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EASY TO USE, VERSATILE ROBOTICS KITS

Rhino Robot Control Board [RKI-1550]

Users Manual

Robokits India

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The Rhino Robot control board is versatile and expandable platform for robotics. Due to its expansion capabilities the board can be used to control all robots starting from beginner's robot to advanced robots with multiple functionality.

The board is compatible to 6-25VDC input compared to all robot control boards available which accepts inputs just up to 12VDC.

It has onboard two MC33932 5A Driver IC's which can drive 4 DC motors or 2 stepper motors. The board is sold generally with only one MC33932 5A driver and second driver needs to be ordered separately.

The motor drivers have inbuilt protection for overheating so you would not see your motor drivers burnt in any case. The high capacity motor drivers give an edge to the development board for driving big robots without any problems. The board is designed in such a way that Back EMF for big motors do not affect working of microcontroller. Also the motor drivers give very good breaking and linear speeds of motors with input PWM compared to conventional motor drivers.

The board comes with a boot loader software pre-programmed in ATMega16 microcontroller and can be easily programmed through USB within few seconds.

This Product Includes

- **CD containing all required software's and Documents**
- **Rhino Robot Controller Board with ATMega16 and 1X 5A MC33932 Dual Motor driver**
- **USB cable**

Robot Controller Board Features

- **On Board Regulator with filters and Operating voltage from 6V-25V**
- **2 General purpose LED's**
- **2 Switches including reset**
- **Power on/off toggle switch 10A (Use better capacity switch if your power requirement is more then 10A or just short the terminals)**
- **16MHz crystal for maximum speed**
- **Onboard LCD connector compatible to HD44780 LCD Modules**
- **LCD brightness control**
- **Power Indicator LED**
- **4 DC/2 Stepper motor 5A driving capability (Normal configuration offers capability of 2 DC/1 Stepper motors)**
- **PWM pins connected to motor drivers for speed control of motors for two motor drivers**
- **8ADC/Standard servo compatible connectors. 4 Servo connectors extra.**
- **All Pins accessible through male header pins**
- **Onboard 36Khz receiver to receive signals from RC5 remote**

- PS2 remote compatibility (Shares same pins as of LCD so either LCD or PS2 remote can be used at a time).
- USB to UART converter onboard
- Can be expanded for I/O through expansion connector via SPI/I2C/UART.
- Reverse polarity protection using a diode (Short the diode to SMD pad provided on board to reduce voltage drop by 0.7V or increase current requirement if more then 6A. In this case reverse polarity protection will also be removed.)
- Can be programmed via USB through bootloader or through ISP programming (If programmed through ISP the bootloader will be erased and we do not offer bootloader files as of now).

