

*{Learn, Create, Innovate};*

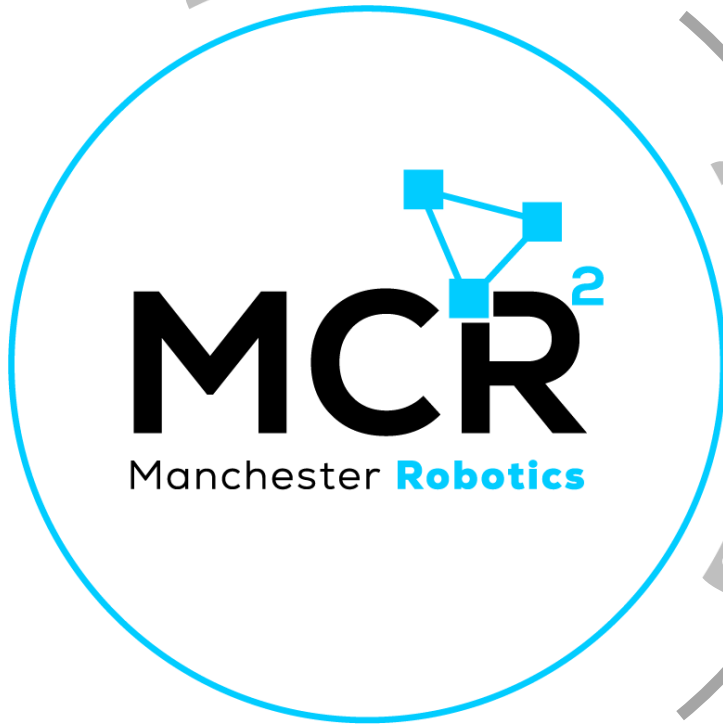
# The Puzzlebot

*Introduction*

MCR<sup>2</sup>

Manchester **Robotics**

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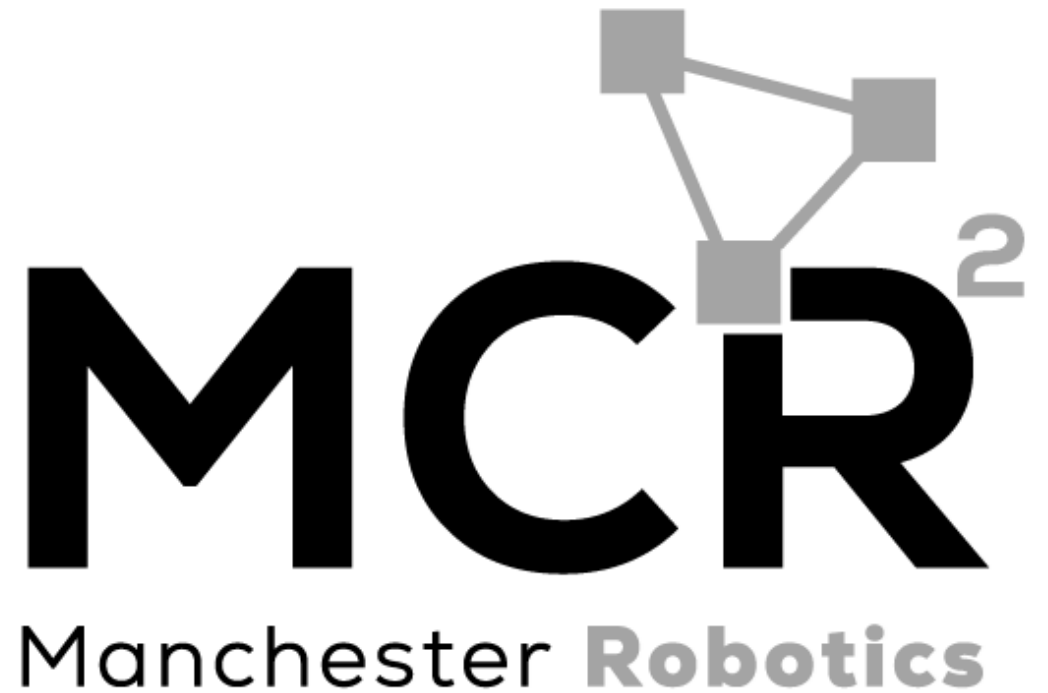
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Property of  
Robot

# Puzzlebot

*What is the Puzzlebot?*

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# Puzzlebot



- A flexible, low-cost platform that can be developed by the user and become “smarter”.
- The Puzzlebot was born as an answer to the concept of robotic democratisation.
- The governing philosophy is that customers are motivated to learn robotics by the appeal of advanced features, which offers far more value than over-simplified proxies with high cost, and limited utility.

# Puzzlebot

“For us, robotic democratisation is not a concept... it's our way of thinking, working... being.”

