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HARSH SANMOTRA

SKILLS

Coding | Proficient in Python and C++ • Register Level Programming (Machine Level Coding) • MATLAB • CodeSys

Software | ROS1 and ROS2 (Rqt, Naviagation Stack, Control Stack) • Simulink • CATIA • SolidWorks • Altair HyperWorks

Control System Engineering | Model-based Design • Control Engineering (PID and MPC Implementation)

Hardware| Arduino

EDUCATION

Master of Engineering – Mechanical Engineering (*Industrial Control System Specialization*) *Sept 2021- April 2023*
Concordia University, Montreal, QC CGPAP – 3.6

- Relevant Courses: Microcontrollers in Mechatronics, Industrial Automation, Robotics Kinematics and Dynamics, Design of Industrial Control Systems, Numerically Controlled Machines, Advance CAD.
- Completed Course on Autonomous Robotic Systems: Natural Sciences and Engineering Research Council of Canada.
- Robotics Space Concordia – Autonomy Team Member

Bachelor of Engineering – Mechanical Engineering (Majors in Mechatronics) *July 2014-May 2018*
Punjabi University, India

- Capstone Project – Developed process and hardware to control the Precision Machining Lathe for producing mirrors and lenses for Avionic HUD Display at CSIR – Central Scientific Instruments Organisation (CSIO) India
- Relevant Courses – CAD, Dynamics of Machine, PLC Programming, C++, Robotics, Vibrations,
- Scored 1st division.

WORK EXPERIENCE

SpaceConcordia Robotics Team Member *Jan 2023 – Present*
Concordia University

- Building Rover for CIRC 2023
- Supporting autonomy team in navigation and object avoidance tasks.
- Developing control interface for rover in RQt and migrating the ROS1 code to ROS2

Avionics System Engineer Intern *Jan 2023 – April 2023*
Airbus Canada

- Facilitated certification and testing process of avionics systems to ensure the safety and airworthiness of the aircraft.
- Reviewing engineering documents and provided feedback on behalf of the avionics team ensuring their validity.
- Wrote 7 Flight Functionality Test procedures used by test pilots prior to aircraft delivery to the customer.

Junior Manager – R&D Suspension System Engineer *Aug 2018 – Aug 2021*
SML ISUZU, Chandigarh, India

- Supporting electric vehicle systems and control development and coordinating real time testing in bench and vehicle.
- Control and software development using Model Based Design (MBD) for suspension control.
- Development and validation of physics-based vehicle behavioral/Plant model development.
- Coordinated development and testing of Vehicle diagnostic System, Vehicle Telemetry Modules, Driver-cabin infotainment system and controls specifications.
- Coordinated with supplier for development of parts during prototyping phase.
- Prepare and compile DFMEA reports.

PROJECTS

Obstacle Avoidance using Navigation Stack in ROS – The Construct Project *April 2022*
Implemented an obstacle avoidance algorithm for a mobile robot that can navigate through a cluttered environment without colliding with any obstacles. Completed entire project in C++.
Skills – C++, ROS, Navigation

Cruise, Traction and Braking Control using single-board ATMEL Microcontroller *April 2022*
Designed different controllers to control a car's braking, traction and speed and successfully tested controllers using a HIL racing car simulator.
Skills – C++, Register Level Programming, MPC, Adaptive Control System, Hardware in Loop Simulation

Computer Vision Based Robot Defense and Attack *April 2022*
Developed an Arduino-based robot and used computer vision to detect the opponent's robot position and programmed attacking and defense strategy.
Skills – Python, OpenCV, Path Planning, Arduino

Semi-Active Suspension System using Classical Control Theories *Dec 2021*
Developed PID-based semi-active suspension system for a Jeep and tested model by simulating various road conditions.
Skills – Matlab, Simulink, PID, Stateflow

Design and Analysis of In-Pipe Inspection Robot *Dec 2021*
Designed successfully an In-Pipe inspection robot. We used Catia V5 and Ansys to design and simulate the robot's assembly, respectively, and 3D printing to print the parts.
Skills – CATIA V5, Ansys

SAEINDIA SUPRA Formula Racing *Sept 2017*
Our team developed a racing vehicle for competition. Led the Suspension Department and CAD modelling department. Our team rose 23 from last year to end at 22nd in the final ranking.
Skills – SolidWorks, ANSYS, Manufacturing Processes, Product Designing, MATLAB

SAEINDIA BAJA Off-Road Racing *April 2017*
Our team developed an offroad racing vehicle for competition. I designed a Pitman Steering system for the project vehicle. Reduced the wheelbase by 48 mm by altering the driver's sitting position.
Skills – SolidWorks, ANSYS, Manufacturing Processes, Product Designing, MATLAB

CERTIFICATIONS

ROS Basis in 5 days (C++) – The Construct

ROS Navigation in 5 days – The Construct

ROS Basics in 5 days (Python) – The Construct

Autonomous Robotics Systems - CREATE Program by Natural Sciences and Engineering Research Council of Canada

Applied Control Systems 1: autonomous cars: Math + PID + MPC (Udemy)

ROS for Beginners: Basics, Motion, and OpenCV (Udemy)

Functional Programming with C++

C++ Programming -Beginner to Advance (Udemy)

2021 Complete Python Bootcamp from Zero to Hero in Python (Udemy)