Optional items

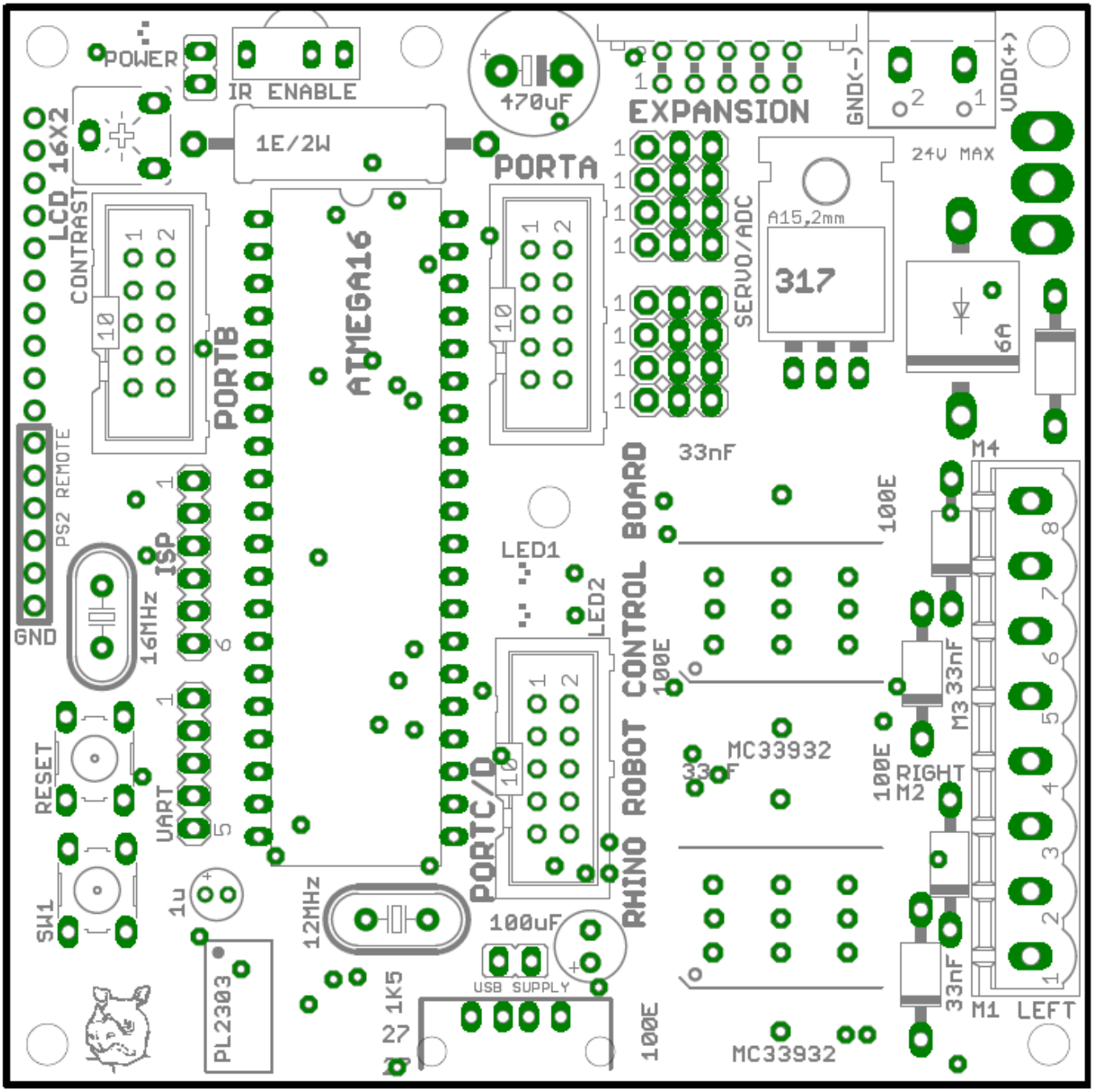
- LCD Module HD44780 compatible
- AVR Microcontroller ATMega16 included with board (Also ATMega32 can be selected)
- AVR programmer (Selectable between Serial Port, Parallel Port and USB Port Programmer) (Once you program bootloader chip through this programmers the chip cannot be re-programmed by bootloader through USB)
  *Serial port programmer does not work properly when LCD is connected. We recommend Parallel or USB port programmer if you are using LCD.
- 1X MC33932VW 5A Dual motor driver
- Playstation 2 remote control
- RC5 remote control
- 18 Servo expansion board
- IO expander board
- Sensors

Install Drivers for Rhino board

- The drivers are provided on CD with each Kit. If you have misplaced the CD you can download the driver from following link.
  http://www.robokits.co.in/downloads/PL2303HX_driver.zip
- To install the drivers use following method.

1. Remove Rhino board from USB if connected
2. Run driver .exe file from the CD or from above zip file.
3. If you have previously installed same drivers remove them first and then install again.
4. Restart the PC if required.
5. Connect your USB device.
6. Check whether it creates a virtual COM port. To check use following method.
   1. Open Control Panel -> System -> Device Manager (or press Windows Key+Pause, click on ”hardware” tab and choose device manager)
   2. Double Click on Ports (COM & LPT)
   3. Search for Prolific USB-to-Serial Comm Port(COMX)