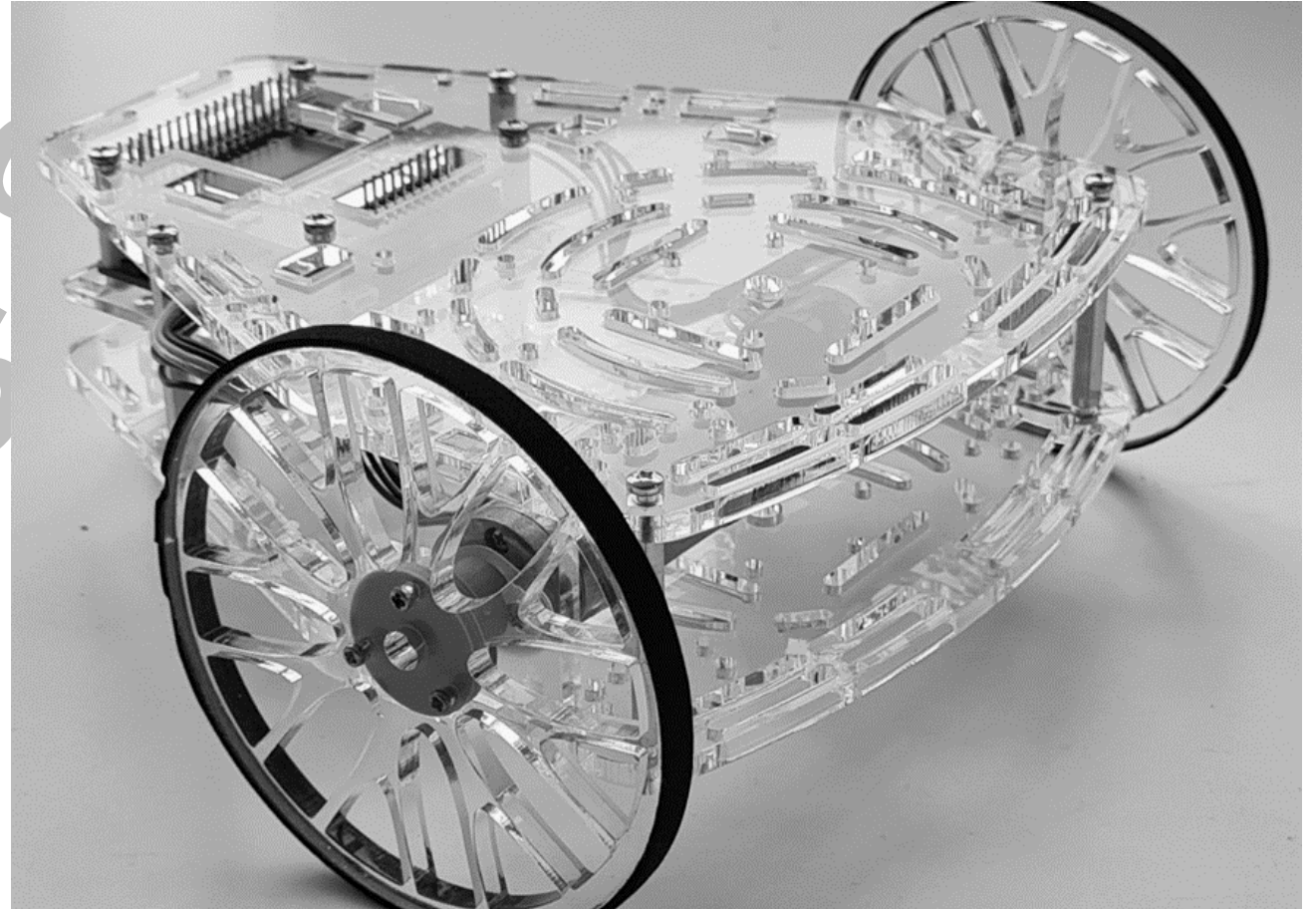
Professor Constantinos Soutis, Director



# Puzzlebot



- Puzzlebot is a universal tool for robotics, to help others learn, create, and innovate their own robotic projects.
- The Puzzlebot is a cross-platform, open-source, plug-and-play mobile robot.
- Capable of accommodating 3rd party off-the-shelf components, keeping unit costs low and education available to everyone, thereby democratising access.

