

{Learn,
Create,
Innovate};

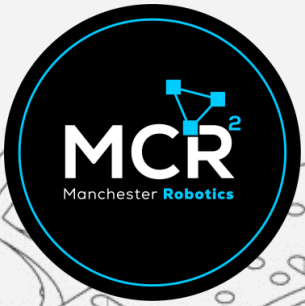


Robotics For Everyone

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Diecast Studios, 53 Store Street, Manchester, M1 2WD, UK.
Rev 1.6.1

Puzzlebot

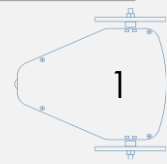




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" Manchester Robotics was born with a mission: To Challenge and Change Education Paradigms " Dr Mario Martinez, CTO



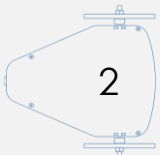
Manchester Robotics

Manchester Robotics Limited was born as a spinout company from The University of Manchester, United Kingdom.

It was an initiative of the Robotics Research Group within the Aerospace Research Institute offering development platforms for academic research and education as well as for industrial prototyping.



Manchester Robotics Limited provides unique educational products that resulted from our research activity, funded by UK Research Councils and Industry.



Vision & mission

VISION

Our vision is to democratize access to skills in Robotics and Automation that will drive future economic growth.

MISSION

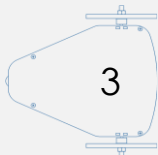
To disrupt how robotics is currently taught by combining technology with teaching to provide learners with a deep understanding of robotics theory, and how to apply this to real world problems.

VALUES

- **Innovation** – To create the world's most advanced educational robot.
- **Applied learning** – to provide the robotics industry with a healthy resource of talent.
- **Availability to all** – to provide access to a robotic platform and courses for everyone.



In a nutshell we provide learners, in whatever manner they want to learn, effectively a lab in a portable robot.



The Team



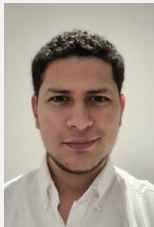
PROFESSOR
CONSTANTINOS SOUTIS
DIRECTOR & CO-FOUNDER



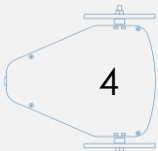
DR ALEXANDRU STANCU
CEO, DIRECTOR & CO-FOUNDER



PHIL KEMP
ADVISOR



DR MARIO MARTINEZ
CTO & CO-FOUNDER



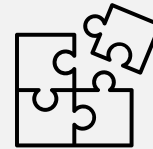
"Simply put, Puzzlebot has changed the way that my students learn about the principles of robotics. It is engaging from the moment they open the box and the results have been fantastic."

Jason J. Professor, Manchester.

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.

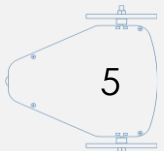
Advanced Courses

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.



"Puzzlebot aims to support the upskilling and reskilling of the labour force in advance of the growth of automation and the Industrial Internet of Things (IoT) within the workplace of tomorrow."

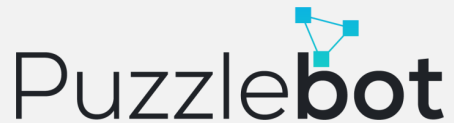
Dr Alexandru Stancu, CEO

The Puzzlebot

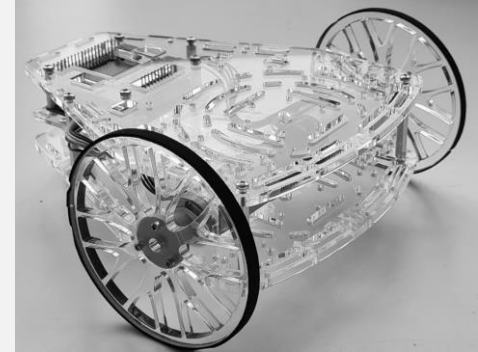
Puzzlebot is a universal tool for robotics, to help others learn, create, and innovate their own robotic projects.

The Puzzlebot was born as an answer to the concept of robotic democratization.