Rhino Board top layout

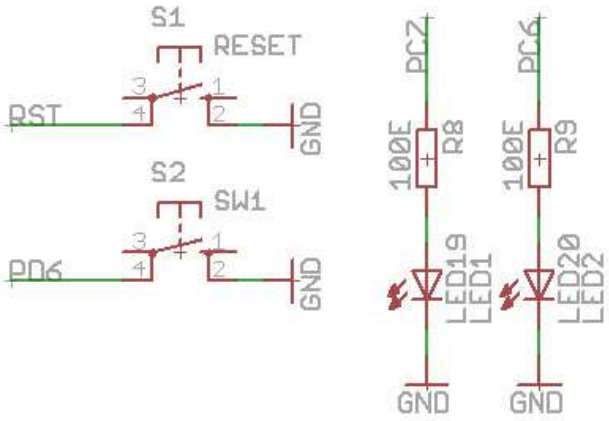


Providing Power Supply

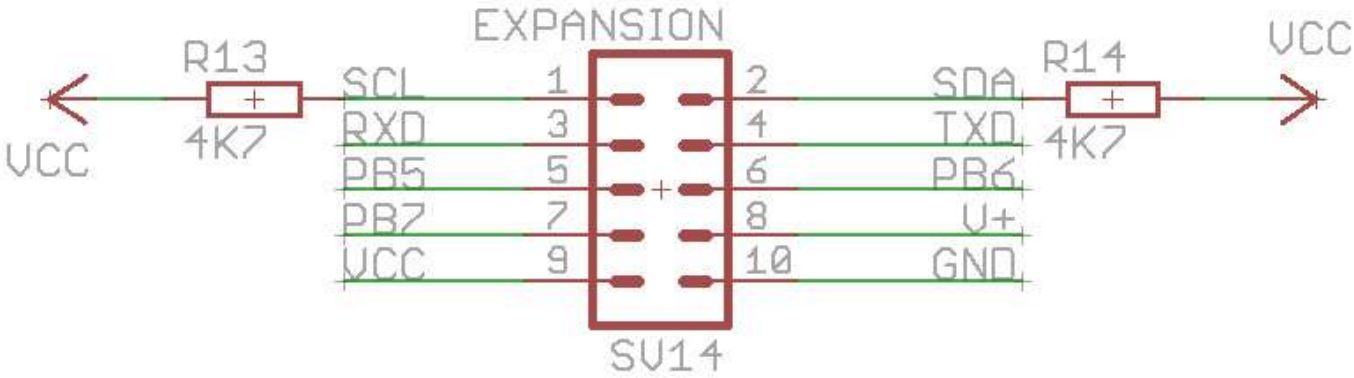
- **You can provide the power supply to the board from any DC source from 6V to 24V.**
- **The microcontroller is preprogrammed for Blinking LED1 and drive motors.**
- **To power up the board using any DC source use VDD terminal as +VE terminal and GND as –VE terminal. Put switch in correct position and check Power LED.**
- **Also 5V can be given directly to the board via USB. Make sure that USB supply jumper is shorted.**
- **In case of reverse polarity the 6A Diode will provide safety.**

