

An Indian-Australian research partnership

Project Title:	Autonomous on-road Driving	
Project Number	IMURA0922	
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Research Clusters:

Research Themes:

Highlight which of the Academy's CLUSTERS this project will address? <i>(Please nominate JUST one. For more information, see www.iitbmonash.org)</i>		Highlight which of the Academy's Theme(s) this project will address? <i>(Feel free to nominate more than one. For more information, see www.iitbmonash.org)</i>	
1	Material Science/Engineering (including Nano, Metallurgy)	1	Advanced computational engineering, simulation and manufacture
2	Energy, Green Chem, Chemistry, Catalysis, Reaction Eng	2	
3	Math, CFD, Modelling, Manufacturing	3	Infrastructure Engineering
4	CSE, IT, Optimisation, Data, Sensors, Systems, Signal Processing, Control	4	Clean Energy
5	Earth Sciences and Civil Engineering (Geo, Water, Climate)	5	Water
6	Bio, Stem Cells, Bio Chem, Pharma, Food	6	Nanotechnology
7	Semi-Conductors, Optics, Photonics, Networks, Telecom, Power Eng	7	Biotechnology and Stem Cell Research
8	HSS, Design, Management	8	Humanities and social sciences Design

The research problem

Self-driving cars are becoming reality day-by-day. There are various aspects of research involved in developing such a vehicle - perception, hardware, control, intelligence - to name a few. This project will address the intelligence required to drive on-road autonomously. It will assume that sensors are available to perceive the surrounding, including other vehicles and pedestrians on the road. Based on the perception, the vehicle will decide its path so that it can reach its destination without violating any traffic rules and avoiding all possible collisions.

Project aims

The project aims to develop an algorithm for autonomous on-road driving. The algorithm will take the sensor data as inputs and will generate the steering command and forward velocity of the car as output. It

will take into account the traffic rules and plan the path, ensuring a collision-free movement. The algorithm will be developed on simulated platforms, and it will be tested in the controlled-laboratory environment.

Expected outcomes

- A feasible and real-time implementable strategy in the form of an algorithm which can be implemented on a car for autonomous on-road driving.
- A couple of peer-reviewed journal publications.

How will the project address the Goals of the above Themes?

Since the project involves the development of an algorithm that addresses the intelligence required to drive on the road with other vehicles and pedestrians, it certainly falls in the advance computational engineering domain.

Capabilities and Degrees Required

List the ideal set of capabilities that a student should have for this project. Be as specific or as general as you like. These capabilities will be input into the online application form and students who opt for this project will be required to show that they can demonstrate these capabilities.

Necessary:

- Knowledge of modern control theory.
- Experience with algorithm development.

Desirable:

- Knowledge of ROS

Select up to **(4)** keywords from the Academy's approved keyword list (**available at <http://www.iitbmonash.org/becoming-a-research-supervisor/>**) relating to this project to make it easier for the students to apply.

Robotics