



Machine Learning in STEM

For Years 9-10

A 25 hour unit for IST

Our **Machine Learning course** utilises the latest in hardware and software

(Python & Raspberry Pi 4).

The course emphasizes critical thinking & problem solving skills throughout whilst building a self-drive car from scratch against a backdrop of the problem of future transport in our community.

Learning objectives Self driving car



Develop familiarity with simple **computer vision problems**

Students will learn how to apply simple algorithms and a neural network to drive actions (e.G. Stop) and Predict steering angles.



Improve **programming competency**

Python is an easy language to learn. Using python & cloud technologies **eg.** Google colab, students will develop & test solutions.



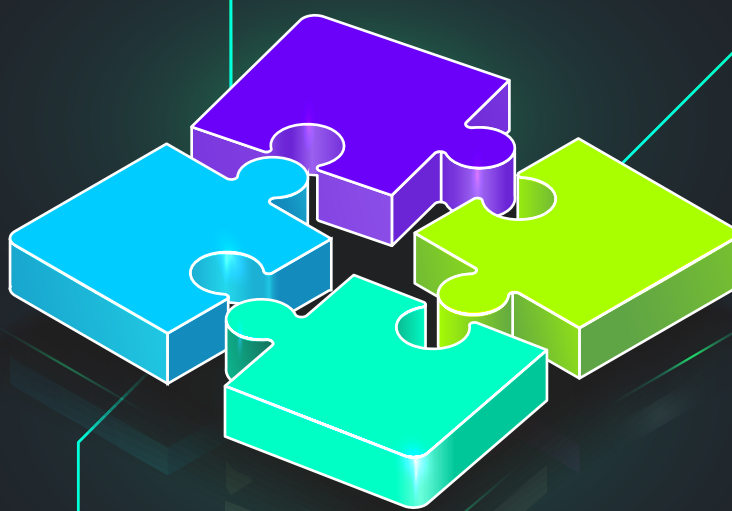
Understand how to **connect software and hardware**

Apply, modify & create algorithms to drive actions.



• **Multidisciplinary**

Students will further develop general capabilities from a range of syllabuses **eg.** Statistical techniques (numeracy)



Course breakdown

Self driving car



Software

WEEK
1

- How does a computer 'see' ? (Exercises & problem sets)
- Overview of architecture and systems design for the problem.

WEEK
2

- Develop code for trafficlight-stopping algorithm.
- Establish criteria for success.

WEEK
3

- Test and evaluate accuracy of traffic light-stopping algorithm.
- Develop potential enhancements to the algorithm (e.g. dataset augmentation)

WEEK
4

- Develop Algorithm for steering angle prediction. **(Part 1)**

WEEK
5

- Develop Algorithm for steering angle prediction. **(Part 2)**

WEEK
6

- Enhance/Augment Algorithm for steering angle prediction. | Develop & enhance steering performance code. **(Part 1)**

WEEK
7

- Enhance/Augment Algorithm for steering angle prediction. | Develop & enhance steering performance code. **(Part 1)**

WEEK
8

- Test & Evaluate integrated systems.

WEEK
9

- Make modifications.

WEEK
10

- Final evaluation of system (car) against set criteria.
- Score participants & determine final ranking.



Hardware

- Commence build of car platform.

- Integrate Camera onto platform.
- Set up environment for Raspberry Pi.

- Finish car build with camera attached.

- Integrate traffic light-stopping algorithm into car and test effectiveness with model traffic lights.
- Explore systems programming to make the car stop smoothly.

- Continue exploration.

- Integrate Algorithm for steering angle prediction. | Systems testing. **(Part 1)**

- Integrate Algorithm for steering angle prediction. | Systems testing. **(Part 1)**

- Test & Evaluate integrated systems.

- Make modifications.

- Test & Evaluate systems.
- Score participants & determine final ranking.



**NEXGEN
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For further info & pricing plans.

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