Rhino board connections

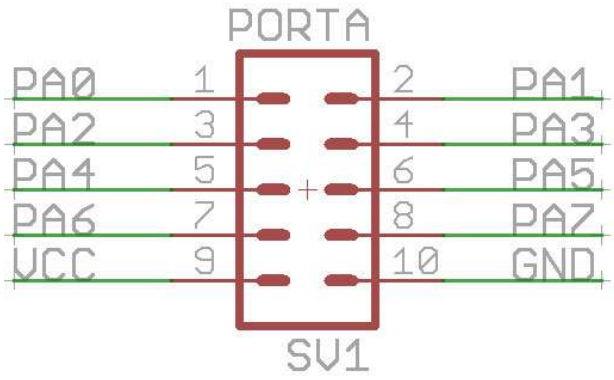
Switches & LED's



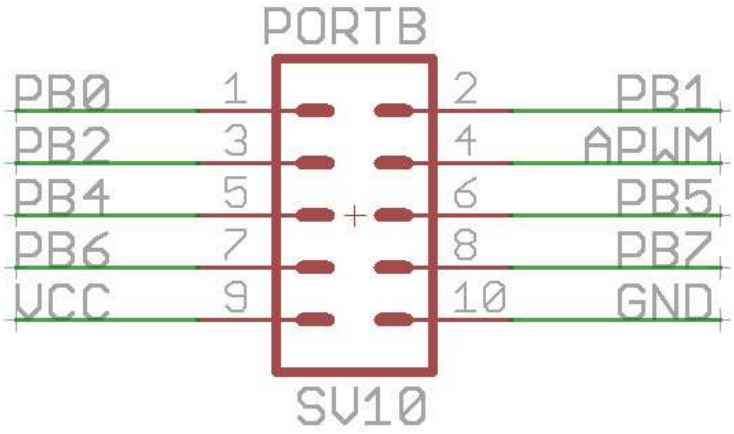
Expansion PORT



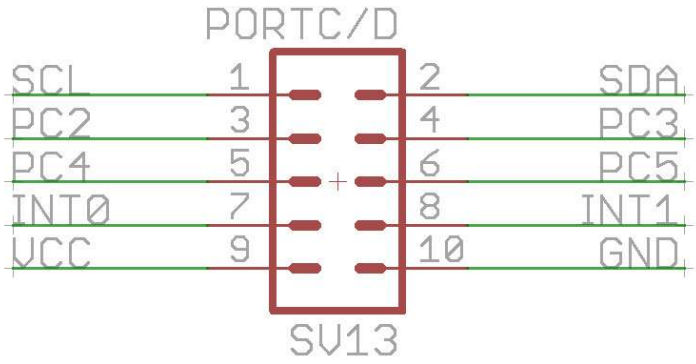
PORTA



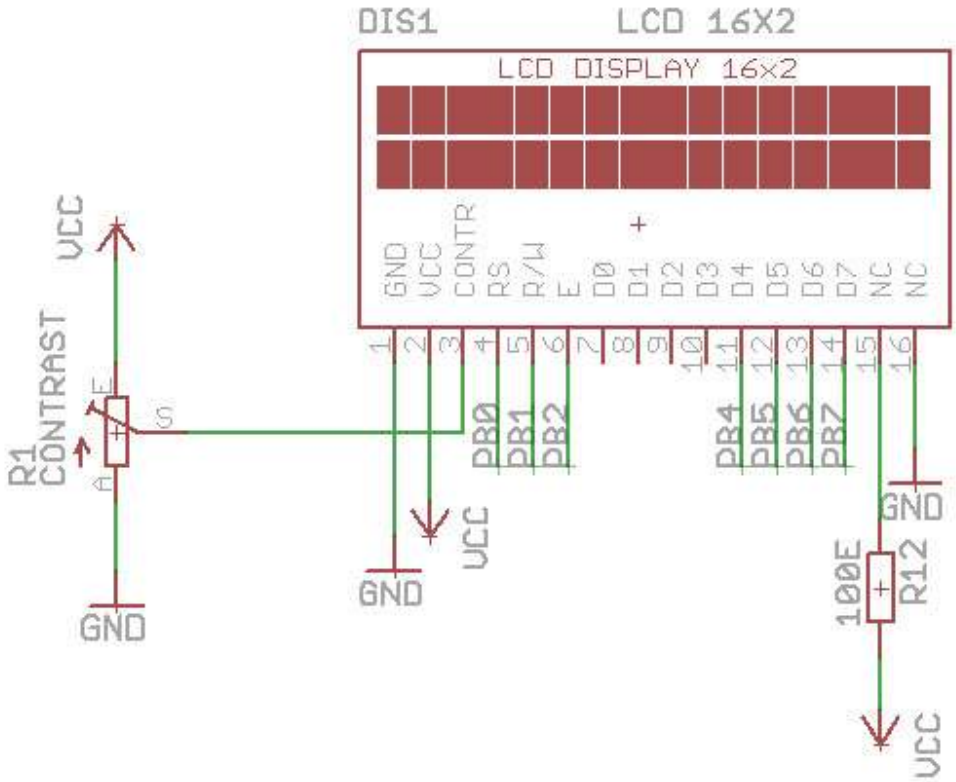
PORTB



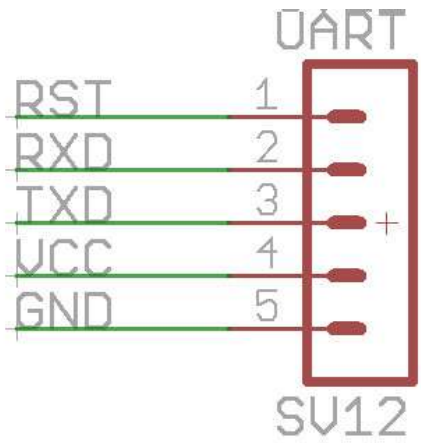
PORTC/D



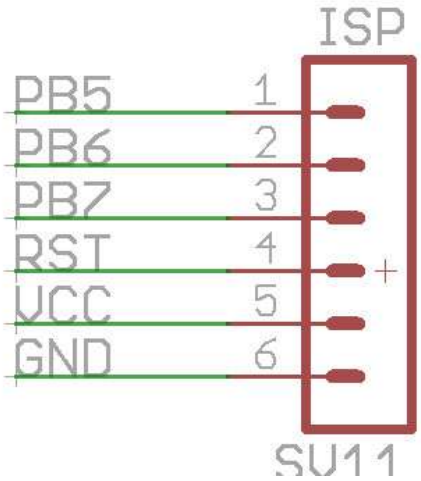
LCD


DIS1
LCD 16X2
LCD DISPLAY 16X2
GND
VCC
CONTR
RS
R/W
E
D0
D1
D2
D3
D4
D5
D6
D7
NC
NC
VCC
R1
CONTRAST
GND
PB0
PB1
PB2
PB4
PB5
PB6
PB7
GND
VCC
GND
100E
R12
VCC

