Hardik Gossain

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WORK EXPERIENCE:

Freelance Developer **Nov 2023 - Present**

Remote

- Established AWS infrastructure to record and analyze IoT data, leveraging Lambda, S3, and API Gateway for seamless data processing for a startup.
- Engineered multiple path planning algorithms for robots on a grid-based map, collaborating with a PhD researcher to deliver a robust solution.

Production Associate – DENSO **Aug 2023-Nov 2023**

Guelph, Ontario, Canada

- Calibrated various machines, such as manipulators, to maintain precision in manufacturing HVAC systems parts.
- Conducted thorough quality checks involving both physical and electrical assessments.
- Collaborated with team members to ensure timely completion of targets and upheld exceptional quality standards.

Software Engineering Intern - Aerogram Private Limited **Jan 2020-Aug 2020**

Indian Institute of Technology, New Delhi, India.

- Worked on pollution monitoring product launched in Delhi.
- Applied FreeRTOS on STM32 to collect data from sensors like accelerometer, gyroscope, PM2.5
- Designed PCB using Eagle for STM32 and onboard sensors.
- Used protocols like I^2C, CAN, SPI, UART for communication between sensors, STM32 and Raspberry Pi
- Performed Unit testing, Integration Testing and Hardware testing before deployment of the device.

EDUCATION:

Master of Engineering in Electrical and Computer Engineering **Sept 2021-Dec 2022**

University of Waterloo, Waterloo, ON, Canada

- Overall GPA: 8.4/10
- Relevant Courses: Multivariable Control Systems, Social Robotics, Robot Dynamics and Control, Intelligent Sensors, and Sensor Networks

Bachelor of Engineering, Electronics and Communication Engineering Aug 2017-Sept 2021

ADGITM (formerly NIEC), GGSIPU University, New Delhi, India

- Overall CGPA: 8.6/10
- Relevant Courses: Embedded Systems, DSP, Digital Electronics, Data Structures, Microcontrollers

SKILLS:

Programming Languages: Python, C, C++

Operating Systems: Windows, Ubuntu, Raspbian OS

Tools: Git, MATLAB, VREP, Gazebo, Rviz, Atmel Studio, Solid Works, Eagle, AWS, TCP/IP

Technologies: IoT, WSN, STM32, ROS, SLAM, I2C, CAN, UART, Ethernet, TCP/IP, Real Time Operating Systems

PROJECTS:

Modelling and Dynamics of 5 DOF Manipulator **May 2022-Aug 2022**

University of Waterloo

- Denavit–Hartenberg parameters were used to model the KUKA-YOU Bot on MATLAB and Simulink
- Applied Forward kinematics, Inverse Kinematics, Force Dynamics, path planning and optimization to make the robot perform pick and place operations.
- Used python and OpenCV for performing object detection and Motion Control.

Mathematical Controller for Under-Actuated Mobile Robot **Sept 2021-Nov 2021**

University of Waterloo

- Made a state-space model of the two wheeled robot and applied LQR and PID individually on it.
- Designed both the controllers using linear algebra on MATLAB and compared the results using graphical output.
- Simulated the controllers to stabilize the robot at a set point and concluded that LQR worked better for the robot.

Autonomous Dynamic Navigation using ROS **Sept 2020-Dec 2020**

ADGITM (formerly NIEC), GGSIPU University

- Implemented SLAM-based mobile robot with LIDAR sensor for arena mapping.
- Used A* algorithm for shortest path navigation.
- Leveraged ROS and gmapping package for successful task completion.

RESEARCH EXPERIENCE:

[1] Gossain, H., Sharma, B., Jain, R., Garg, J. (2022). **Multi Robot Environment Exploration Using Swarm**. In: Piuri, V., Shaw, R.N., Ghosh, A., Islam, R. (eds) AI and IoT for Smart City Applications. Studies in Computational Intelligence, vol 1002. Springer, Singapore. https://doi.org/10.1007/978-981-16-7498-3_11

[2] Hardik Gossain, Sumnit Singh Gulshan, Avneet Kaur Batra, Atul Kumar Mishra, "**LOW-COST SECURITY SYSTEM WITH FEEDBACK CONTROL LOOP**", International Journal of Creative Research Thoughts (IJCRT), ISSN:2320-2882, Volume.8, Issue 12, pp.14-18, December 2020, Available at: http://www.ijcrt.org/papers/IJCRT2012003.pdf

[3] Hardik Gossain, Bhavya Sharma, "**MOBILE ROBOT NAVIGATION AND MAPPING USING OPTICAL ENCODERS**", International Journal of Creative Research Thoughts (IJCRT), ISSN:2320-2882, Volume.8, Issue 7, pp.254-258, July 2020, Available at: http://www.ijcrt.org/papers/IJCRT2007036.pdf

ACHIEVEMENTS / EXTRACURRICULAR:

Tata Crucible Hackathon

2020 || Winner at North Zone Finals

- Developed a two-wheeler safety solution with features like automatic SOS trigger, blind-spot detection, and indicator syncing with Google Maps.

Smart India Hackathon

2019 || IIT Kharagpur, India

- Developed IoT-based asset tracking solution for the Ministry of Coal (India) using MQTT protocol.

Bosch Hackathon

2019 || IIT Guwahati, India

- Created a car fitness tracking solution with accident detection, prevention features, and haptic feedback for blind spots.

President of Robotics Club

Sept 2020 - Aug 2021 || ADGITM (formerly NIEC), GGSIPU University, New Delhi, India

- Managed 100+ students, organized workshops, and led teams to win various hackathons and competitions.