

Introduction to the PIC32™ Based Open-Robot

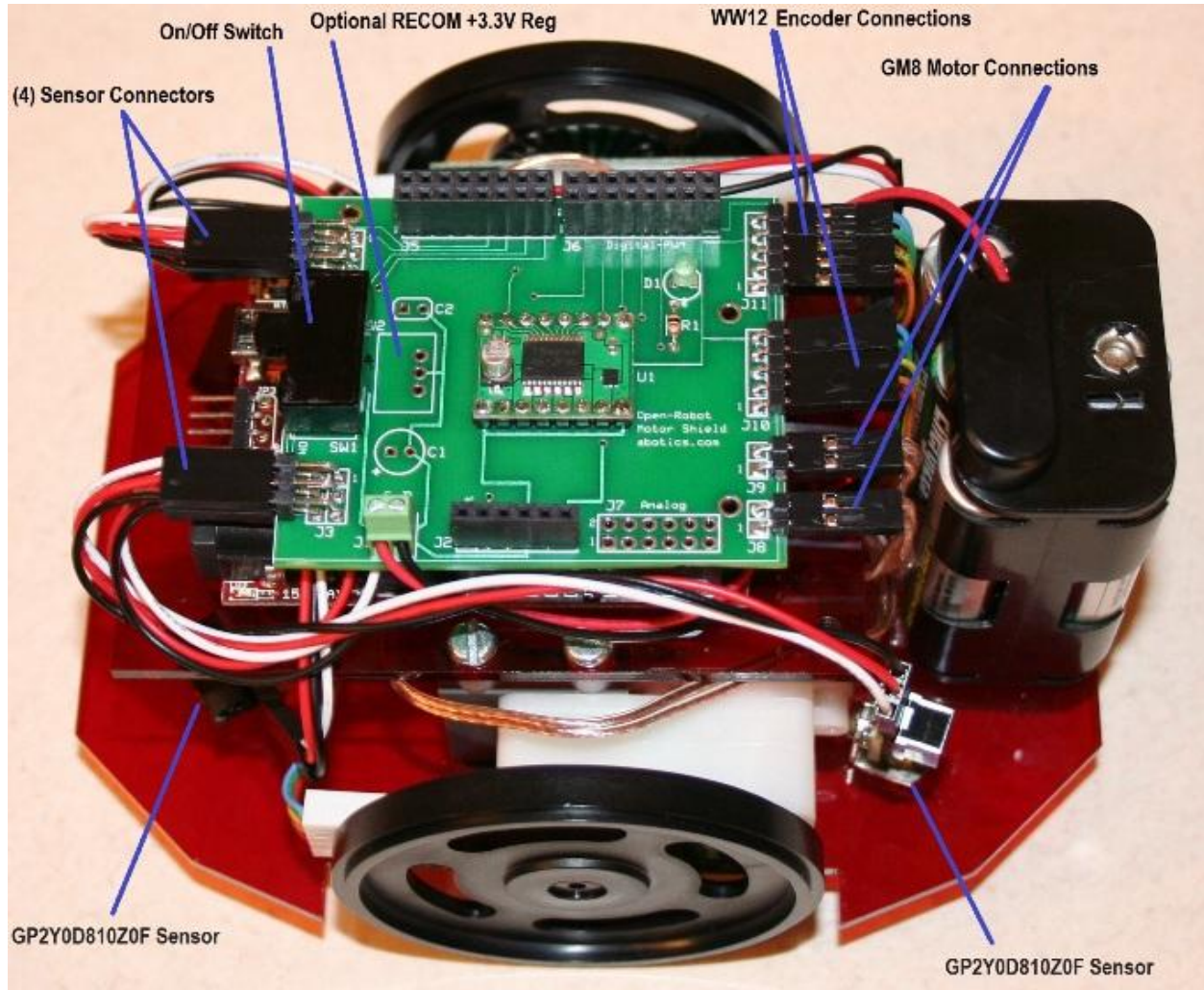


FIG 1. UNO32™ Based Open-Robot shown with optional WW12 encoders & (2) extra GP2Y0D810Z0F IR sensors.

The PIC32™ based Open-Robot leverages the new open-source, chipKit UNO32™ Arduino™ compatible prototyping platform and opens up a whole new world of programming possibilities¹. A specially designed stackable circuit board provides motor control and the ability to read the state of (4) connected Sharp GP2Y0D810Z0F sensors (default is two). This board also accepts the new WW12 Wheel Encoders from Nubotics (purchase separately) so that advanced motion control can be achieved².

