# 4-wheel mobile robot platform with STM32F103 Cortex-M3 drive-controller and Raspberry Pi ROS based AI navigation capabilities.

## Sparklife Pte Ltd

Provides English User Guide for this mobile platform
Provides local support and training.

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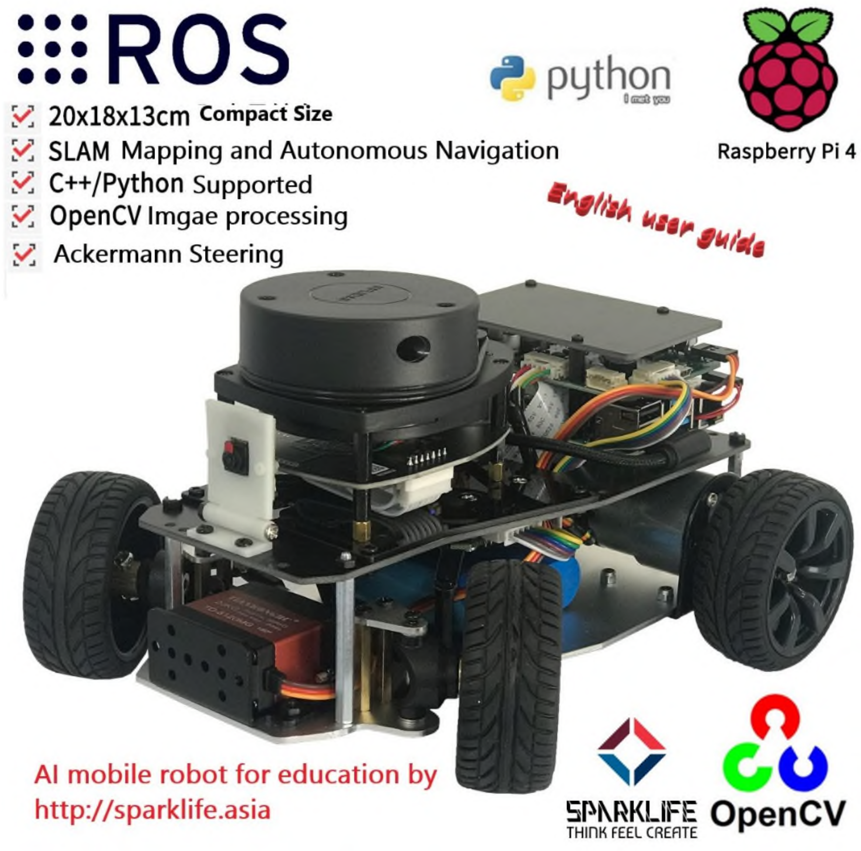
1) **4-wheel mobile robot - Nanocar with Raspberry Pi 4-2Gb**



**See more specifications below.**

## 2) System specifications

| S/No | Description | **Remarks (Current 2020 version)** |
|---|---|---|
| 1<br>1.1 | **4-wheel mobile robot platform with STM32F103 Cortex-M3 drive-controller and Raspberry Pi Robot Operating System (ROS) based Artificial Intelligence (AI) navigation capabilities**<br>**Hardware**<br>The system should include the following Components<br>4-wheel robot chassis<br>a. The chassis should be sturdy and strong enough to carry all the components. | |
| | b. Four wheels with soft rubber tyres of minimum 50mm diameter and minimum 20mm width for good grip to uneven floor. The diameter of the wheels should be 50 to 80 mm. | 25 mm,<br>Diameter 60 mm |
| | c. Two DC geared motors with encoders for driving the back wheels | |
| | d. One servo motor for steering Akerman based front wheels. | |
| | e. One Li-ion rechargeable battery of at least 1800mAh and 12V output. | 2550 mAH Li rechargeable |
| | f. Dimension of the assembled robotic platform on chassis should be within 220 mm x 200 mm x 150 mm. | 210 mm x 185 mm x 135 mm |
| 1.2 | STM32F103 Cortex-M3 controller board which includes<br>a. STM32F103 Cortex-M3 chip or equivalent chip at 72MHz clock. | |
| | b. An Inertial measurement unit (IMU) sensor | |
| | c. An Universal Serial Bus (USB) port | |
| | d. Motor drivers and connectors for 2 motors and 1 servo motor. | |
| | e. Connector to Raspberry Pi General Purpose Input/Output (GPIO) pins. | |
| 1.3 | Raspberry Pi 3B+ or 4B board that includes<br>a. 16 Gb or higher SD card | |
| | b. Ubuntu OS and Robot Operating System (ROS) installed. | |
| 1.4 | Raspberry Pi 5MP camera mounted on the chassis. | |
| 2 | **Software**<br>The following programs should be provided with 1 Raspberry Pi SD Cards to demonstrate the mobile platform ROS capabilities. Programs can be in Python, C++ or Scripts. | |
| | a) Controlling the movement of the robot. | |
| | b) Reading odometry data. | |
| | c) The RPLIDAR driver | |
| | d) Capturing video on Raspberry Pi Camera | |
| | e) Robot Operating System (ROS) based program to perform Simultaneous Localization and Mapping (SLAM) | |