The governing philosophy is that customers are motivated to learn robotics by the appeal of advanced features, which therefore offer far more value than over-simplified proxies with high cost, and limited utility.



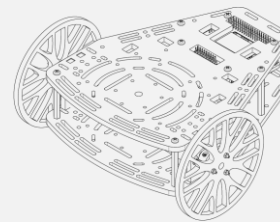
This tool allows for an independent learning and vocational training, a versatile, integrated, and dedicated development board for robotics.



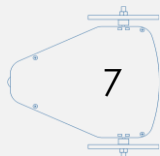
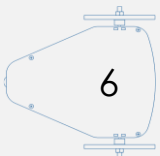
The Puzzlebot is a cross-platform, open-source, plug-and-play mobile robot.

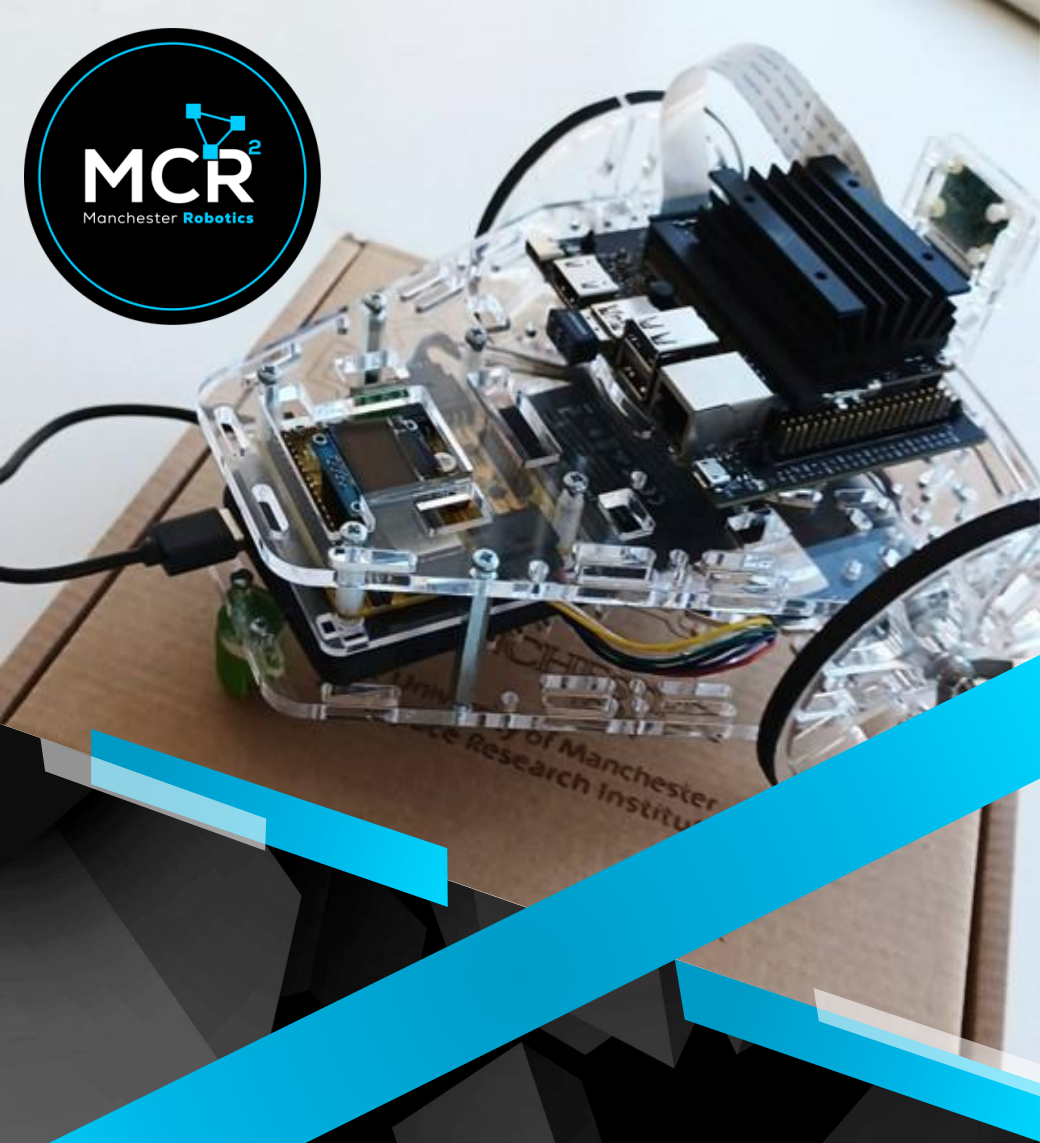
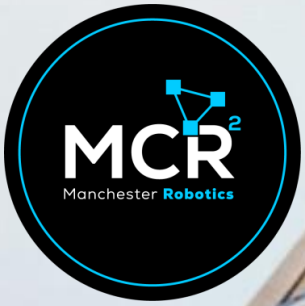
Programed in different languages, catering to learner's preferred starting languages.