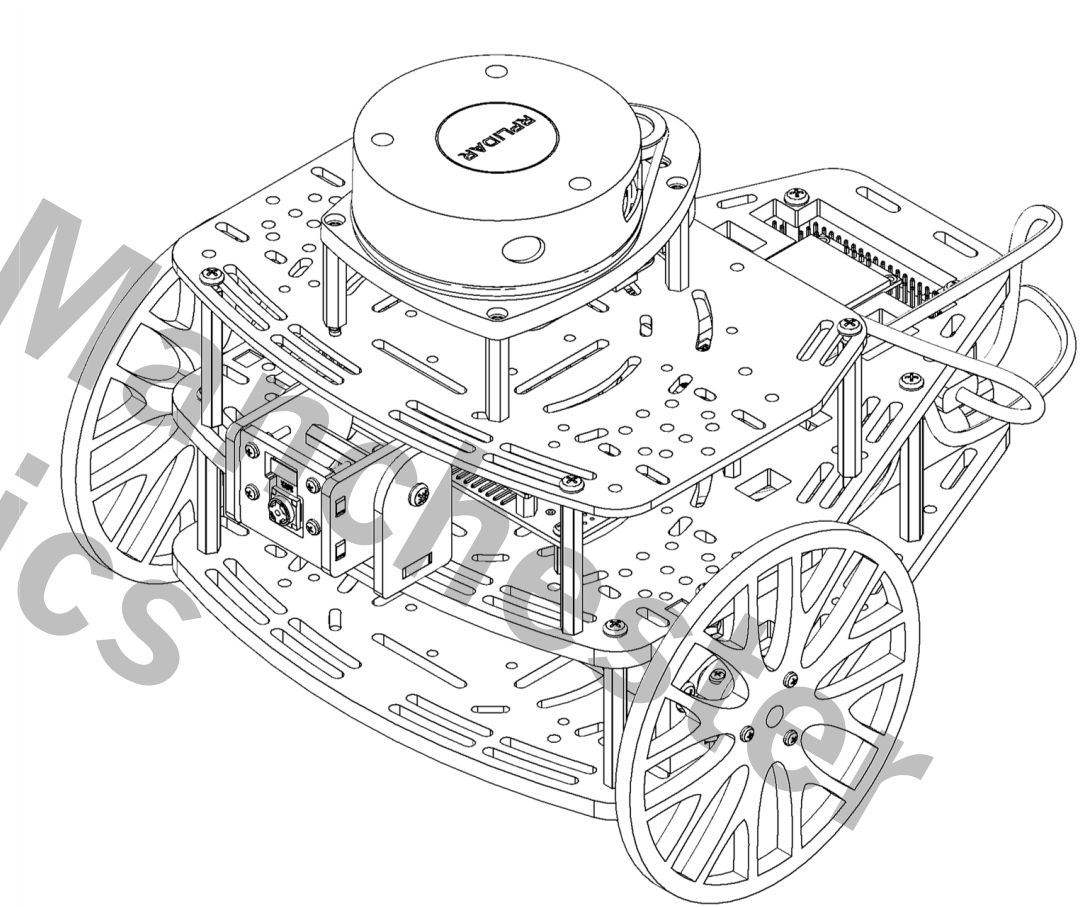


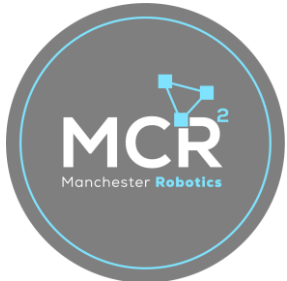


# Puzzlebot



- Programed in different languages, catering to learner's preferred starting languages.
- Provides continuity from entry-level access to research-level functionality ensuring learners to focus on progressing skills rather than having to constantly switch between robotics platforms.



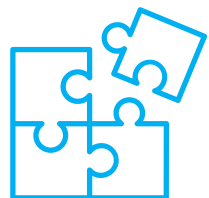


# What makes us different?



## Advanced Capability

The circuit board is designed around powerful microprocessors and microcontrollers.

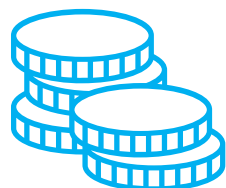
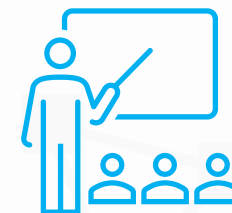


## Versatile Feature-set

Our circuit board and software are designed to be versatile to accommodate add-on components.

## Basic to Advanced Courses

Basic to advanced robotics courses developed alongside our partnership with NVIDIA



## Accessible Price Point

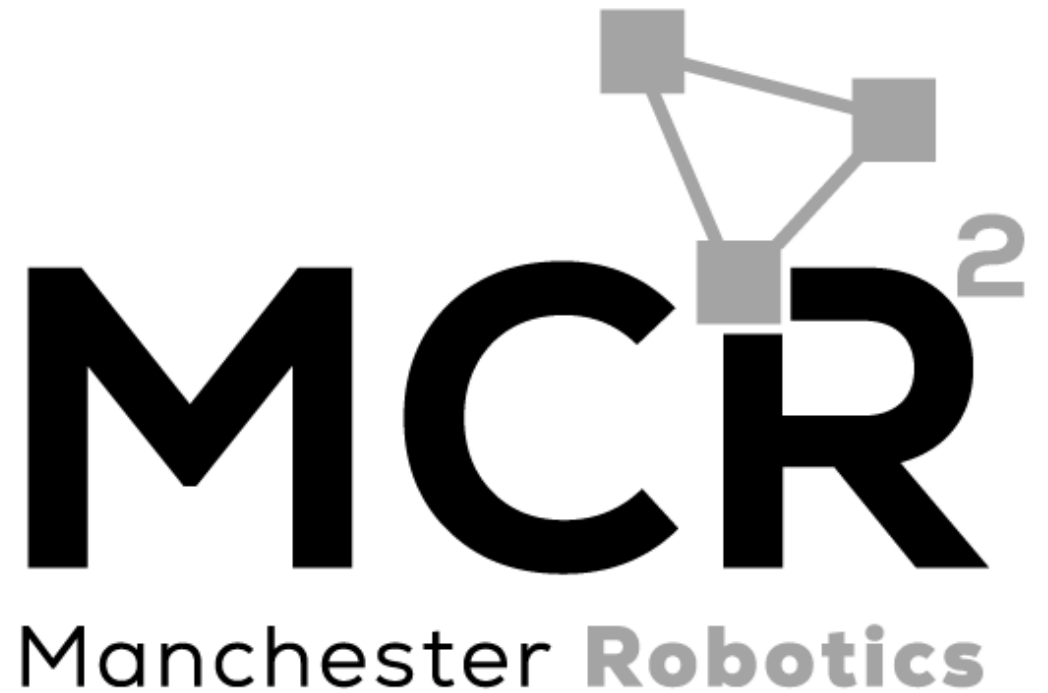
We design with the intent of manufacturing at high volume to keep unit costs low.

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# Puzzlebot

*Versions*

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# Puzzlebot



- The Puzzlebot is available in various versions, offering a broader range of opportunities to learn about robotics.
- The main three versions are:
  - The Hacker Edition
  - The Laser Edition
  - NVIDIA Jetson Edition (NVIDIA Partnership)
  - Jetson/Lidar Edition (NVIDIA Partnership) \*