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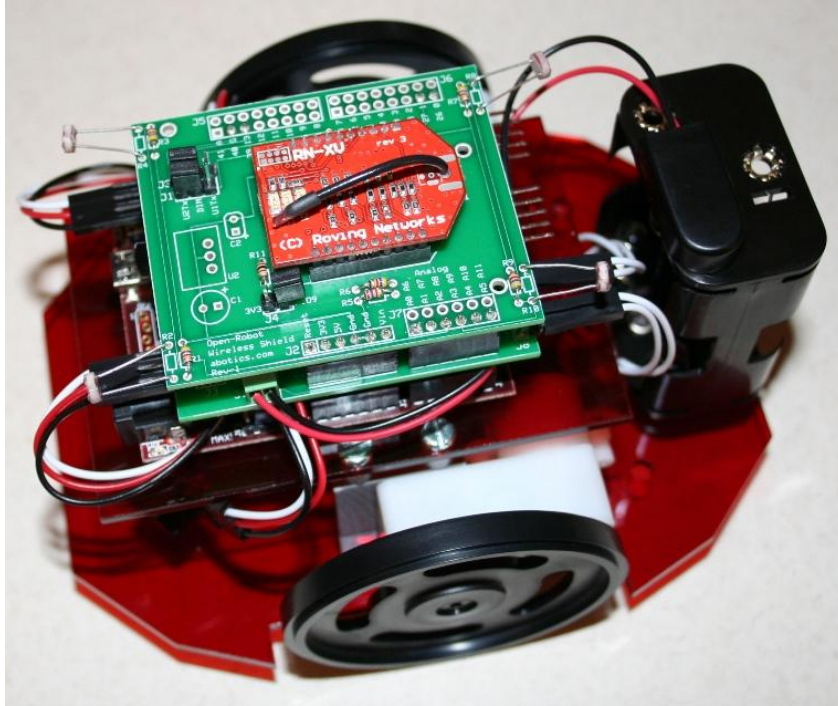


FIG 2. UNO32™ Based Open-Robot shown with wireless add-on board and RN-XV WiFi module.

Future stackable, add-on boards will be developed and at this time we have developed a WiFi add-on module that will leverage the newly released RN-XV WiFi module from Roving Networks³. The wireless add-on board not only provides WiFi capability via the RN-XV module, but also supports (4) cadmium sulfide photo-cells that are light sensitive and change resistance based upon the ambient light conditions. These light sensors are fed into the PIC32's analog-to-digital (A/D) inputs where their output is converted into a 10-bit digital value that corresponds to the light intensity. This board also supports connecting the RN-XV's DIN and DOUT serial communication pins to either UART1 or UART2 on the PIC32. UART1 is already used to upload new programs via the USB cable, but future bootloader changes could allow for wireless uploading by leveraging the RN-XV and UART1. Finally, a set of jumper pins, J4, allows the end-user to boot the RN-XV module in Ad-Hoc mode, connect wirelessly and then configure through Tera Term. Most wireless modules need to be configured by using a special development board, but not the RN-XV.

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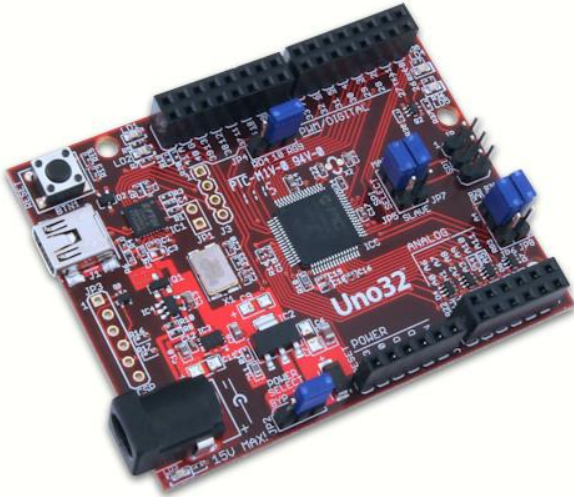


FIG 2. chipKit UNO32™ Prototyping Platform.

Download the Arduino™ Multi-Platform IDE (MPIDE) and you will be able to create, compile and download new programs to your Open-Robot using a simple USB cable⁴. No expensive in-circuit programmers to purchase unless you need to perform advanced level debugging.

A screenshot of the MPIDE software interface. The window title is 'OpenRobot_UNO32_Test | Arduino 0022-chipkit-win-20110521'. The menu bar includes 'File', 'Edit', 'Sketch', 'Tools', and 'Help'. Below the menu bar is a toolbar with icons for running, stopping, saving, and other functions. The main text area shows the following code:

```
OpenRobot_UNO32_Test
/*
  OpenRobot_UNO32_Test
  This is a test program for the UNO32 controlled Open-Robot.
  Created by Abraham L. Howell, 6.11.2011.
  */

int LED5_Pin = 43;
int PWMA_Pin = 6;
int AIn1_Pin = 4;
int AIn2_Pin = 9;
int PWMB_Pin = 5;
int BIn1_Pin = 3;
int BIn2_Pin = 2;
int PWM_Count=0;
int leftFrontEye = 13;
int rightFrontEye = 12;
int leftEncoderClk_Pin = 7;
int rightEncoderClk_Pin = 8;
int leftEncoderDir_Pin = 19;
int rightEncoderDir_Pin = 18;
```

FIG 3. MPIDE Screen Shot.

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Additional information can be found on the Arduino™ website⁵. Please check out the ChipKIT forum to find out more information regarding end-user questions, issues and current developments⁶. More information on the PIC32™ chips can be found on the Microchip® website⁷.

Please contact Abe Howell's Robotics (support@abotics.com) if you are interested in learning more about the new PIC32™ based Open-Robot.

WEB REFERENCES

1. <http://www.digilentinc.com/Products/Detail.cfm?NavPath=2,892,893&Prod=CHIPKIT-UNO32>
2. <http://www.nubotics.com>
3. <http://www.rovingnetworks.com>
4. <https://github.com/chipKIT32/chipKIT32-MAX/downloads>
5. <http://arduino.cc/en/>
6. <http://www.chipkit.org/forum/index.php>
7. http://www.microchip.com/en_US/family/32bit/