Capable of accommodating 3rd party off-the-shelf components, keeping unit costs low and education available to everyone, thereby democratising access.



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.





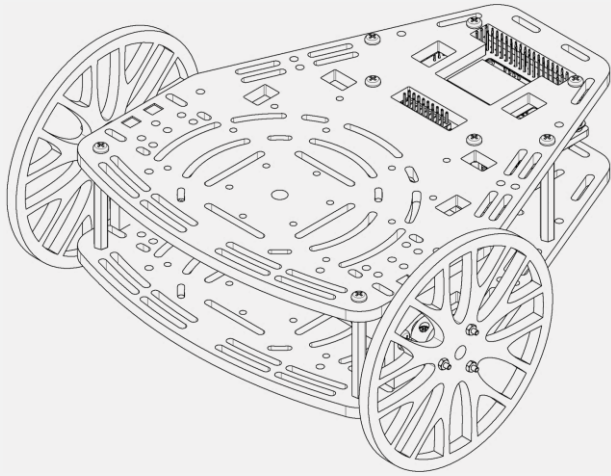
Our learning kits

"For us robotic democratisation is not a concept... its our way of thinking, working... being."

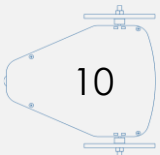
Professor Constantinos Soutis, Director


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The Puzzlebot : Hacker Ed.



The Puzzlebot Hacker Edition contains all the essential components needed to quickly access meaningful robotics capabilities and provides a user-friendly platform for incorporating a wide range of advanced add-on feature-sets.

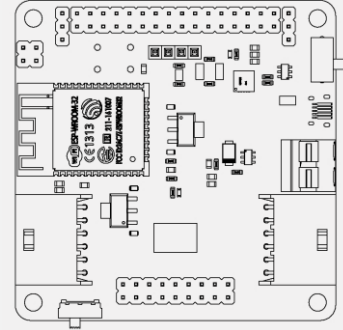



Puzzlebot

How it works?

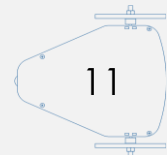
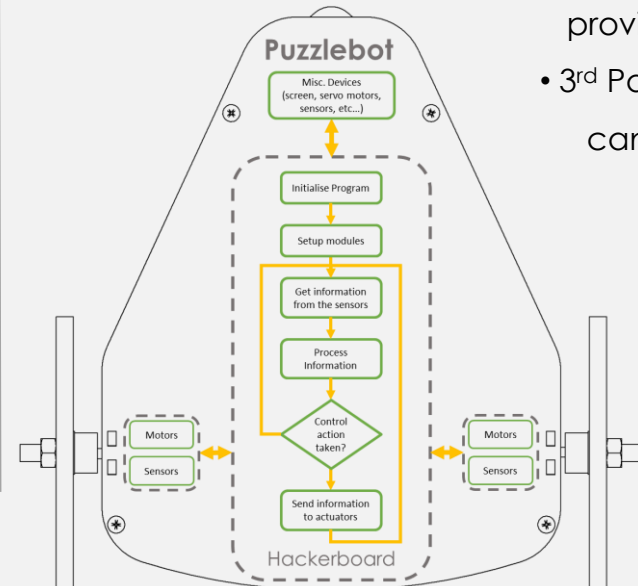
Puzzlebot, is powered by the Hacker Board for algorithms which require real-time processing capabilities, such as:

- low level control,
- navigation, obstacle avoidance, 2D-LiDAR based SLAM, and
- fault tolerant control.

