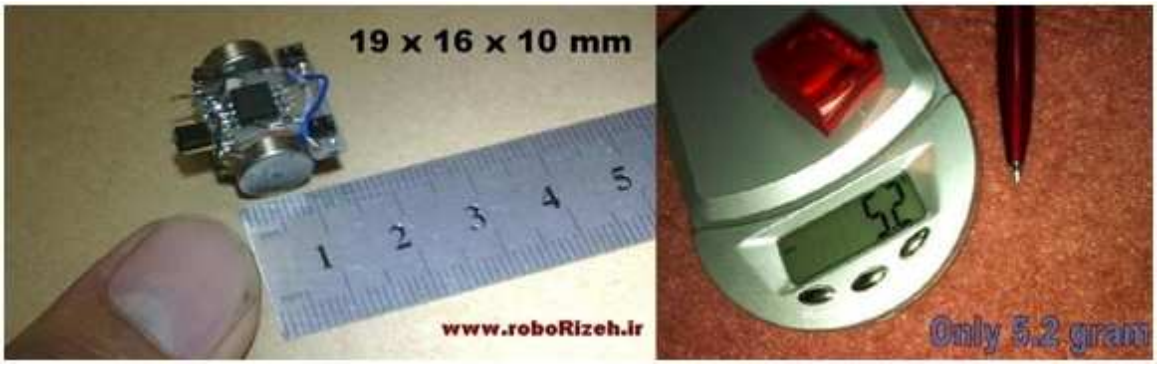
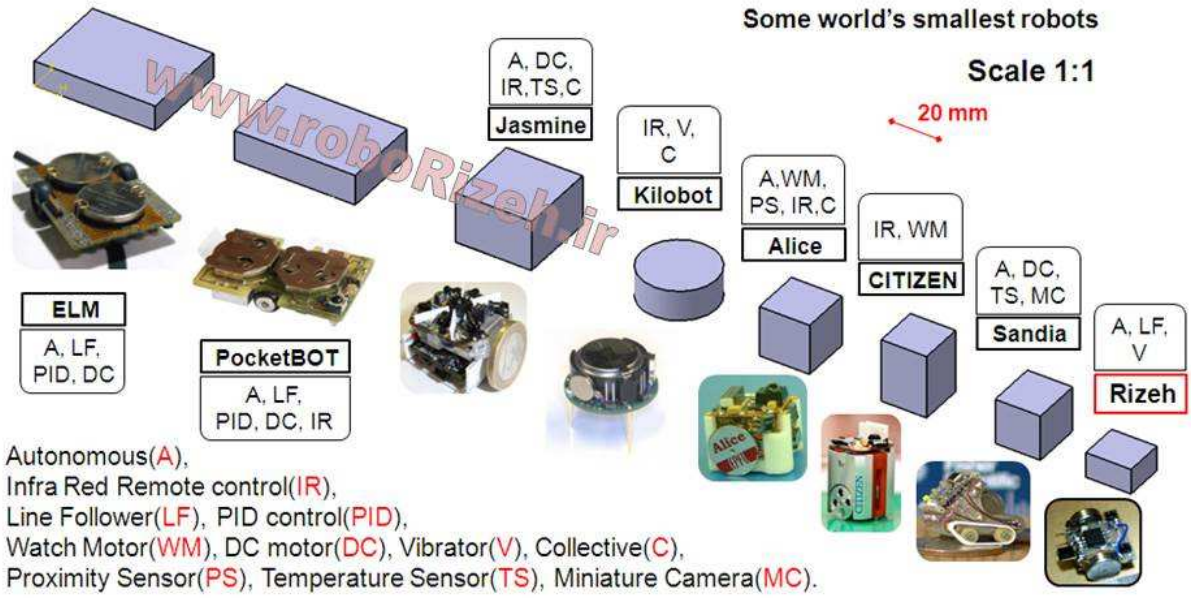
How to make: a robo Rizeh

World's Smallest Line Follower Robot (Vibrobot) By: Naghi Sotoudeh



The word "Rizeh" is a Persian word that means "tiny". Rizeh is a vibration based very small robot. It is driven by two vibrators of cell phones. This makes the robot very low cost to build and implement. The robot is able to perform linear and circular motions as two basic motions in mobile robots. Control mechanism of the robot employs internal PWM of micro-controller to control vibrators. Some techniques are applied to minimize electronic control board of the robot which is a very crucial in building up a small robot. As a standard task in mobile robots, line following task is selected to test Rizeh.



