

Subham Swastik Samal

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Education

Master of Science in Mechanical Engineering

GPA – 3.91/4

Graduate Certificate in Data Analytics

GPA – 4.00/4

Virginia Polytechnic Institute and State University (Virginia Tech)

Jun 2024 (anticipated)

Bachelor of Technology in Mechanical Engineering

May 2020

Indian Institute of Technology Madras

GPA – 8.29/10

Skills and Relevant Coursework

Programming C++, Python, MATLAB, and Simulink,

Tools/Softwares Linux, Git, ROS2, LabVIEW, Raspberry Pi, PTC Creo, SolidWorks, AutoCAD, ANSYS, ADAMS

Courses Mechatronics Systems, Multibody Dynamics, Advanced Instrumentation, Computer Vision, Deep Learning

MPC for Agile Robots, Applied Linear Systems, Guidance of Autonomous Vehicles

Publications

- Subham Samal, Oumar Barry. *Exploring Deep Learning Models for Pathological Tremors Prediction Using EMG and Kinematic Measurements*. ASME 2024 IDETC-CIE 2024 (**Submitted for review**)
- Subham Samal, Oumar Barry. *Model Predictive Control for Tremor Suppressing Exoskeleton*. Modeling, Estimation and Control Conference, 2023

Professional Experience

Graduate Research Assistant, Vibrations and Robotics Lab, Virginia Tech

Sep 2022 - Present

- Developed a **CNN-LSTM** framework for the modeling of pathological tremors using EMG signals and IMU sensor data aimed at designing improved rehabilitation devices
- Formulated the **kinematics and dynamics** of a 6 DOF wearable exoskeleton system, and implemented a **Model Predictive Controller** for trajectory tracking and tremor alleviation
- Currently performing experimentations using a **ROS2** framework to test **feasibility for real-time** applications

Assistant Manager (Analytics), BGMH Supply Planning, Flipkart Pvt Ltd, Bengaluru, India

Aug 2020 – Aug 2022

- **Led a team of 4** and collaborated with diverse internal teams to **develop Machine Learning models** for analyzing and extracting insights from large amounts of data, leading to **scale-up of hyperlocal business by 87%**
- Built and owned **automated reporting** using **SQL, Power BI, and Google Data Studio** to track and provide insights on supply KPIs, saving the team **10 hours** of weekly manual labour

Summer Intern, CMS Engineering Unit, CERN, Geneva

May 2018 – Jul 2018

- Instrumented a CO₂-based cooling system aimed to **improve the cooling efficiency** in the CMS Outer Tracker
- Programmed a **DAQ system** to collect the sensor readings using LabVIEW, and calibrated the sensors using regression
- Performed **experimentations** and detailed thermal analysis to validate the simulations of the cooling system

Projects

Mobile Robot: Simulation and SLAM | ROS2, C++, AMCL, Gazebo, RViz

- Simulated a ball-chasing differential-drive robot, detection via colors in OpenCV. Designed URDF of the robot and arena
- Implemented localization using AMCL, deployed SLAM and Navigation to simulate obstacle avoidance operation

Cyclic Knee-Testing Mechanism (Bachelors' Thesis) | PTC Creo, ANSYS, ADAMS, MATLAB

- Conceptualized, designed and manufactured a crank rocker-based mechanism to simulate the swing phase knee joint movement of a walking gait cycle to test the life cycles of polycentric prosthetic knee joints
- Analysed the kinematics and dynamics using MATLAB, validated in ADAMS, and performed fatigue failure analysis in ANSYS
- Selected and installed the appropriate industrial components, i.e. encoders, motor, gearbox, bearings, fasteners, etc.
- One of the 4 finalists nominated for the best Inter-Disciplinary Bachelors Thesis Project

Autonomous Farming Bot (I-Bot Club, IIT Madras) | SolidWorks, ANSYS, Raspberry Pi

- Ideated and designed a bot to perform basic agricultural processes like soil preparation, sowing and seed firming
- Designed various components of the robot, chose all the hardware like the microcontroller, sensors, and actuators, and presented the assembled bot in an annual Open House event

Self-Balancing Cycle | MATLAB, Arduino, PID Control

- Conceived the design and manufactured the chassis and flywheel of the self-balancing bicycle
- Analysed the dynamics of the closed loop system in Simulink and implemented PID control systems by installing Arduino controllers, motor drivers and MPU 6050 sensor

Projection Mapping (Team Envisage, IIT Madras) | Blender, Kinect, Control Systems

- Spatially mapped 2D videos on to a manufactured 3D environment using surface maps, thus creating an augmented reality
- Created a virtual environment in tune with audio and human interaction to give illusions of depth and motion, using an IR Sensor based feedback control system for positioning accuracy