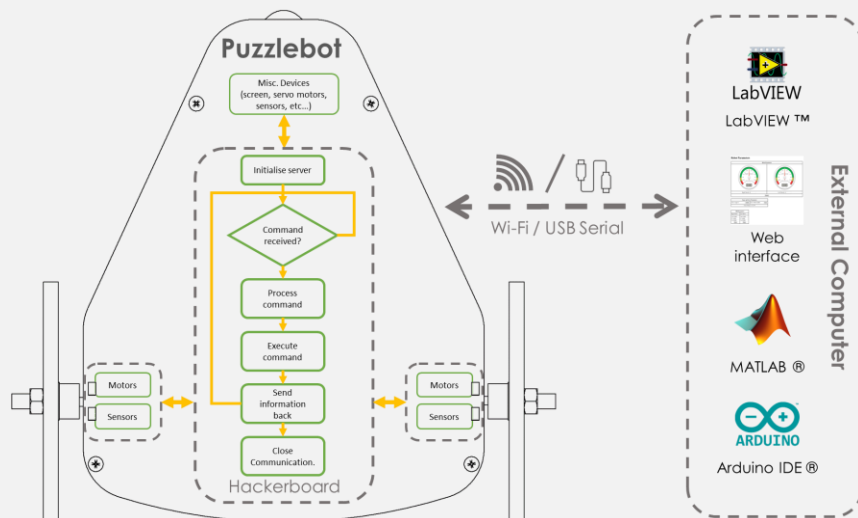


STANDALONE CONFIGURATION

- 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.



How it works?



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.
- MATLAB and LabVIEW libraries for communicating with the robot are provided by MCR2.
- MATLAB and LabVIEW simulator are provided. No extra libraries for required working.

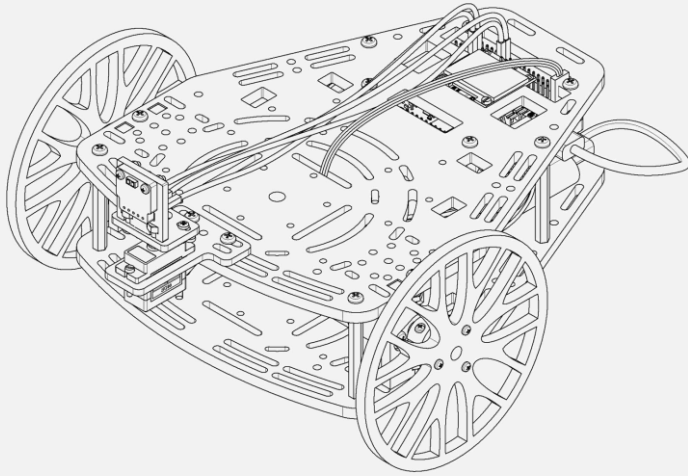
Microcontroller Board			
Characteristic	Description	Characteristic	Description
Processor	Dual Core Xtensa® 32-bit LX6 MCU	Logic Voltage Level	3.3 V
External Flash Memory	4 MB	Wi-Fi / Bluetooth	Yes
Clock Speed	40 MHz	Indicators	Yes (Programmable LED)
SPI Channels	4	Servo Channels	2
I2C Channels	2	Available Voltages	3.3 / 5 V
UART Channels	3	Motor Connector Dedicated	Yes (Brushed Motor)
I/O Pins	34	LCD Display	Yes

Motor Driver			
Characteristic	Description	Characteristic	Description
Motor Type	Brushed	Peak Current per Channel	2.0 A
Motor Channels	2	Back EMF protection	Yes
Voltage	0-15 V	Communication	GPIO
Current per Channel	1.0 A	Motor Connection Type	2.54 mm Pitch Socket