\* Beta Testing



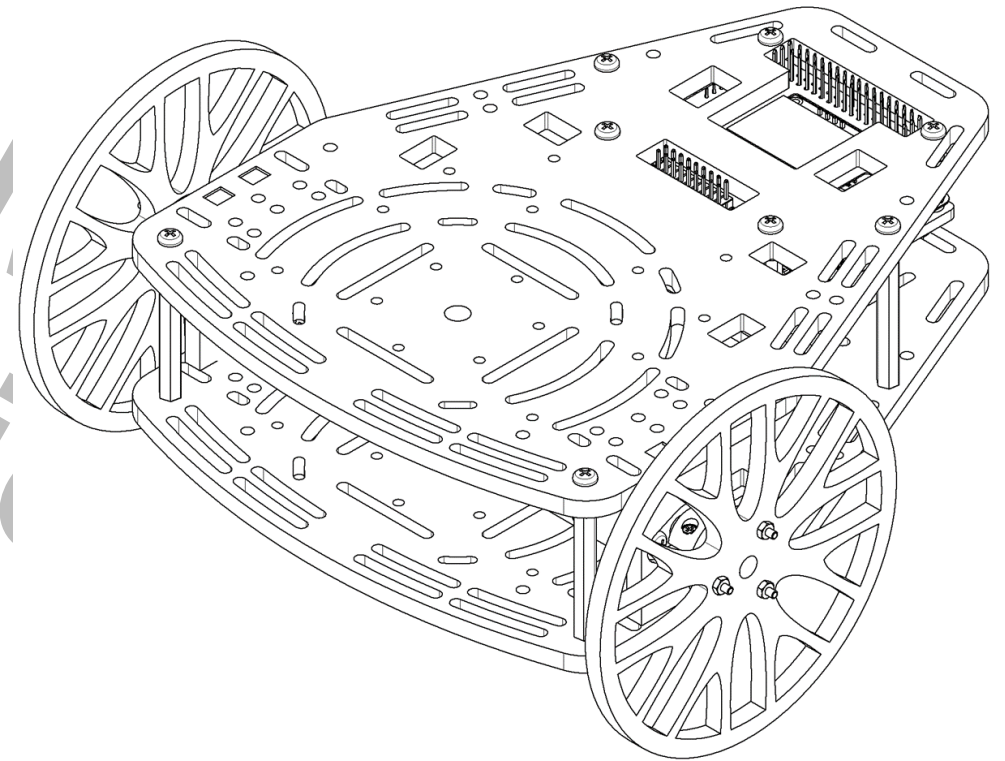


# Puzzlebot: Hacker Edition



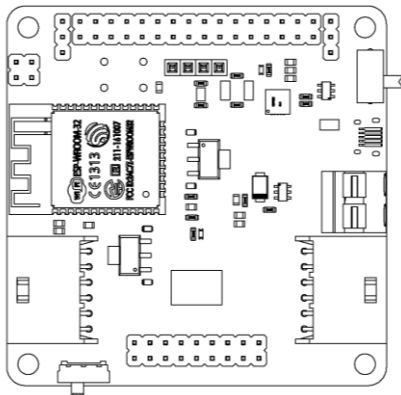
## Introduction

- The Puzzlebot Hacker Edition contains all the essential components needed to access meaningful robotics capabilities quickly providing a user-friendly platform for incorporating a wide range of advanced add-on feature sets.
- Powered by the Hacker Board for algorithms which require real-time processing capabilities, such as low-level control, navigation, obstacle avoidance, 2D-LiDAR-based SLAM, and fault-tolerant control.

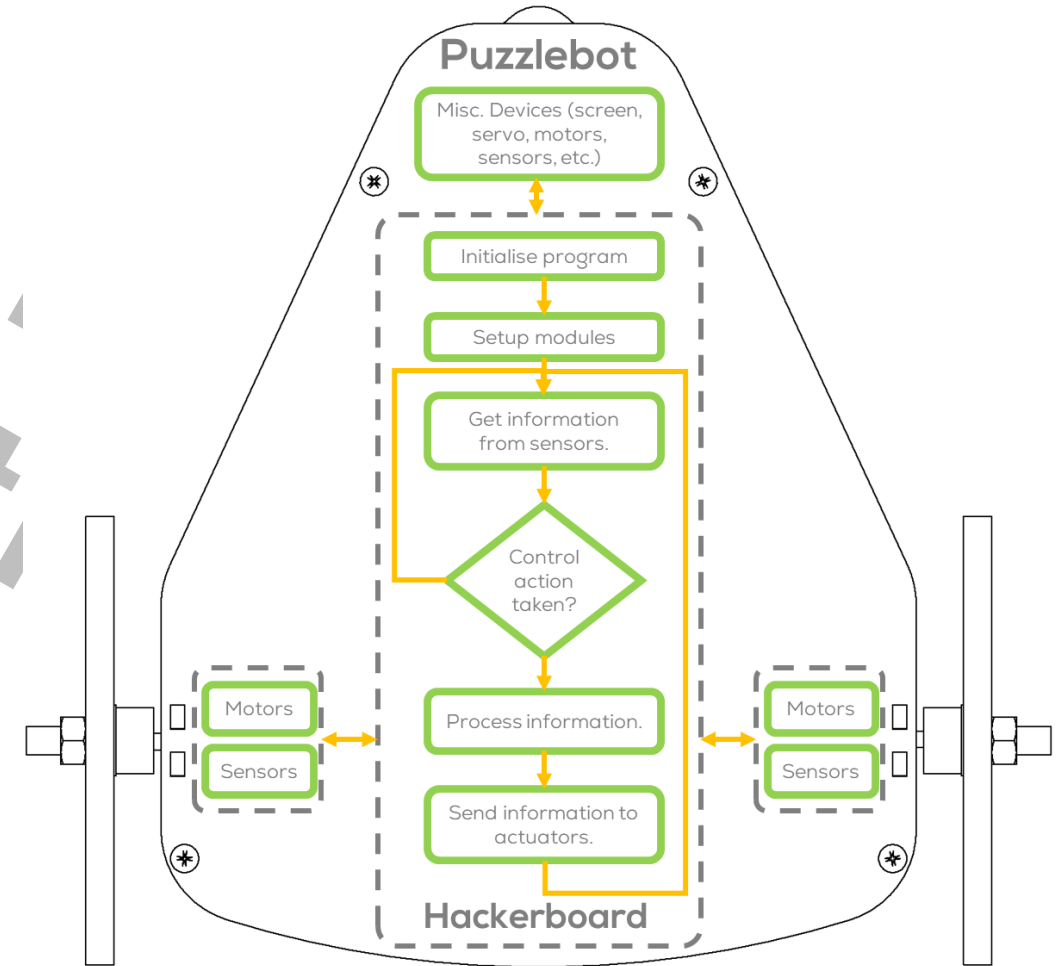


## Control Mode: Standalone Configuration

- The user directly programs the Hacker Board.
- Libraries for control and communication with computing units, sensors, and actuators are provided by MCR2.
- 3rd Party peripherals can be attached.



