Subham Swastik Samal

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Education

Master of Science in Mechanical Engineering *(Robotics Specialization)*   **Dec 2024**
Virginia Polytechnic Institute and State University (Virginia Tech)   *GPA – 3.88/4*
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, ANSYS, ADAMS

Courses   MPC for Agile Robots, Modern Control Theory, Guidance of Autonomous Vehicles, Applied Linear Systems, Mechatronics Systems, Robotics, Advanced Instrumentation, Deep Learning

Publications

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

Experience

Robotics Test Engineer Co-op, *SharkNinja, Needham, Massachusetts*   *Jun 2024 - Present*
- Developing **Computer Vision based automation** methods for product-testing protocols for floorcare and haircare products
- Implemented the pipeline for **remote control and data acquisition** of a 6-DOF Robot Arm for 3 different testing protocols

Graduate Research Assistant, *Vibrations and Robotics Lab, Virginia Tech*   *Jan 2023 – May 2024*
- Developed a **CNN-LSTM** framework for the modeling of pathological tremors using EMG signals and accelerometer sensor data aimed at designing improved rehabilitation devices, resulting in **16% increase in accuracy**
- Formulated the nonlinear dynamics and generated 3D simulations of a 6 DOF exoskeleton system using **Object-oriented programming**, and implemented a **Model Predictive Controller** for trajectory tracking and tremor alleviation

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 CO_2-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

Design of MPC for Gait Planning of Unitree A1 Quadrupedal Robot | *MATLAB, Optimal Control*
- Implemented event-based MPC to achieve trot gait for front and lateral walking based on reduced order LIP model of the quadruped using MATLAB (benchmarked IEEE RAL paper)
- Extended the trot gait to pace gait by tuning the MPC based on SRB reduced order model

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, Feedback Control*
- Spatially mapped 2D videos onto a 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

Kalman Filtering and Sensor Fusion | *Sensor Fusion, C++*
- Implemented and compared Linear, Extended, and Unscented Kalman Filters to estimate the navigation state of a 2D vehicle using simulated GPS, LIDAR, and Gyroscope sensors

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