Steps:

1. **Preparation components**
2. **PCB**
3. **Programming the microcontroller**
4. **Soldering the components**
5. **Mount vibrators and stands**
6. **Draw a course**
7. **How to run and test**

*** HEX and PCB and Source CODE files attached.**

1. List of components:

-1 x MCU: ATtiny45 microcontroller

-2 x IR sensor pack GP2S04

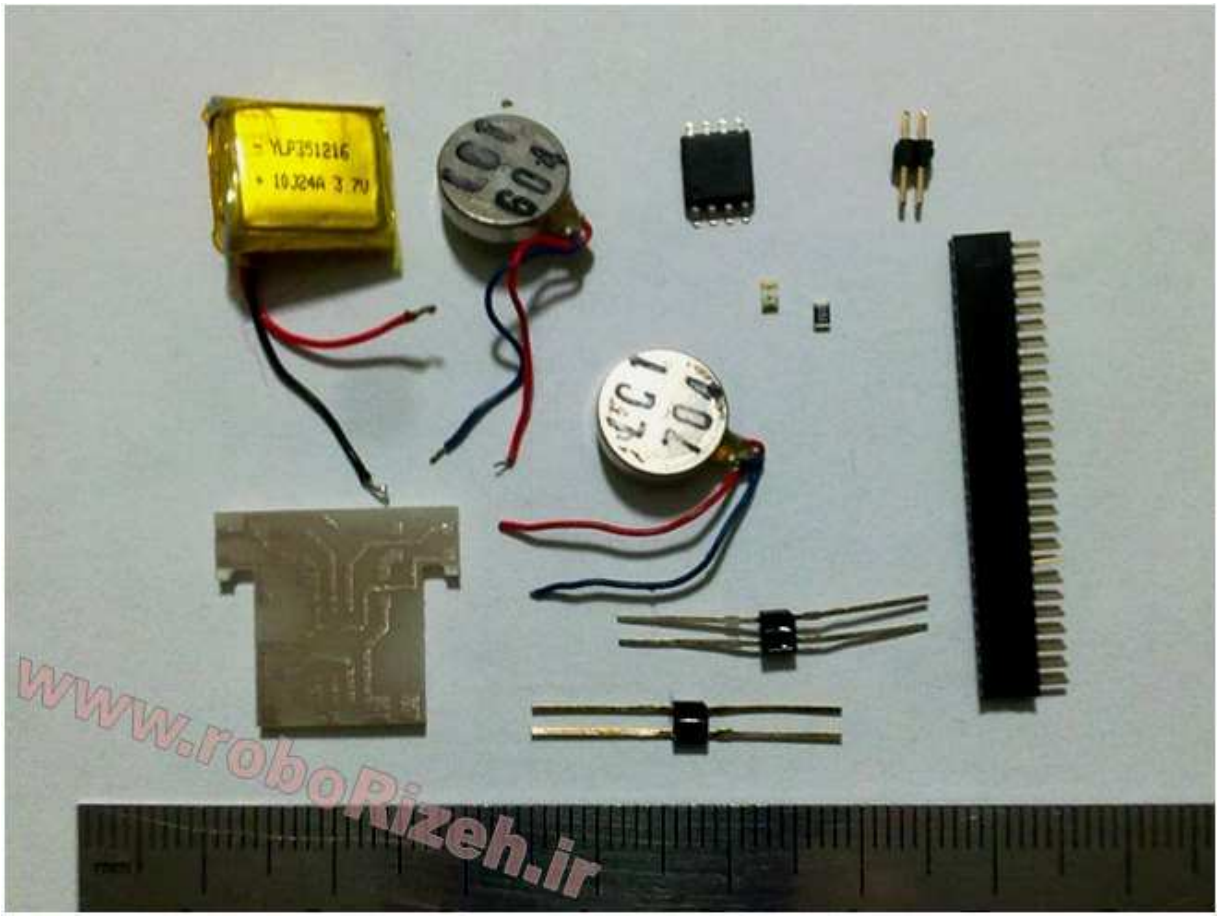
-1 x SMD LED (size=805)