Hackerboard



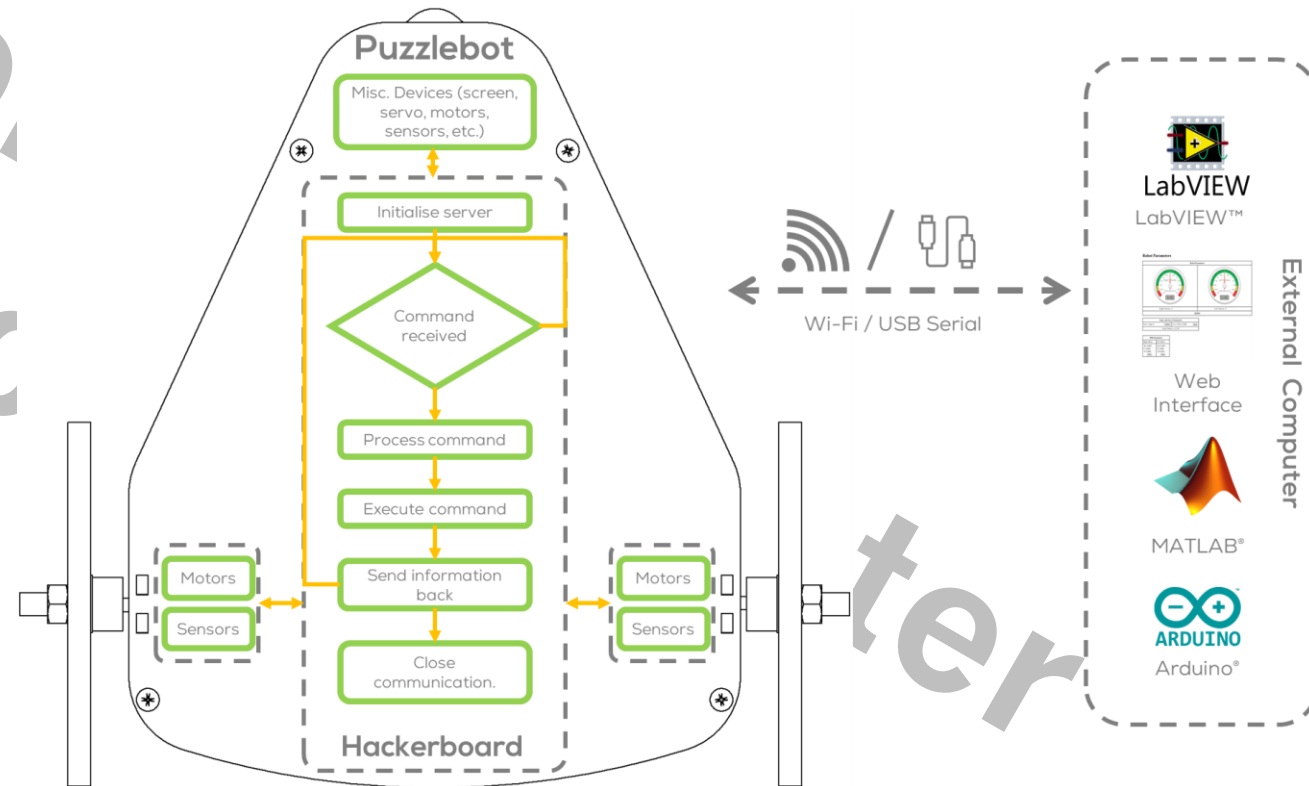


# Puzzlebot: Hacker Edition



## Control Mode: External-Control Configuration

- The robot is controlled from an external computer via Wi-Fi or Serial Communication.
- The internal firmware and libraries for communicating with the robot, its sensors and actuators are provided by MCR2. For more information, visit our webpage.
- Basic web interface for configuring and testing provided.
- MCR2 provides MATLAB, ROS and LabVIEW libraries for communicating with the robot.
- MATLAB and LabVIEW simulators are provided. No extra libraries for required working.