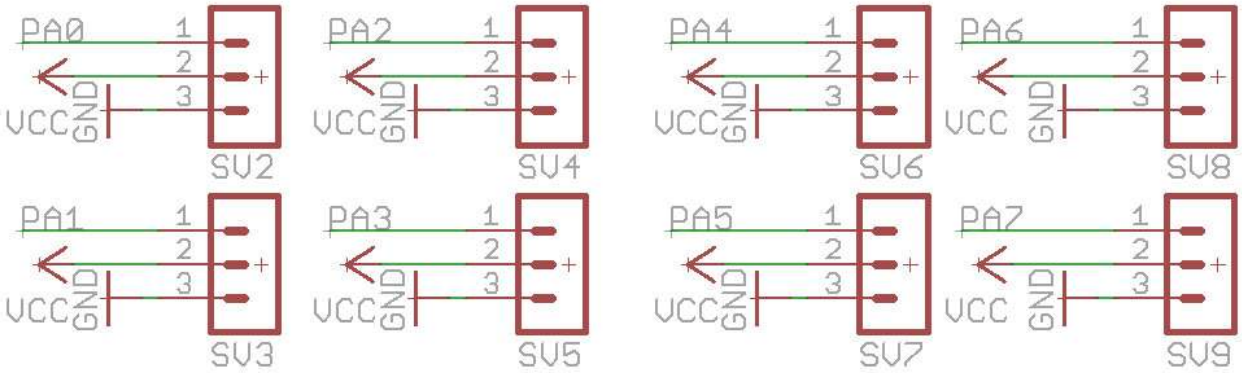
UART


UART
RST
RXD
TXD
VCC
GND
1
2
3
4
5
SV12

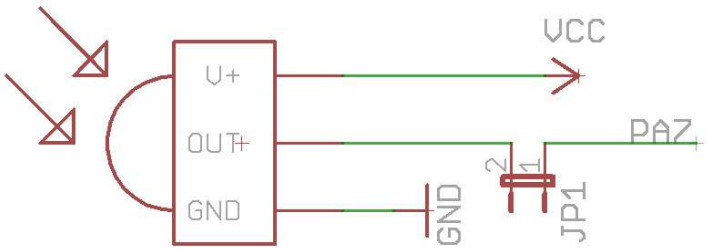
ISP



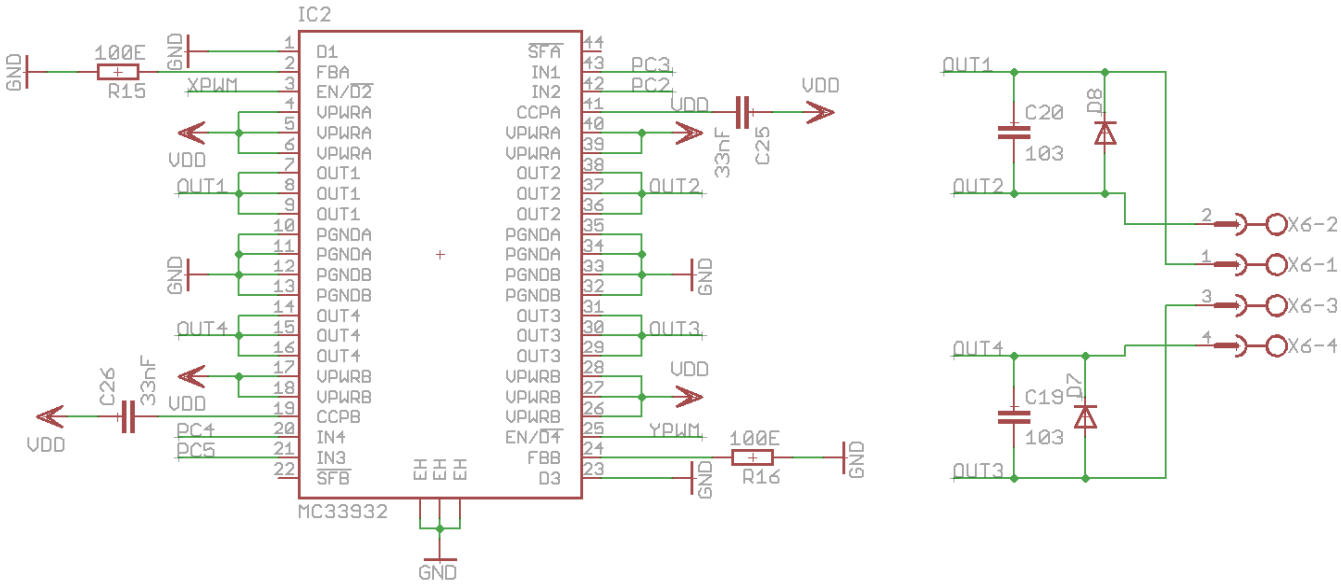
Servo/ADC