-1 x R=100 ohm (size=805)

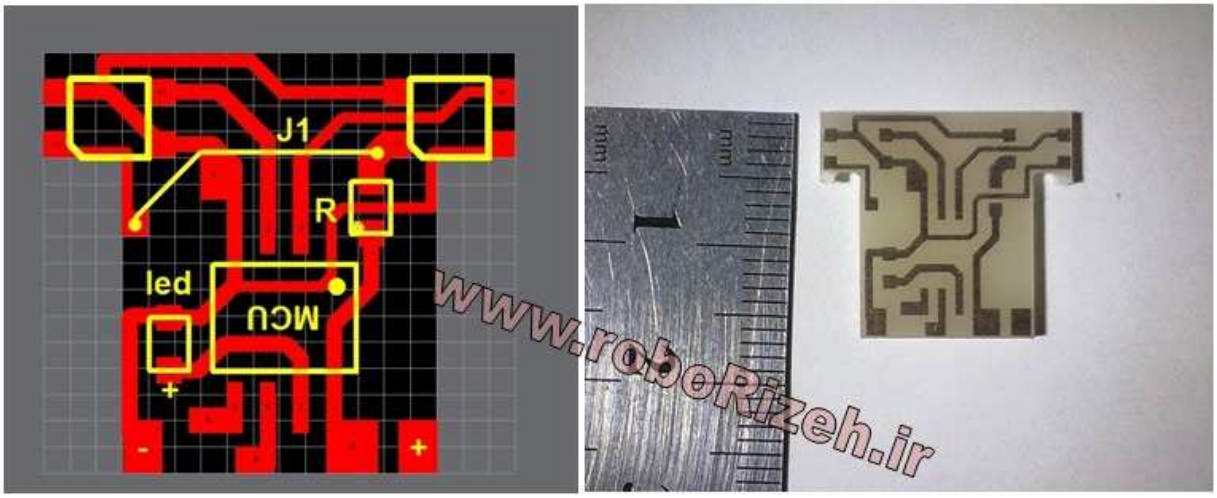
- 2 x 3_Volt cell phone coin-vibrator D10mm W2mm

-1 x 3.6 volt Lit-Pol battery(Bluetooth hands free battery)

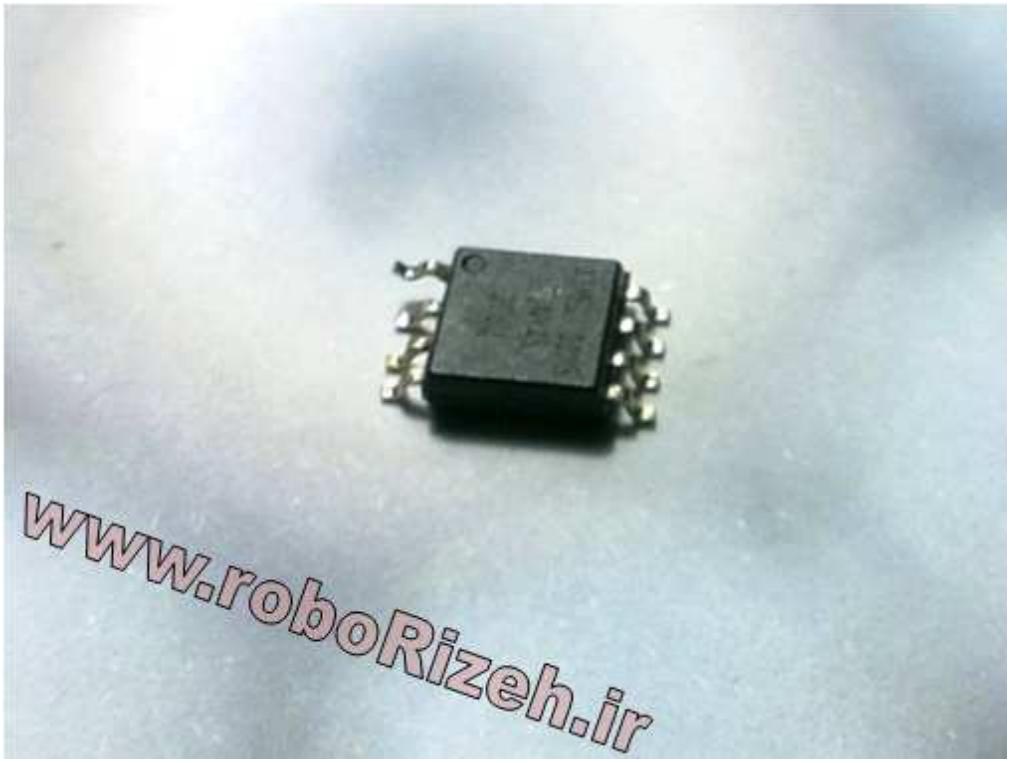
-2 x Small size pin-header(male and female)