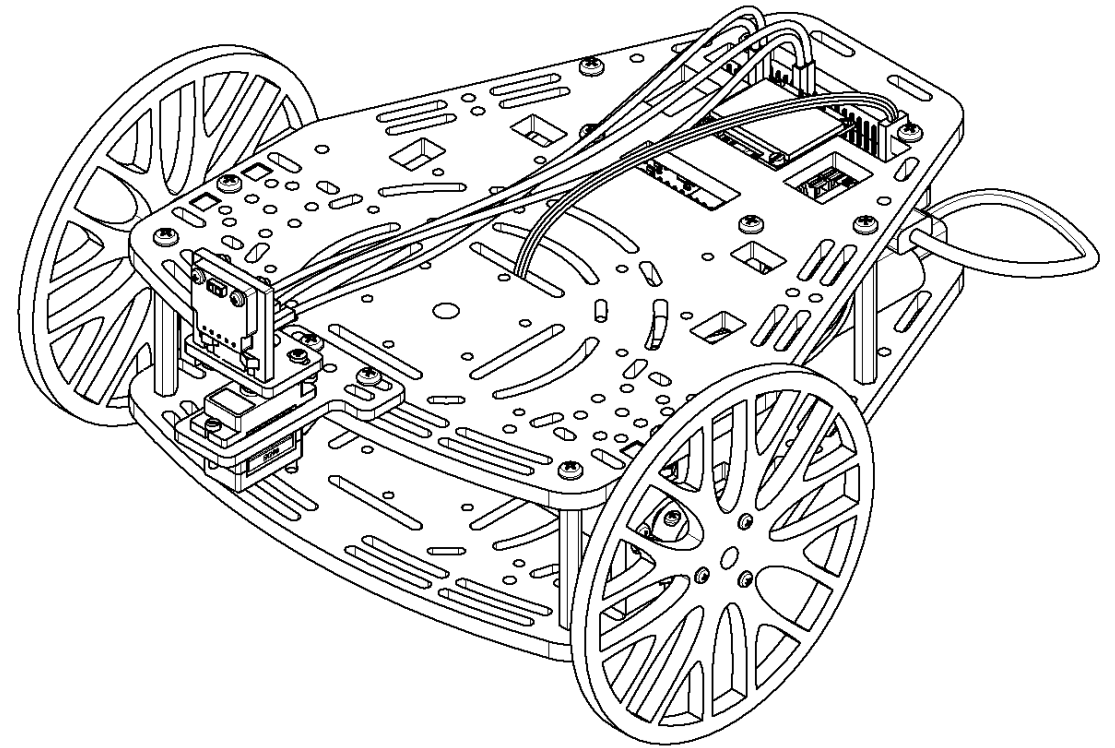


# Puzzlebot: Laser Edition



## Introduction

- The Puzzlebot Laser Edition is an extension of the Puzzlebot Hacker Edition, which encompasses the VL53L1X TOF (Time Of Flight) Laser Sensor and a 9g Servo Motor to provide more autonomous capabilities such as obstacle avoidance, 2D mapping, etc.
- The Puzzlebot Laser Edition has the same configurations as the Puzzlebot Hacker Edition.
- MCR2 provide the libraries required for communicating with the sensors and actuators in both configurations.





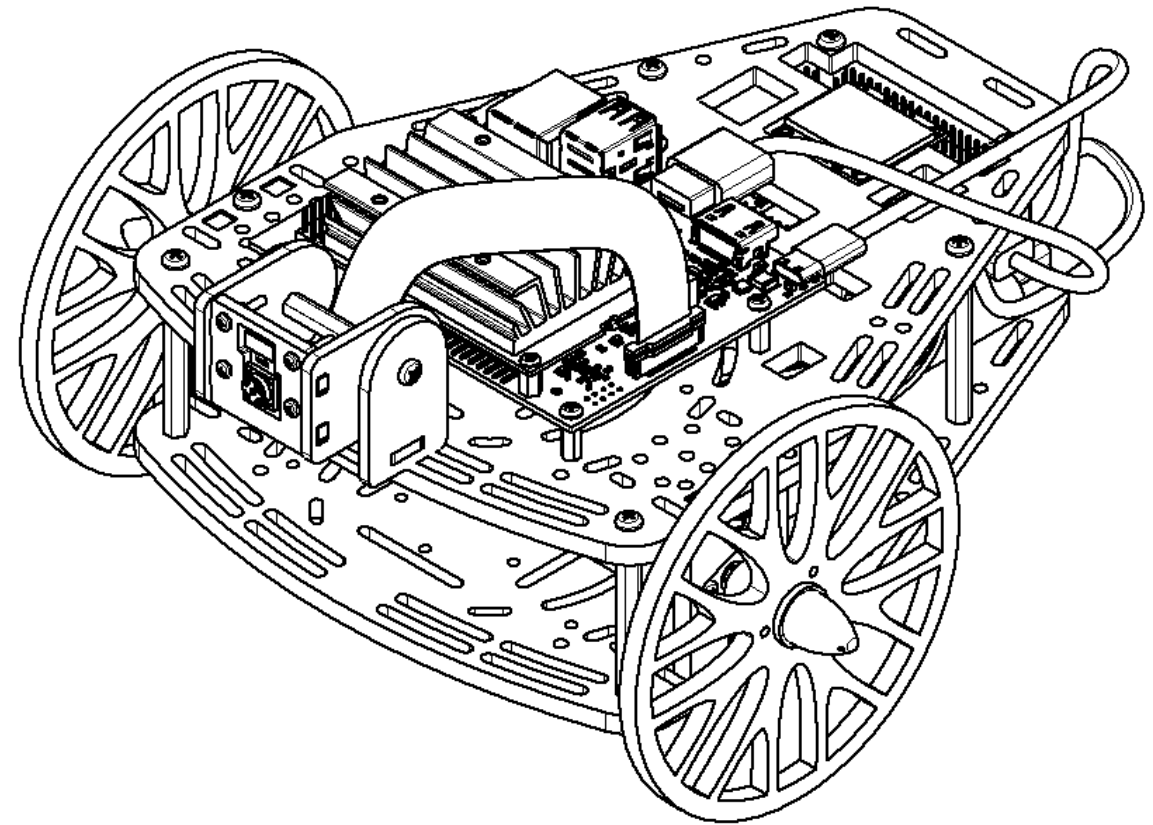


# Puzzlebot: NVIDIA Jetson Edition



## Introduction

- The Puzzlebot NVIDIA JETSON® Edition is an extension of the Puzzlebot Hacker Edition encompassing an NVIDIA Jetson® CPU and a Raspberry Pi® Camera.
- Combining the power of the Hacker Board and the NVIDIA JETSON Nano® allows users to implement research-level, real-time algorithms such as AI & Computer Vision, SLAM and autonomous driving algorithms using ROS.
- The Puzzlebot NVIDIA JETSON® Edition works by communicating the Hacker Board (Plug and play) with the NVIDIA Jetson Nano®.



