OVERVIEW

The Multirole 2WD Robot Kit can be configured and programmed as either a line tracing/line follower, a sumobot, or an obstacle avoidance robot among other applications. This robot is based on the Saleng/Arduino Uno as its microcontroller but is also compatible with the Arduino Mega. Basic example programs are also available as a working template.

FEATURES

- General purpose kit for line tracing/follower, sumobot, obstacle avoidance among others
- Simplified wiring
- Minimal soldering
- 2x line sensors (optionally 3 IR sensors) with non-inverted and inverted signals plus analog output
- Example programs available

KIT LIST

The kit contains the following parts:

Part Description	Quantity
Saleng Uno OR Arduino Uno OR Compatible board	1 pc
Acrylic base board with attachments for the wheels/motors	1 set
USB Cable	1 pc
3-9V geared DC motors	2 pcs
65mm Plastic-Rubber Wheels	2 pcs
Caster wheel	1 pc
2x18650 Li Ion Battery Holder – color may vary	1pc
Lithium Ion 18650 Batteries	2 pcs
Single 18650 Battery Charger	1 pc
Kimat Motor Driver Shield Mk III	1 pc
Saleng Tracker line tracing sensors	2 pcs
HC-SR04 Ultrasonic sensor	1 pc
Female-Female Connecting Wires	10 pcs
Set of wires	1 set
Standoff spacers for line tracing sensor	1 set
DC Plug adapter or similar	1 pc

ASSEMBLY

The following are suggested on the assembly of the robot. This may be customized based on your application needs.

Tools and other materials required:

- Long nose / small pliers
- Phillip or narrow flat screw driver
- Soldering Iron for the Motor wires
- Solder wire
- Double sided tape or glue stick or other adhesives
- Optional: extra nuts and bolts
- Optional: extra casing material for sumobot protection e.g. thick plastic sheets, aluminum sheets, ply wood

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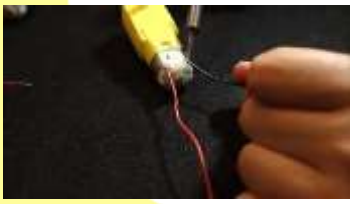
Before Assembly:

Prepare the base board.

Before proceeding, you may choose to peel off the protective cover on both sides of the acrylic base board. This will reveal the acrylic plastic underneath the cover. Do the same for the small motor brackets. Other users leave this on.

Solder the motor wires.

Insert the wires into the holes in the motor terminals and then solder the wires. Avoid overheating to prevent damage to the plastic or rubber materials used in the motor.



Wheel, Motor and Chassis Assembly:

Use the acrylic brackets to install the motor into the base board. Use the long bolt and its nuts to hold the motor in place. To facilitate neat wiring, the motor terminals face inward. The wheels may then be installed into the motor shaft. The optional encoder disc goes into the other side of the shaft if you will be using them.

The caster wheel is installed with the brass stand offs.

Electronics Installation:

Find a spot on the acrylic base board for the Saleng/Arduino Uno board and the battery holder to sit on. Double sided, glue stick, cable ties or nuts and bolts may be used to keep them in place. Connect the battery pack and DC plug in parallel. Watch out for the polarities.

Install the motor driver shield on top of the Uno board. The pins should mate in alignment.

Microjumper on ONE PWR / EXT header

Check the motor shield and ensure that the micro jumper on header H1 is at the “EXT” position. This means that the power of the motors will be taken from the -VM+ terminals while the logic circuit power is taken from the Arduino 5V pin.