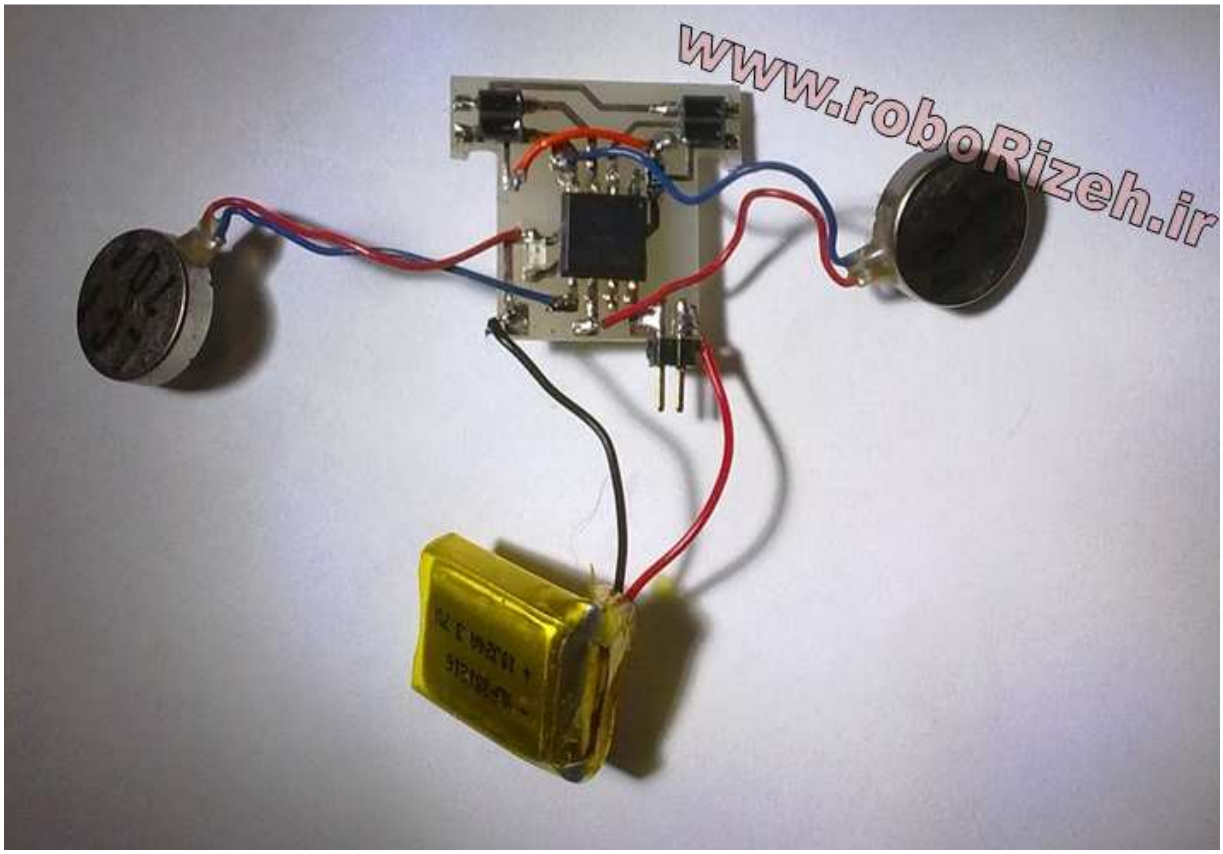
2. Order the PCB file with CNC cut:

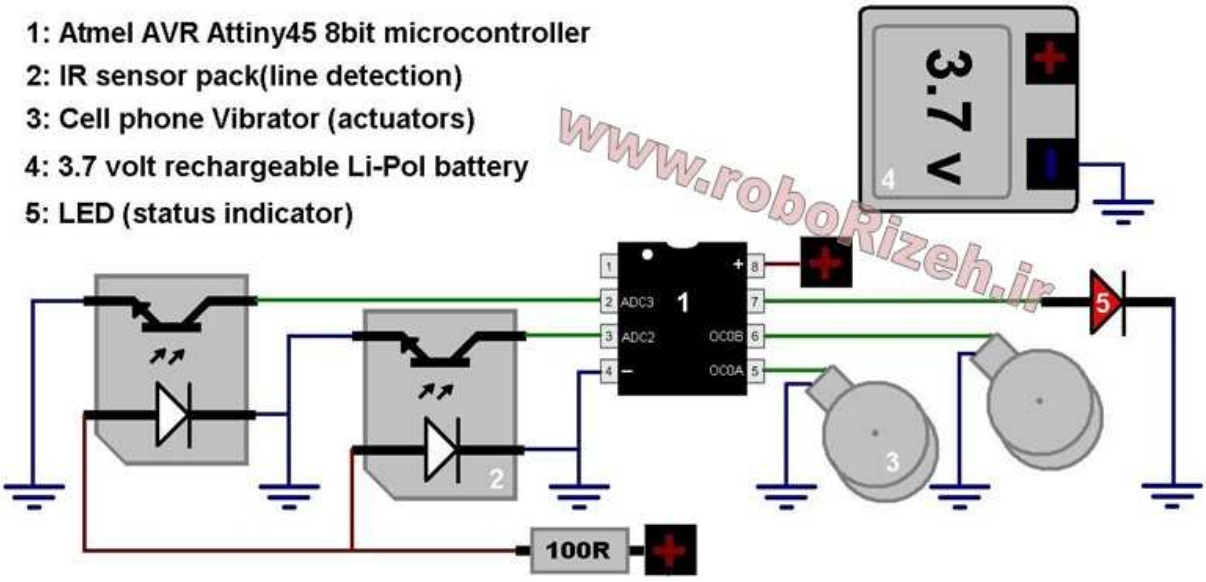


3. Bend or cut pin 1 of MCU After programming the MCU with HEX file.

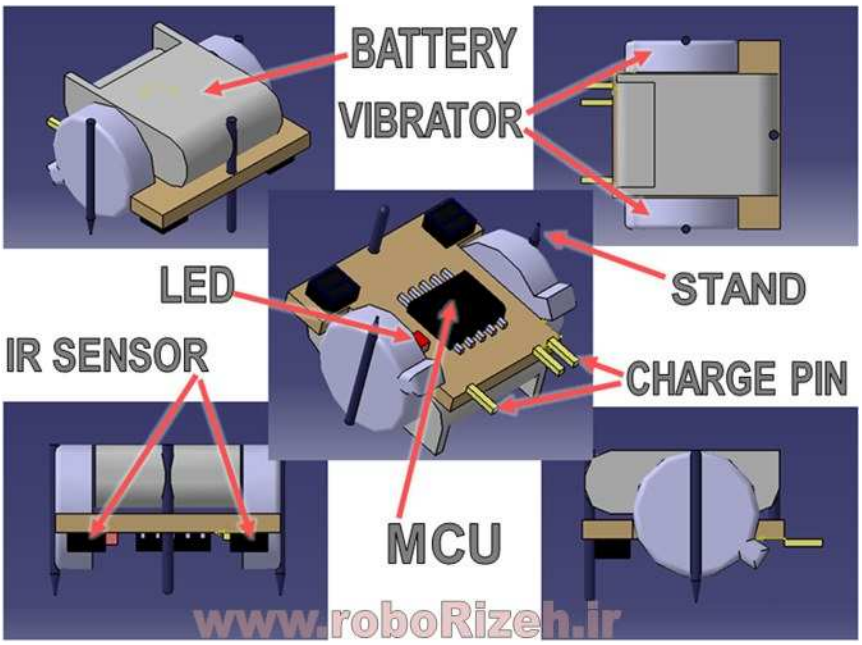


4. Soldering all components (attention to wire colors and polarity and jump wire):