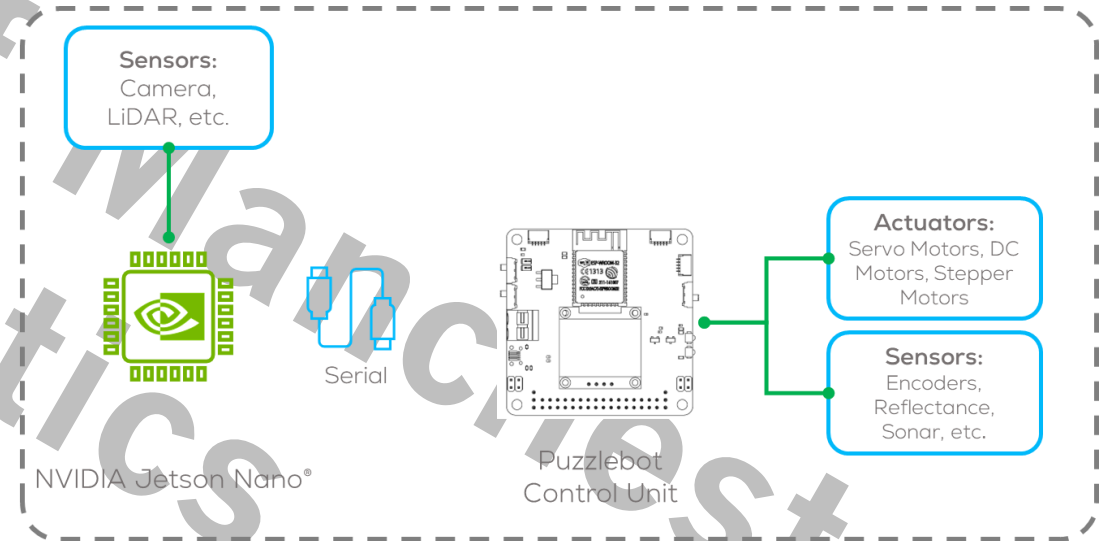


# Puzzlebot: NVIDIA Jetson Edition



## Control Mode: Puzzlebot ROS Connection

- The user can develop advanced robotic algorithms in ROS (Robot Operating System) using the computing power of the NVIDIA Jetson Nano<sup>®</sup> and communicate to the actuators and sensors using the Hackerboard.
- The Hackerboard and NVIDIA Jetson Nano<sup>®</sup> are connected via Serial (Communication Libraries with Hackerboard, Sensors and Actuators, provided by MCR2).



Puzzlebot

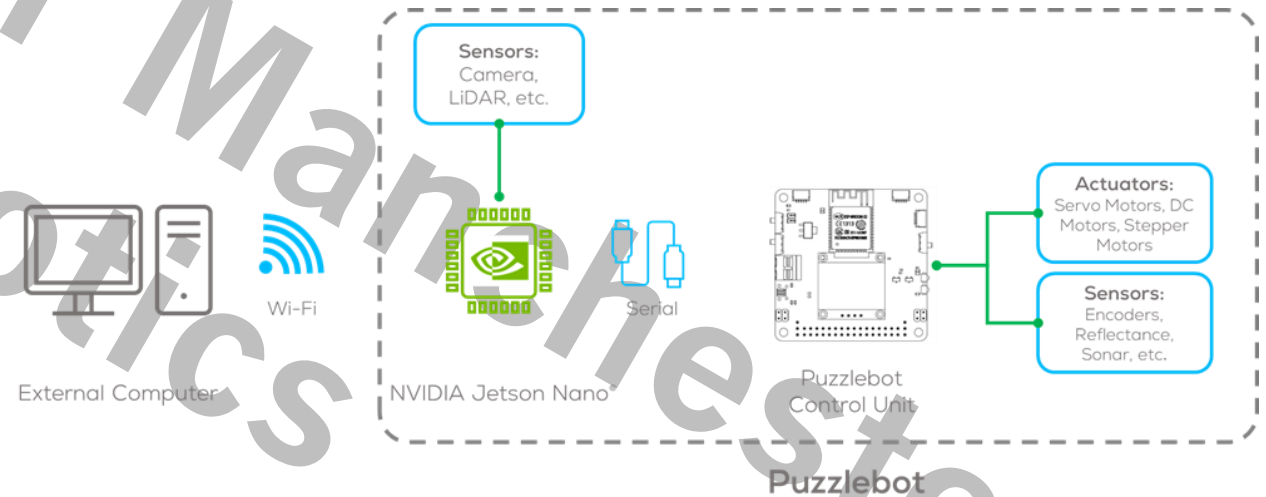


# Puzzlebot: NVIDIA Jetson Edition



## Control Mode: Puzzlebot ROS Connection Client

- In this configuration, the user can connect to the NVIDIA Jetson Nano<sup>®</sup> to monitor the functionality of the robot, monitor or control a process or simply control the robot wirelessly.
- This configuration works as the previous one, with the difference that, in this case, the user can connect to the External computing unit (ROS Master) via Wi-Fi.
- The ROS Master node runs in the NVIDIA Jetson Nano<sup>®</sup>, making this a suitable combination for Advanced Distributed Control.