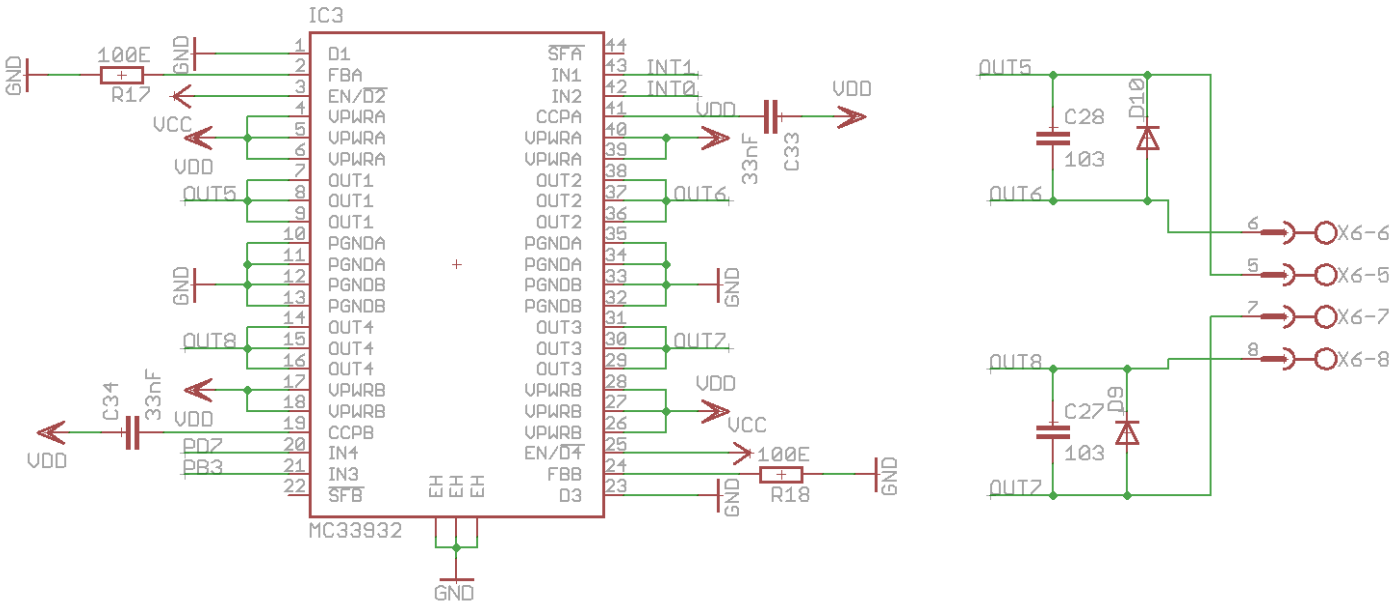


IR RC5 Receiver



Motor Drivers





***Note**

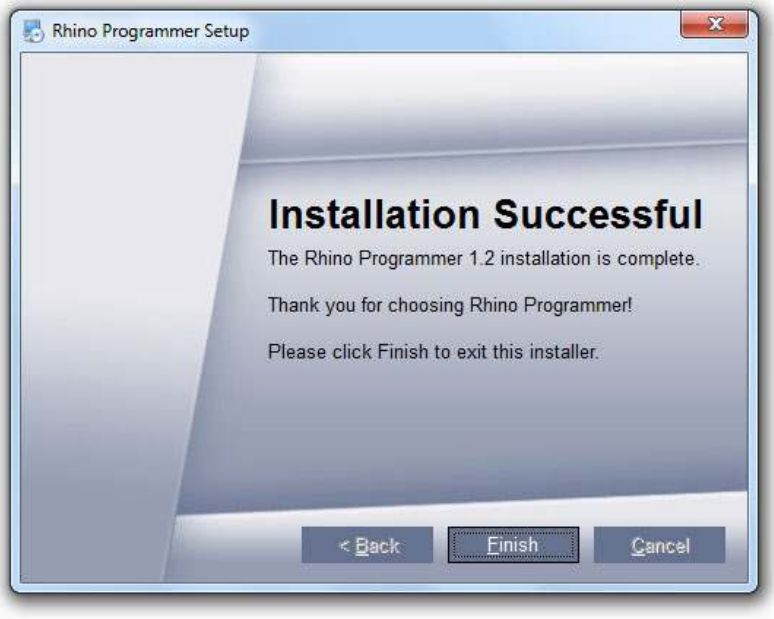
1. XPWM – PD5, YPWM – PD4

2. M1 – Left motor where M1-1 – Left motor