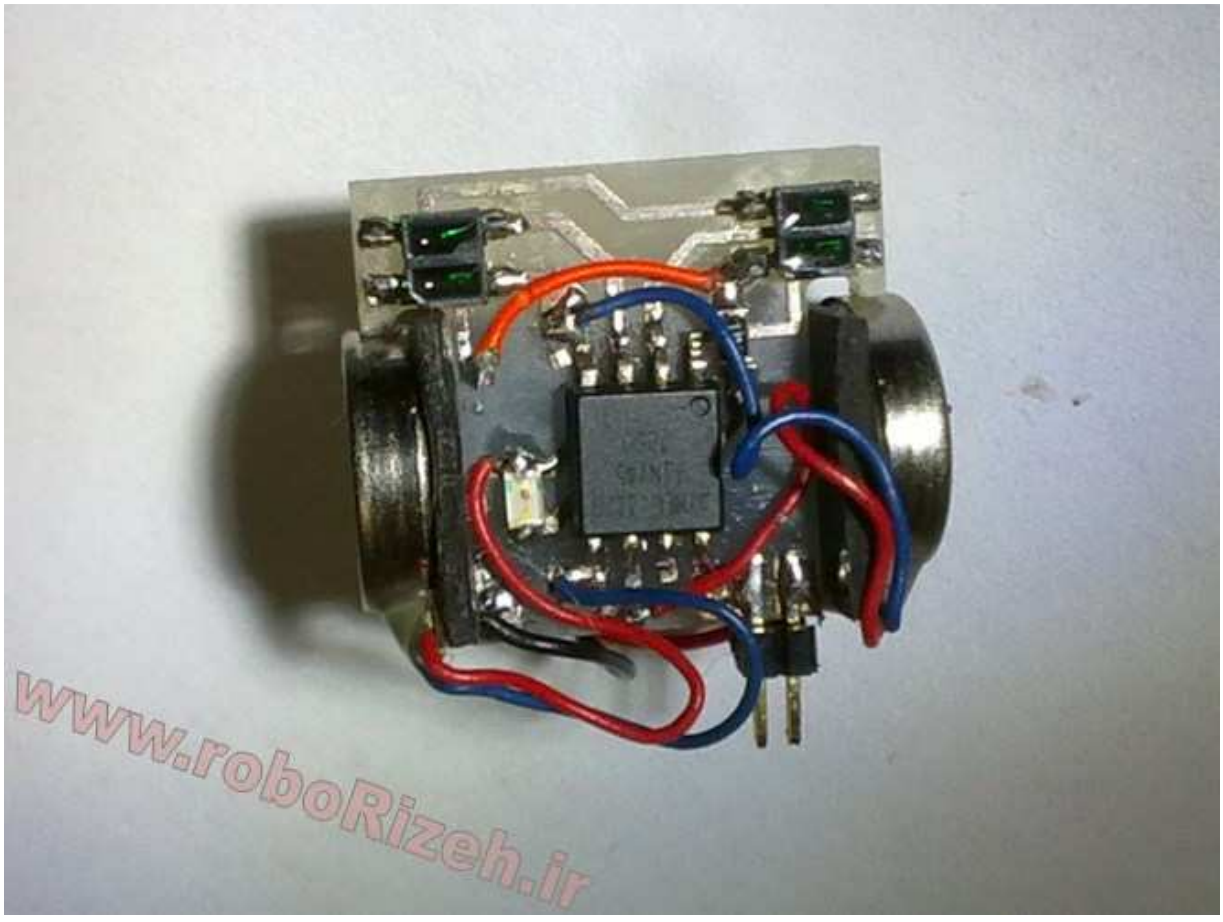


5. Mount the vibrators and stands and battery:



Use bilateral gummy band:


www.roboRizeh.ir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Cut 3 needles for robot stands (left & right= 12mm front=13mm):


