

Lizi Robot Manual



Manual version: 1.3

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Safety instructions

Safety in operation

Distance: Keep a safety distance of few meters between the robot and people when in operation. If the robot may hit a person, it may cause an injury.

Battery safety

The robot's battery are Sealed Lead Acid (SLA) battery. The safety instructions for the battery and charger are as follows:

- (1) Do not load the battery in airtight case. This may cause an explosion or injury.
- (2) Charge the battery using the exclusive charger. Charging the battery with other chargers may cause the battery to overheat, emit hydrogen gas, leak, ignite, or burst.
- (3) Do not put the battery near a device that may cause sparks. The battery may generate flammable gas when charged, so keep the battery away from fire or an open flame to prevent any sparks from igniting or causing explosions.
- (4) The operation temperature is -15°C to 40°C . Avoid placing the battery near a heat source. This may cause the battery to overheat, leak, ignite, or burst.
- (5) Do not immerse the battery in water.
- (6) Be careful not to drop the battery onto feet to avoid injury.

1. Robot Specification

The Lizi- Mobile Robotic Platform is designed for indoor and good-weather outdoor operation. The Lizi robot uses skid-steering for maximum maneuverability. The robot is designed to be small and light to be able to operate and navigate indoor and outdoor. The Lizi platform is rugged, light weight, and compact. The robot is equipped with a whole suite of sensors for autonomous navigation. The robot is fully compatible with the ROS (Robot operating system) and can be controlled using ready-made ROS packages. Following are the robot's detailed specifications:

- Size: 38 L X 31 W X 20 H cm
- 4 solid rubber wheels, differential drive.
- Wheels diameter: 14 cm
- 2x5W motors (Lizi2), 4x50W motors (Lizi4).
- High resolution encoders (56000(Lizi2)\4288(Lizi4) counts per revolution) for closed loop control.
- Weight: 9.1 Kg (with battery).
- Battery: 12V SLA 9Ah (Charging socket available on the robot, Charger included).
- Wireless 802.11N connection.
- Sensors: GPS, 9 DOF IMU (3 Gyros, 3 Accelerometers, 3 Magnetometers), laser scanner, RGB-D (Kinect like) mounted on pan-tilt system, 3 Ultrasonic Range Finders (URF) mounted on the sides and back of the robot.
- Fully compatible with the ROS (Robot operating system).
- Maximum payload: 2 kg.
- Maximum speed: 1 Km/hr (Lizi2), 3.6 Km/hr (Lizi4).
- MTBC: 2 Hour.

2. Included Hardware

The included hardware in the box is:

1. Lizi Robot.
2. 12V battery charger.
3. Charging adapter.

3. Getting started

In this section we describe the required steps in order to operate the Lizi robot using its onboard computer.

To turn the robot on do the following:

- On the back of the robot turn the power switch to ON position. The blue LED should be lit.
- Turn the computer ON (this is the button just under the power switch), a short push is enough.

Now you can control the robot from its on-board computer. If you want to work directly on the robot you can connect a keyboard mouse and monitor to the back connectors panel of the robot. Alternatively, you can use remote desktop to connect to the robot and log into its computer. Another, more common option, is to run the ROS core on a master machine, while one or more robots are working on the same network. For more details see our ROS tutorial page http://wiki.ros.org/lizi_robot/Tutorials

While operating the robot one may connect the charger and work directly from the electric outlet, and charging at the same time. This allows continuous working without draining battery life.