| | | |
|---|---|---|
| | f) Robot Operating System (ROS) based program to perform auto-navigation | |
| | g) Customized programs for high, medium, low speed auto-navigation that support Ackermann steering model. | |
| | h) Scripts files to automate the tasks. | |
| 3 | **Documentation**<br>The following documents in English shall be provided:<br>a) Quick startup manual for using the ROS functions (e.g. vision, Simultaneous Localization and Mapping (SLAM), Navigation) of the robot. | |
| | b) Schematic of the STM32F103 Cortex-M3 controller board. | |
| | c) Communication protocols for STM32F103 Cortex-M3 controller board. | |

## Demo

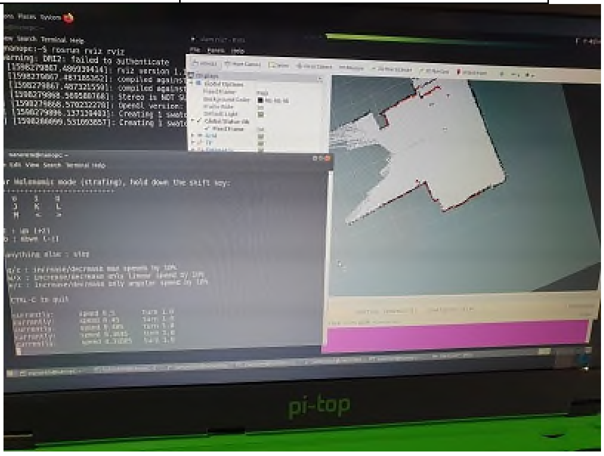
A ROS (Robot Operating System) based AI robot car using SICK TiM 240 LIDAR to perform autonomous navigation on a map created by it using the SLAM (Simultaneous Localization and Mapping) technique.

https://youtu.be/gcIlOKwPm0g

without obstacles

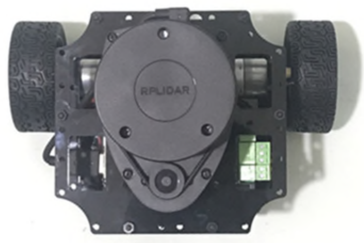
Part 2: with obstacles:

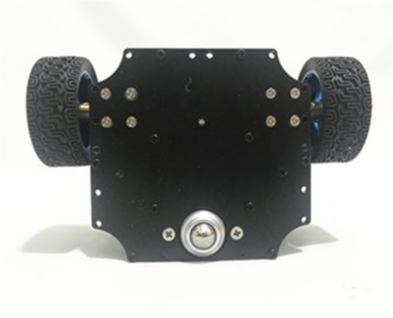
https://youtu.be/fetT32WnHMg



## Other AI mobiles platforms offered by Sparklife:

1) 3-wheel mobile ROS AI robot:





## 2) Misty Robot

Sparklife is a authorized re-seller for Misty Robots.

Misty introduction: https://www.mistyrobotics.com/

YouTube videos for Misty:

a) Using Misty to teach Python in the library : https://www.youtube.com/watch?v=vWehZfpgXDA

b) Misty Temperature Screening Solution to help to reduce manpower during Covid-19 pandemic. https://youtu.be/qHNVlorSCe4

c) Simple program for sound and light : https://www.sparklife.asia/hidden1

3) Jetson Nano Mobile Robot with Jetson Nano Controller