Adesh Grewal

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Career Objective

I am an enthusiastic and self-driven professional with a Master's Degree in Robotics Engineering and four years of hands-on experience in designing and building robots, from hobby projects to advanced coursework. My work has included simulating robot arms, land surveying, cave exploration projects, and developing a robotic arm for Guide Dogs Australia, with a focus on human-robot interaction to help replace traditional guide dogs with robotic alternatives. I have also led and contributed to projects for multiple motorsports teams in SAE competitions. My expertise covers autonomous systems integration, real-time control, multi-sensor fusion, mechanical design, electromechanical systems, and simulations. I have demonstrated the ability to lead cross-functional teams and deploy robotics platforms in challenging environments. I am passionate about field robotics, robotic exploration, and human-robot interaction, and I look forward to applying my skills and talent to turn the vision of robotics into reality.

Core Skills

- Programming: C++, Python, MATLAB, Embedded C (STM32, Arduino)
- Frameworks/Tools: ROS/ROS2, URDF, RViz, OpenCV, YOLOv11, Git
- Robotics Systems: SLAM, Motion Planning (A*, PRM, Dijkstra), PID, Sensor Fusion
- Hardware Platforms: Boston Dynamics Spot, Cube Mars, Robot Arm, STM32, RealSense D-435i
- CAD & Simulation: SolidWorks, FEA, Sim Centre, Gazebo
- Soft Skills: Team Leadership, Cross-disciplinary Collaboration, Field Testing, Research Publication, Problem solving, analytical.

Education

Master of Professional Engineering (Robotics)
University of Technology Sydney (UTS) — GPA: 7.9/10 Aug 2023 – June 2025
Graduate Project: Robotic Arm-Equipped Guide Dog for the Visually Impaired
Key Study Areas: Robot Exploration, Robot Control, Simulations, Project Management, Risk Assessment

Bachelor of Mechanical Engineering
UIET, Panjab University — GPA: 7.25/10 Aug 2018 – July 2022
Graduate Project: Autonomous Fixed Delta-Wing UAV for Aerial Surveillance

Selected Projects & Experience

Graduate Project – Assistive Robotics (Spot Integration) *May 2025*

- Developed **3-DOF robotic arm** integrated with Boston Dynamics' Spot for assistive guidance for **Guide Dogs Australia Association**.
- Used capstan-tendon actuation for **lightweight** and **compliant** HRI interaction.
- Led **end-to-end system design**: SolidWorks + FEA, workspace optimisation (MATLAB), custom URDF, PID tuning (ROS2).
- Conducted HIL testing with Spot, validating reachability, safety, and back-drivability.

UTS Motorsports Autonomous – Mechanical Systems Lead *Feb 2024 – Jan 2025*

- Led 8-member mechanical team, enabling autonomous conversion of a race car platform.
- Designed dual-mode pedal box and Ackermann steering; achieved sub-3s system latency.

- Collaborated closely with electrical/software teams for full autonomous stack integration.

Robotics Studio – Vision-Based Manipulation *Dec 2024*

- Programmed Robot Arm for image-guided **pick-and-place** using **eye-to-hand** calibration.
- Integrated RGBD sensors, tag detection, and OpenCV for **visual servoing**.

Space Robotics – Autonomous Navigation in Unstructured Terrain *Dec 2024*

- Implemented A*, Dijkstra, PRM and frontier **exploration** for planetary-like simulation.
- Integrated YOLOv11 with LIDAR and RGBD data for **perception**.
- Fused LIDAR, IMU, and camera data for navigation and object detection.
- Full ROS stack simulation in Gazebo using Python and ROS1.

Programming for Mechatronics Systems- Multi-robot collaboration, Land surveying *May 2025*

- Developed C++ ROS2 control stacks for quadcopter, Ackermann, and skid-steer robots.
- Used threading for multi-agent architecture and efficient resource management.

Research & Industry Experience

Engineering Researcher – Acoustic Materials

UTS Botany Bay | Oct 2023 – Nov 2024

- Laser vibrometer experiments on damping materials; mode shape analysis using Sim Centre.
- Investigated structural response and tested material for acoustic insulation.

Graduate Trainee – Shot Blasting Optimisation

Mahindra & Mahindra, Swaraj | Jul – Sep 2022

- Improved shot-blasting efficiency by analysing consumable usage.

Engineering Research Intern – Embedded Sensors

NTU & Panjab University | Jun 2021 – Feb 2022

- Designed 3D-printed RF sensors using recycled plastic blends.
- Investigated dielectric property variations and their effect on antenna gain.
- Publication: Springer Journal (RF-Based 3D-Printed Sensors). https://link.springer.com/article/10.1007/s12046-022-01992-2

Additional Projects

- Autonomous Delta-Wing UAV *(Mar 2022)* – Designed and fabricated an autonomous surveillance drone with GPS waypoint tracking and gyro-stabilised flight.
- National Electric Kart Championship (NEKC 3.0) *(Mar 2020)* – Led mechanical design for winning team; focused on ergonomics and responsive steering.
- Auto India Racing Championship (AIRC) *(Feb 2020)* – Contributed to chassis design and steering optimisation; team placed 16th nationally.

Leadership & Volunteering

- Well-being Representative, Activate UTS (Nov 2023 – Dec 2024)
- Executive Member, SJOBA Alumni Association (May 2018 – July 2023)

References

Dr. Marc Carmicheal – UTS – Robotics Institute- Marc.Carmichael@uts.edu.au
Dr. Can Nerse – UTS Tech labs - Can.Nerse@uts.edu.au
Ellie – Al Aseel Parramatta Manger - Casual work – 0424-488-222