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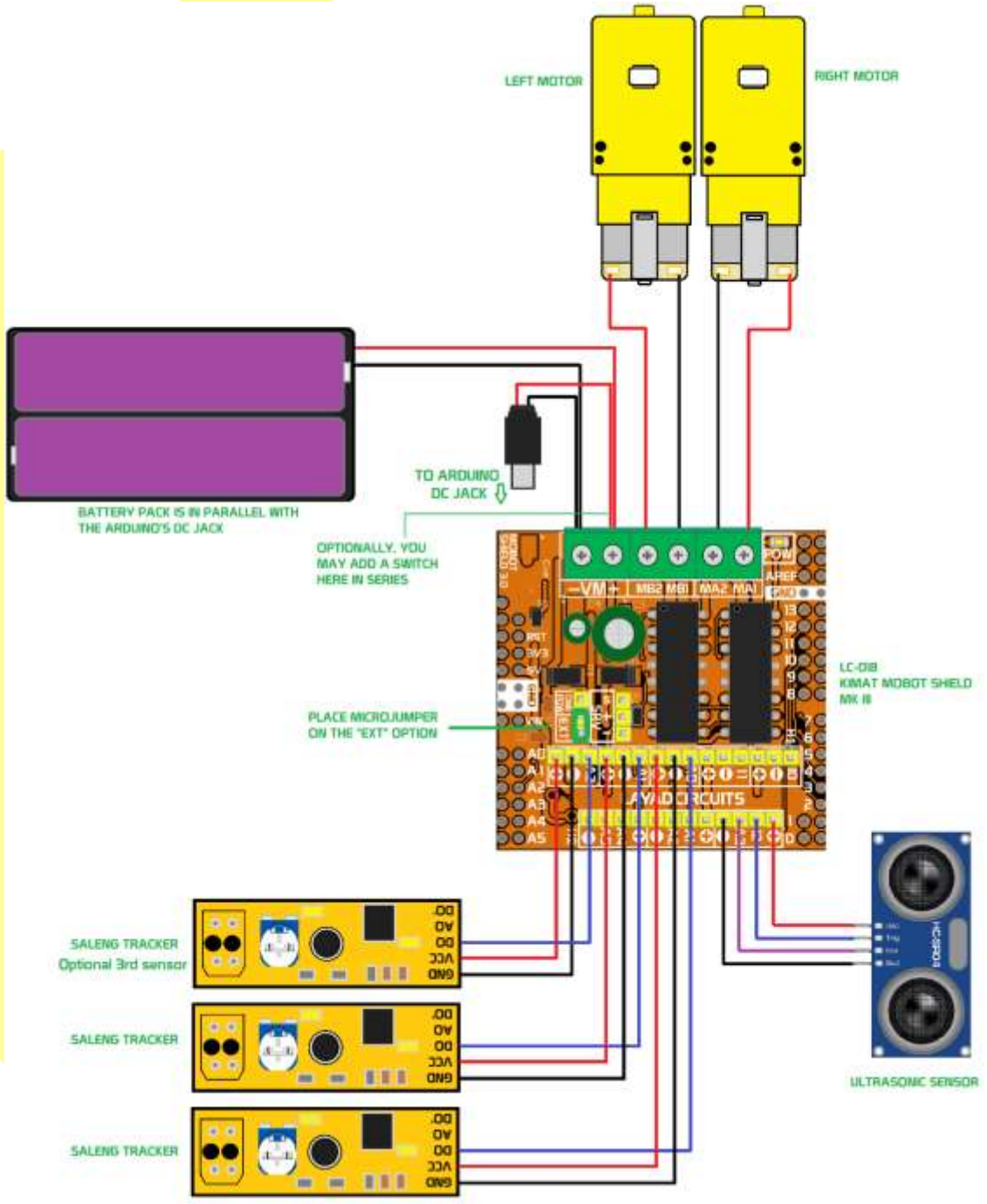
Electrical Connections

Refer to the diagram below for the suggested wiring. Customization is encouraged by omitting or adding sensors, communication modules, motors and other external devices



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Notes on Line Tracing

- At a minimum, use the 2 line tracing sensors. Add more sensors for faster response or smoother performance
- Adjust the speed. This depends on several factors including the line thickness, print material, battery charge level among others. Decrease speed if robot overshoots the track often. Adjust the speed using the function `speedSetting(255);` where the input value has a range of 0-255, zero is a complete stop and 255 is at the maximum speed.

Notes on Sumobot

- Use 2 line tracing sensors, one installed at the front and the other at the rear side of the robot. These 2 are used to detect the limits of the playing area.
- Install the ultrasonic sensor for detecting opponents. The threshold distance for this need to be tuned according to rules or preferences. The value is in cm and indicates at which distance the robot should consider the opponent as in front of it:
- The speed may also be adjusted in the following line:
  `speedSetting(200);`
- Additional enclosure may be implemented to protect the robot
- There are several algorithms for a Sumobot, the example programs a few of them

Notes on obstacle avoidance robot

- At a minimum, this robot need only the ultrasonic sensor
- Adjust the detection threshold for obstacles in the program to properly detect obstacles
- The speed may also be adjusted in the following line:
  `speedSetting(64);`

Limitation of ultrasonic and IR sensors

- IR sensors are sensitive to strong infrared sources such as sunlight, hence, it is not recommended to use them where sunlight is strong
- Ultrasonic sensors work best when the obstacle is perpendicular to the face of the sensor. Inclined and irregular surfaces that bounce off ultrasonic waves may affect their performance. Other sources of ultrasonic waves may also affect distance readings

VERSION HISTORY

V2.0.0 – modified for PCB Mk III / 23/02/10 / CDM
v1.0.0 – initial creation / 19/07/19 / CDM

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