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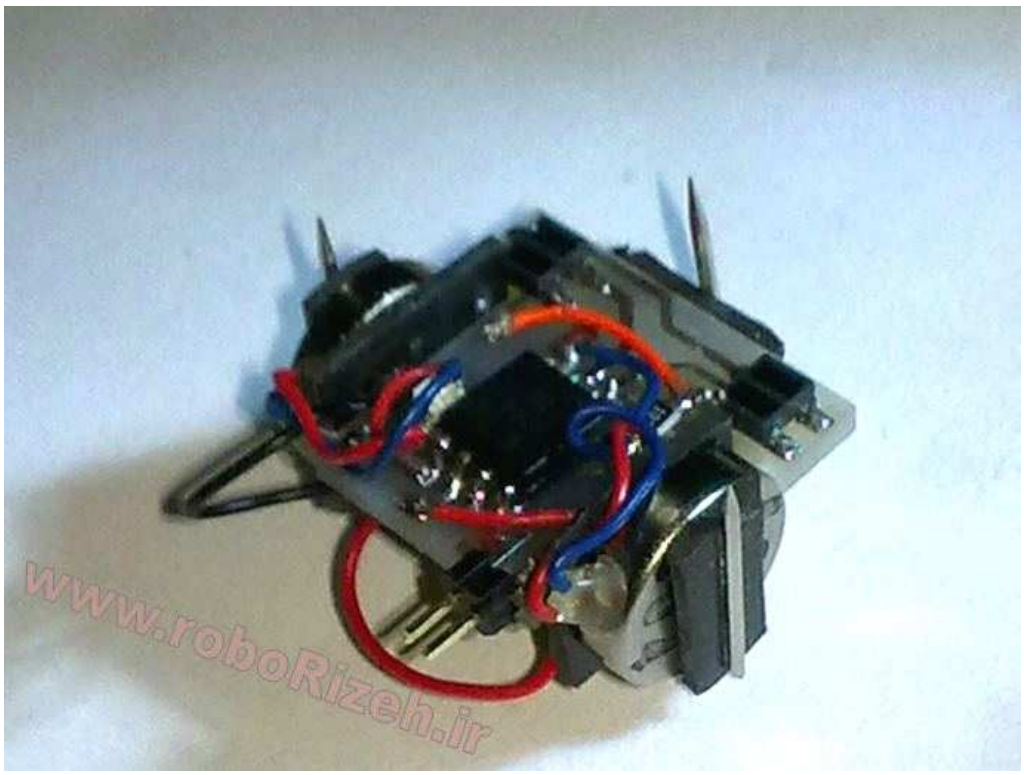
www.roboRizeh.ir

6. At over of a soft surface draw a course with 6mm width:


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7. How to run and test: After place power connector please wait 5 second (for sensors calibration). Then place robot on course.

NOTE:

1. The Robo_ RIZEH full paper article published in **ADVANCED ROBOTICS** journal:

"Design and motion analysis of vibration-driven small robot Rizeh"

http://www.tandfonline.com/doi/full/10.1080/01691864.2013.843788

2. Robo_RIZEH get **first place** at RoboCup IRANOPEN2013 in Demo league (free style league)

3. For more information and video please visit the robot website : www.roborizeh.ir

4. Special thanks to **Prof. Adel Akbarimajd** my partner in this project.


www.roboRizeh.ir
By: Naghi Sotoudeh
nscontrol@yahoo.com
Rizeh


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By: Naghi Sotoudeh
nscontrol@yahoo.com
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