Motors/Encoders			
Characteristic	Description	Characteristic	Description
Voltage	6.0 V	Stall Torque	5 Kg-cm
No-Load Current	0.8 A	Gear Ratio	35 :1
No-Load Speed	176 rpm	Encoders	5 V, Dual Channel Encoder per Motor
Stall Current	0.9 A	Counts per revolution	44

Add-Ons	
Characteristic	Description
Connection accessories	Included
Screwdriver Set	Included
Battery	Not included Recommended battery: Power bank 5 V, 15W, 3A 10000mAh Example: INIU Power Bank, Slimmest & Lightest Power Bank (USB C In & Output) 15W, Triple 3A 10000mAh https://www.amazon.co.uk/gp/product/B07PNL5STG/ref=ppx_yo_dt_b_asin_title_o02_s00?ie=UTF8&psc=1
Connection accessories	Included

The Puzzlebot : Laser Ed.



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 of more autonomous capabilities such as obstacle avoidance, 2D mapping, etc.

How it works?

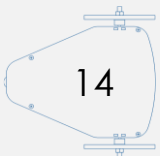
The Puzzlebot Laser Edition has the same configurations as the Puzzlebot Hacker Edition.

STANDALONE CONFIGURATION

- In this configuration, the user directly programs the Hacker Board and the TOF sensor.
- The libraries for control and communication the TOF sensor and the Servo Motor are provided by MCR2.
- As per the previous configuration different 3rd Party peripherals can be attached.

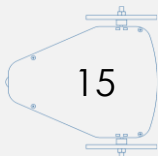
EXTERNAL-CONTROL CONFIGURATION

- The sensors and actuators are controlled by an external computer.
- The libraries for communicating the TOF sensor and Servo Motor are provided by MCR2.
- Web interface for testing provided.
- MATLAB and LabVIEW are supported to communicate and control de TOF sensor and Servo Motor.



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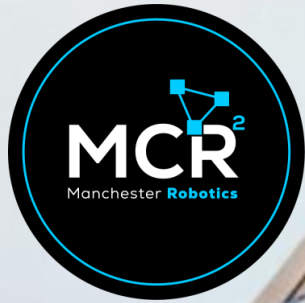
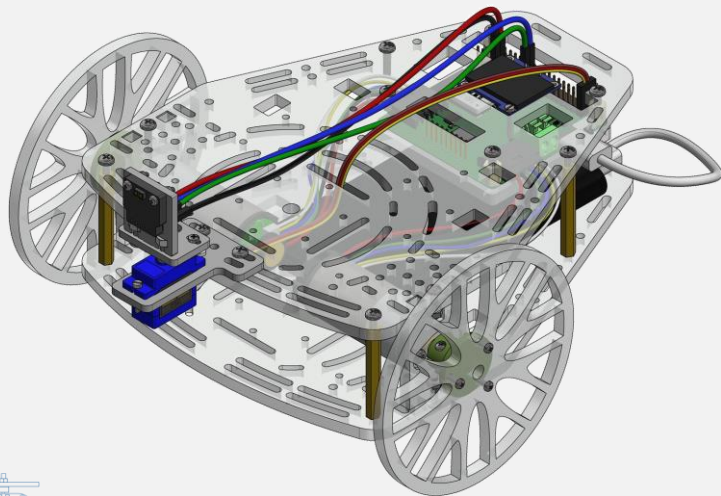
Puzzlebot



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The Puzzlebot : Laser Ed.

Characteristic	Description
Puzzlebot Hacker Edition	Included w/Accessories
VL53L1X TOF (Time Of Flight) Laser Sensor	Included with Standoffs, screws and nuts required for mounting.
9g Micro Servo Motor	Included
TOF Sensor and Servo Motor Mount	Included
Connection accessories	Included