Positive terminal, M1-2 Left motor Negative terminal

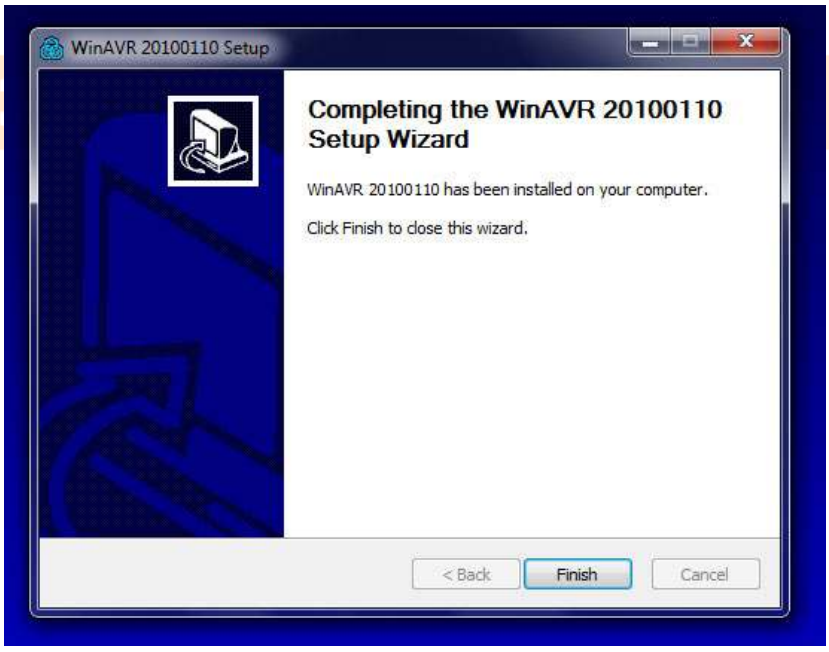
3. M2 – Right Motor where M2-1 – Right motor Negative terminal, M2-2 – Right motor Positive terminal