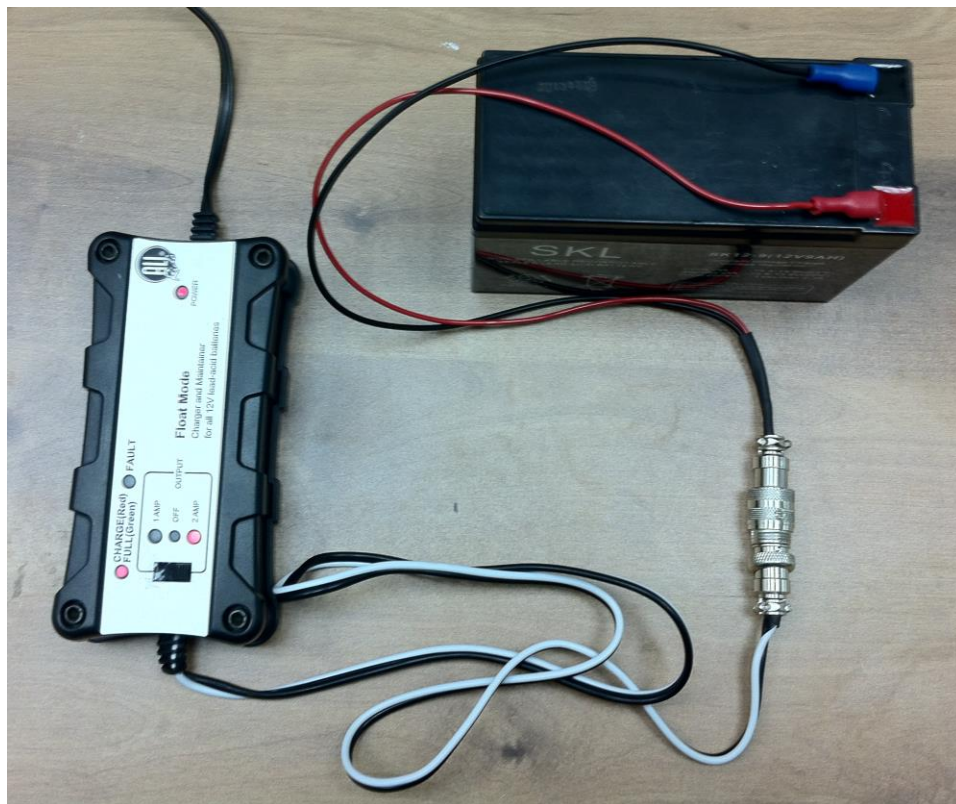
4. Maintenance

The battery of the robot can be charged while connected to the robot, and even when the robot is in ON mode. The battery is located at the back part of the robot. To replace the battery follow these steps:

1. Open the cover by unscrewing the four screws that hold the battery cover in place. Open the screws all the way, and remove them away.
2. Pull the battery off the robot and then disconnect the two cable connectors from the battery
3. Connect the connectors to the new battery with the correct polarity red (+12V) connector to the red battery terminal and blue (GROUND) connector to black battery terminal.
4. Place the new battery inside the robot, close the cover and screw the four screws back in place.

Charging the battery is done by simply connecting the charger to the robot CHARGE (12V) socket.

Charging the battery outside the robot is also possible using the charging adapter.



WARNING:

Incorrect connections or connections with reverse polarity of the battery will damage the robot internal components.

5. Warranty

Limited Warranty Coverage:

Subject to the limitations provided below, the Lizi Robot is warranted against defects in materials and workmanship, under normal use, from the date of shipment through the period identified in the purchase quote (one year). If warranty period is not specified then the deliverable is "as is" and no warranty is provided.

Where a warranty is provided, RoboTiCan liability for such warranty is limited to: 100% of the parts necessary to repair the covered defect. Technical support by telephone, e-mail, fax or other means of correspondence during the warranty period for issues covered by warranty is provided at no charge for covered defects.

If travel to a location (other than RoboTiCan facility) is required to address an issue determined to be covered by warranty, parts will be covered but all labor and travel expenses will be billed. Travel will be billed at expenses plus \$50.00 per hour for work time and \$20.00 per hour travel. Determination of warranty coverage is the responsibility of RoboTiCan and cannot be assigned or delegated to any other party.

The following are specifically not covered by warranty: (1) failure due to abuse and neglect and/or improper operating environment (including, but not limited to, improper power supply, temperature, humidity, and environmental conditions); (2) down time and related costs due to failure; (3) items such as batteries, and (4) software.

RoboTiCan shall have sole authority to determine type and means of repair in the event of a warranty claim. RoboTiCan shall have the right to require the return of the defective part or system to RoboTiCan, transportation prepaid, to establish the claim. RoboTiCan shall in no event be held liable for repairs or alterations made without RoboTiCan's written consent or approval. RoboTiCan shall not be held responsible for repairs made by others. If unauthorized service is performed, the warranty provided herein shall be void. This warranty is void if the equipment is altered, improperly operated, improperly maintained or payments are not made according to the agreement.

Any additional software requirements or options are the responsibility of the end user. RoboTiCan does not warrant or guarantee the performance or functionality of any software, or that Customer is acquiring the legal right to use any software embedded within, or provided in connection with, reconditioned robots. Any software provided to customer is provided "as is" without warranty of any kind, either express or implied, and RoboTiCan specifically disclaims any warranty of merchantability, fitness for a particular purpose, satisfactory quality, lack of viruses, title, quiet enjoyment, and/or non-infringement with respect to any software. Customer acknowledges and agrees that use of any software provided to customer is at customer's own risk. Customer agrees to indemnify and defend RoboTiCan from and against any liability arising from customer's use of software in connection with products sold to customer hereunder.

Except for the warranties expressly provided herein, all other guarantees, warranties, conditions or representations, either expressed or implied, whether arising under statute, common law, and commercial usage or otherwise, including implied warranties of merchantability and fitness for a particular purpose, are excluded and hereby specifically disclaimed. In addition to writing here RoboTiCan company will not be responsible for any damage, injury, loss of ability to work, disability and even death caused arising directly or indirectly from the use of the Lizi Robot. RoboTiCan has made no express warranties except as provided herein, and no oral or written information or advice given by RoboTiCan its agents or employees shall create a warranty of any kind or in any way increase the scope of the limited warranty provided herein.

Under no circumstances whatsoever shall RoboTiCan be liable to any person, firm, corporation or other entity for any special, punitive, indirect, or consequential damages, whether for breach of contract, negligence, misrepresentation, or otherwise, and whether resulting in lost profits, loss of interest in money borrowed or invested, impairment of goods, business interruption, work stoppage, or otherwise, in any way arising out of any transaction to which these standard terms apply. RoboTiCan maximum liability for any claim arising hereunder or relating to the products sold to customer hereunder (whether for breach of warranty or otherwise) shall be limited to the obligation to repair the non-conforming product.

Customer agrees that this sale is completely made in the Country of Israel in that the laws of the Israel country shall apply concerning any controversy or claim regarding the equipment. Customer agrees to indemnify and hold harmless RoboTiCan from all claims, damages, liabilities, attorney's fees, and expenses arising from the ownership or use of the equipment.