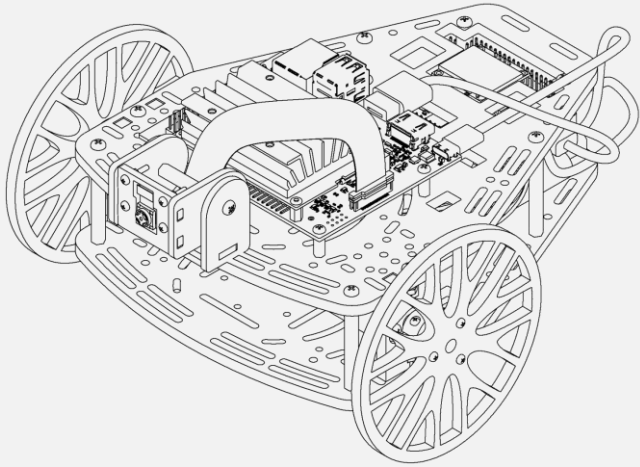


"Education is evolving so we need to evolve with it ..."

Dr Alexandru Stancu, CEO/Director

Robotics For Everyone

The Puzzlebot : NVIDIA JETSON® Edition.



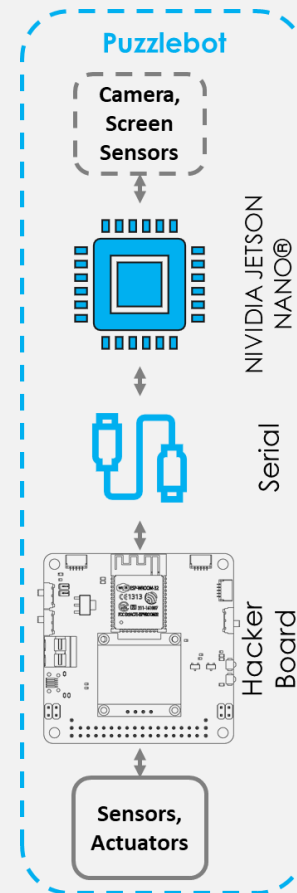
The Puzzlebot NVIDIA JETSON® Edition is an extension of the Puzzlebot Hacker Edition encompassing an NVIDIA Jetson® CPU, and a Raspberry Pi® Camera . Combining the power of the Hacker Board and the NVIDIA JETSON Nano®, allows users to implement research-level, real-time algorithms such as AI & Computer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

How it works?

The Puzzlebot NVIDIA JETSON® Edition works by communicating the Hacker Board (Plug and play) with the NVIDIA Jetson Nano®.

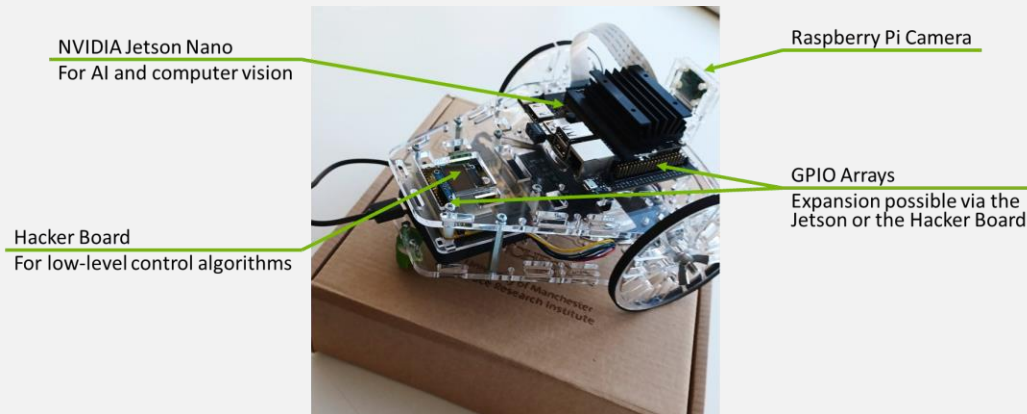
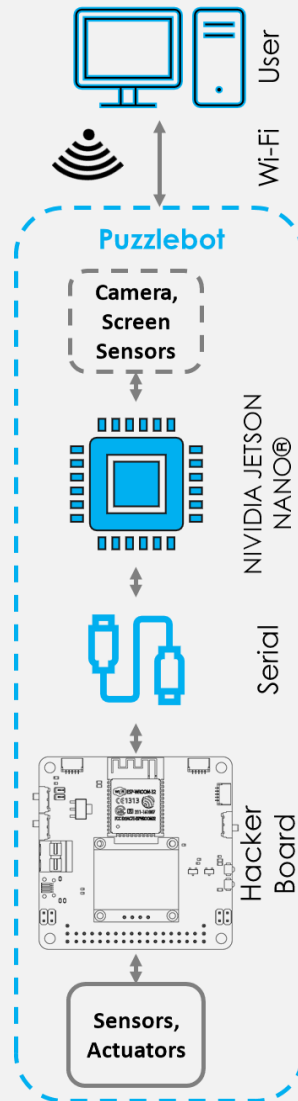
PUZZLEBOT ROS CONNECTION: CLASSIC

