# Manchester Robotics / Tecnológico de Monterrey

# TE3002B: Implementation of Intelligent Robotics

## Introduction

This course, developed by Manchester Robotics ltd. (MCR2), introduces the basic concepts and general knowledge of the ROS environment to the user.

This course is divided into ten sessions, carefully designed for the user to learn about the different aspects of robotics, from navigation techniques to advanced image recognition and Machine Learning implementation using the Puzzlebot and ROS.

This course will be based on challenges to make the student aware of the problems faced during the implementation of advanced intelligent algorithms in robotics.

## General Information

* MCR2 Person in Charge: Mario Martinez
* Tecnológico de Monterrey Person in Charge: TBD
* Duration 10 Weeks.
* Office hours: TBD. GitHub/Email/Custom (if necessary).
* Weekly Briefings: Tuesdays 8AM (Mexico Time)
* Starting: March 27th .
* Ends: June 12TH.
* Requirements:
  + Computer with access to Zoom (online classes).
  + Computer with Ubuntu 22.04 and ROS Humble.
  + Knowledge of Windows.
  + Knowledge of ROS.
  + Basic knowledge of Ubuntu (recommended).
  + Basic understanding of robotics (recommended).
  + Access to a MCR2 Puzzlebot Jetson Edition.
* Student Demographic: Monterrey TBD, CDMX TBD, Occident Region TBD, Centro-Sur Region TBD
* Number of Professors: TBD
* Grading: Minimum Requirements by MCR2, Professor Determined.
* Deliverables: Each professor determines.
* Final Challenge Deliverable: Final Video (Best of each campus). Explain.
* Rubric: Minimum Requirements (Each professor determines the rubric).
* ZOOM Link Classes: https://itesm.zoom.us/j/82276178487?pwd=qc6KexTmQlcCcEJw8C2hLUfWFFNlR5.1
* Meeting ID: 822 7617 8487
* Passcode: MCR2
* Student GitHub Link: [ManchesterRoboticsLtd/TE3002B\_Intelligent\_Robotics\_Implementation\_2025: Intelligent Robotics Implementation](https://github.com/ManchesterRoboticsLtd/TE3002B_Intelligent_Robotics_Implementation_2025)

## Week 1

### Session

This week the student will learn to basics of mobile robotics.

* Introduction to mobile robotics.
* Puzzlebot
* Robot assembly
* Image installation
* Hackerboard firmware

## Week 2

### Session

This week will introduce some basics of open loop control for mobile robotics.

* Open Loop Robot Control of the Puzzlebot (Theory/Activity)
* Activity:
  + Simple Control.
* Mini challenge:
  + Multi point navigation with open Loop control.

## Week 3

### Session

This week will be dedicated to the closed loop control in robotics.

* Localization: odometry
* Closed Loop Control
* Point to point navigation.
* Activity:
  + Simple Control.
* Mini challenge:
  + Multi point navigation with open Loop control.

## Week 4

### Session

This week will be dedicated to the usage of OpenCV for robotics.

* OpenCV introduction and outline
* Interfacing with camera.
* Image filtering and preprocessing

Half-Term challenge:

* Multiple point navigation with image identification.

## Week 5

### Session

* Half-Term Challenge.

## Week 6

### Session

* Open CV: Line Following algorithms.
* Activity:
  + Simple Line Detection
* Mini challenge:
  + Puzzlebot Line Following.

## Week 7

### Session

This week is dedicated to the implementation of Neural Networks for robotics.

### Introduction to neural networks

### YOLO

### Remote testing of the NN

* Mini challenge:
  + Deploy a CNN into a ROS to perform image classification.

## Week 8

### Session

* MCR2/NVIDIA/Tec de Monterrey Challenge
* Challenge Q&A

## Week 9

### Session

* Challenge Q&A

## Week 10

### Session

* Evaluation