MATLAB/SIMULINK | HTML | JavaScript | Linux

Software: SolidWorks | Autodesk Inventor | Microsoft word | Overleaf | VICON Nexus | ROS

Frameworks: PyTorch | PyBullets | Gazebo | Simscape | OpenAI gym | ExpressJS

Hardware: VICON cameras | Instrumented treadmill | IMUs | Delsys Trigno EMGs | Speedgoat | ESP32 | Arduino UNO

PROFESSIONAL EXPERIENCE

Graduate Research Associate

January 2022 - Present

Neuromuscular Control and Human Robotics Laboratory (ASU)

Tempe, AZ

- Fabricated a custom hip-flexion assistance device with 2 inline pneumatically controllable actuators and performed system integration by taking the 2 robot and more than 6 hardware into the loop.
- Characterized peak output force from 2 actuators to be 118N at maximum pressure of 125kPa using single axis strain gauge.
- Validated the integration by using HiL testing and analyzed force measurements, walking gait patterns, biomechanics data to assess the device's performance on rehabilitation outcomes, providing valuable insights.
- Corroborated the experiment's hypothesis through statistical analysis of data from 15 human subjects (8 male, 7 female) and published the study's findings in TBME journal, making significant contributions to the field of robotic rehabilitation.

Junior Manager(Mechanical Engineer)

September 2019 - December 2020

JSW

Toranagallu, Karnataka/India

- Co-managed a team of 5 engineers and 3 technicians to accomplish installation of 10 vertical rolling mills and 5 conveyor tables while adhering to safety protocols.
- Coordinated with cross functional engineering teams to commission mill zone, validating hydraulic compressors and pumps by integrating with PLC and HMI systems.
- Led the training session for 10 technicians on operating protocol for reducing and sizing mills, pinch rollers, and breakdown mills, ensuring efficient production processes.

ACADEMIC PROJECTS

Human-Robot Interaction Using LBR iiwa KUKA

July 2023 - August 2023

ROS/C++

Tempe, AZ

- Implemented an admittance controller on a real-time KUKA robot to understand and react to human forces using 1 ATI Force-Torque sensor for performing a trajectory following experiments with 10 human subjects.
- Created 1 ROS C++ node that published Force-Torque data from sensor to admittance controller at 1000Hz frequency.
- Tuned the admittance controller parameters to achieve smooth interaction and reduce mean trajectory tracking error by 60%.

Motion Planning and Trajectory Control of LBR iiwa KUKA

June 2023 – July 2023

ROS/C++

Tempe, AZ

- Utilized the MoveIt package and OMPL library achieving a 95% success rate in generating collision-free trajectories (RRT, RRT*, PRM) and performed motion control on a real-time 7 DOF LBR iiwa KUKA robot over TCP/IP communication.
- Implemented Joint Position trajectory control algorithm using ROS control framework by creating 2 C++ scripts and integrating them into gazebo launch file.
- Reduced system setup time by 40% through comprehensive documentation and a Docker image, promoting efficient knowledge sharing within the team.

Ankle Angle Estimation Using Vicon Nexus and DELSYS IMU's

November 2022 - December 2022

MATLAB/SIMULINK

Tempe, AZ

- Built a linear Kalman filter employing 3 IMUs and 6 pearl markers to predict ankle angle while walking.
- Tuned covariance matrix of the Kalman filter to acquire ankle angles with MAE of 0.1 when compared against Vicon results.

Speech-to-Image

August 2022 - December 2022

Python

Tempe, AZ

- Integrated speech-to-text API with latent diffusion model to generate 10 different images from a speech prompt.
- Fine-tuned network weights to generate image from a custom dataset of 30 images of size 256x256 pixels using PyTorch.
- Achieved training loss of 0.03 after 2000 steps of training with a learning rate of 1e-06 on RTX 3090 system.