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



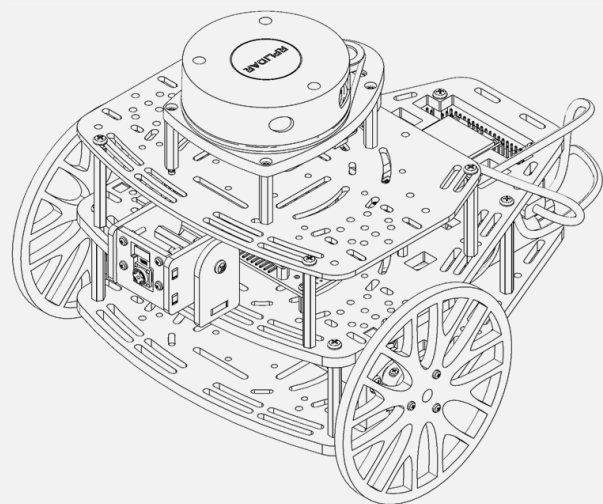
PUZZLEBOT ROS CONNECTION: CLIENT

- In this configuration, the user can connect to the NVIDIA Jetson Nano®, 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 is running in the NVIDIA Jetson Nano® making this a suitable combination for Advanced Distributed Control.



The Puzzlebot : NVIDIA JETSON® Edition	
Characteristic	Description
Puzzlebot Hacker Edition	Included w/Accessories
NVIDIA JETSON Nano Development Board Kit 2Gb ®	Included with Standoffs, screws and nuts required for mounting.
Raspberry Pi Camera V2	Included
Micro SD Card	Included
Raspberry Pi Camera Mount	Included
Connection accessories	Included

The Puzzlebot : NVIDIA JETSON®-Lidar Edition.

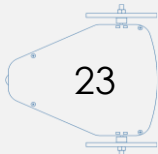
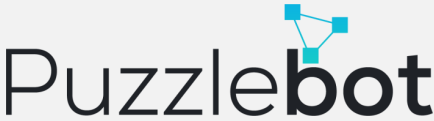
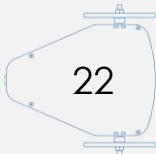


The Puzzlebot NVIDIA JETSON® - Lidar Edition is another extension of the Puzzlebot Hacker Edition encompassing an NVIDIA Jetson® CPU, a Raspberry Pi® Camera and a LIDAR . This combination allows users to implement research-level, real-time algorithms such as AI & Computer Vision, obstacle avoidance and SLAM and autonomous driving algorithms using ROS.

How it works?

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 the capability to use it with ROS.

The Puzzlebot : NVIDIA JETSON® - Lidar Edition	
Characteristic	Description
Puzzlebot NVIDIA JETSON® Edition	Included w/Accessories
RPLIDAR	SLAMTEC A1M8 RPLIDAR Dev Kit included with standoffs, screws, nuts, and base required for mounting.





Thanks

At Manchester Robotics we firmly believe that innovation is driven by change, and so we have made our mission to change the access to educational robotics. We hope you enjoy our products and support this revolution.

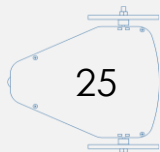
So, from all the team at MCR2 we would like to say

Thank you

{Learn, Create, Innovate};

Robotics For Everyone

Puzzlebot



{Learn,
Create,
Innovate};



Robotics For Everyone

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