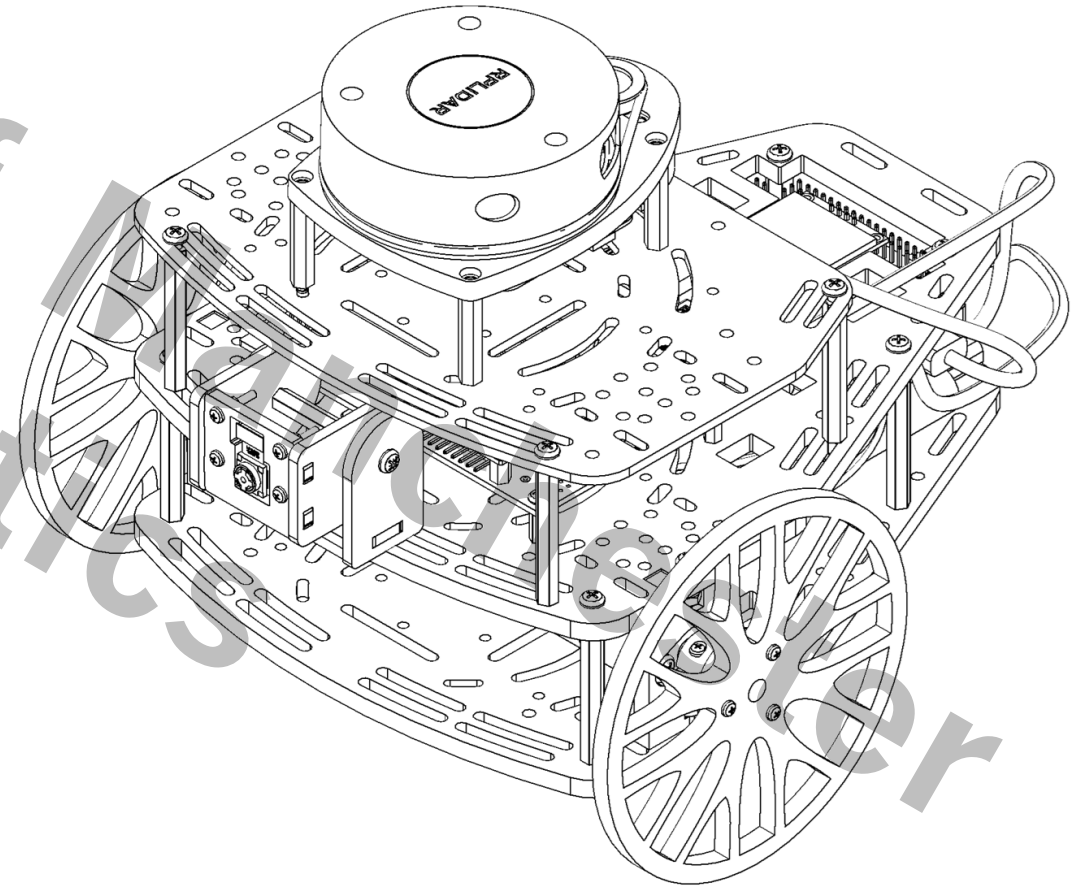


# Puzzlebot: NVIDIA Jetson/LiDAR Edition



## Introduction

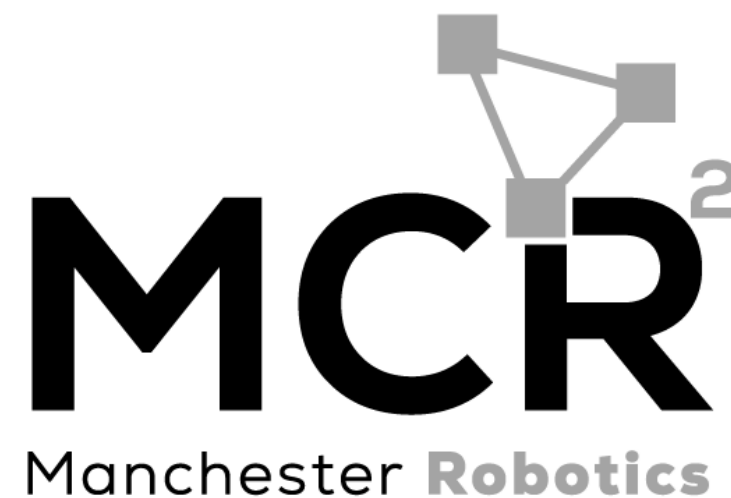
- The Puzzlebot NVIDIA JETSON® - Lidar Edition is another extension of the Puzzlebot Hacker Edition encompassing an NVIDIA Jetson® CPU, a Raspberry Pi® Camera and a LiDAR.
- This allows users to implement research-level, real-time algorithms such as AI & Computer Vision, obstacle avoidance and SLAM and autonomous driving algorithms using ROS.
- The Puzzlebot NVIDIA JETSON® - Lidar Edition in the same configurations as the Puzzlebot NVIDIA JETSON® Edition. The Lidar is directly connected to the Jetson Nano®, providing the user with the capability to use it with ROS.



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Thank you

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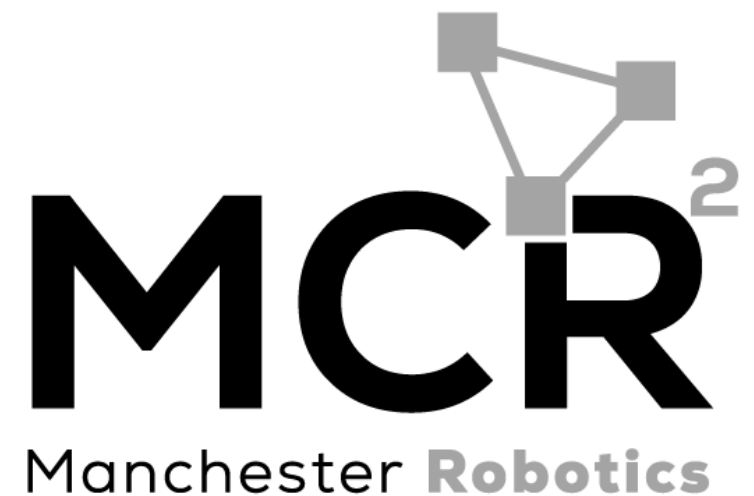


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**T&C**

*Terms and conditions*

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