Rhino programmer Installation Steps

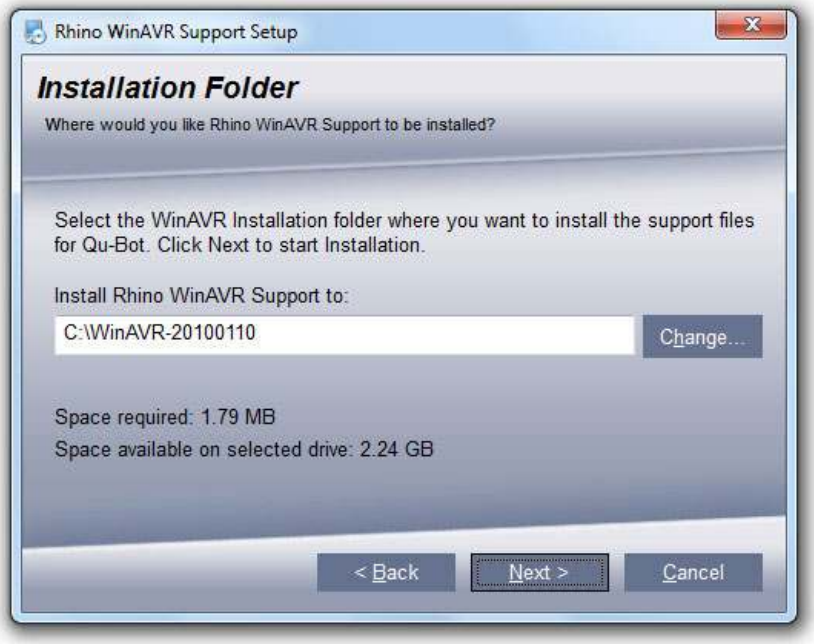
- **Run "Rhino_Programmer_Setup.exe" file from CD. It will install Rhino programmer.**

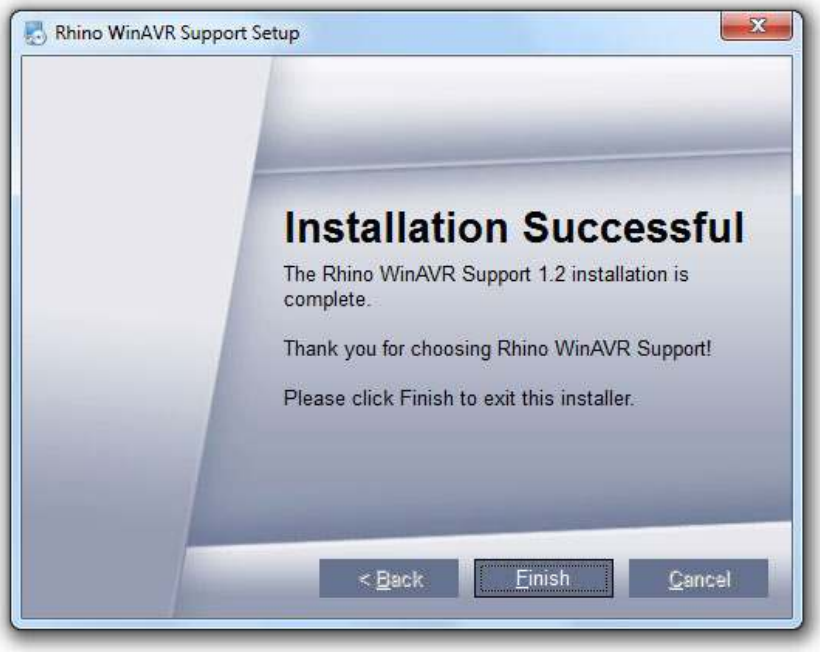


- **If the setup is unable to find WinAVR installed on a computer it will give following warning and if clicked on yes it will install WinAVR. If WinAVR is already installed it will move to next step**



- **The software will then install WinAVR support for Rhino board programming through programmers notepad. It will automatically select Installed WinAVR path.**





Using Rhino Robot Programmer Software

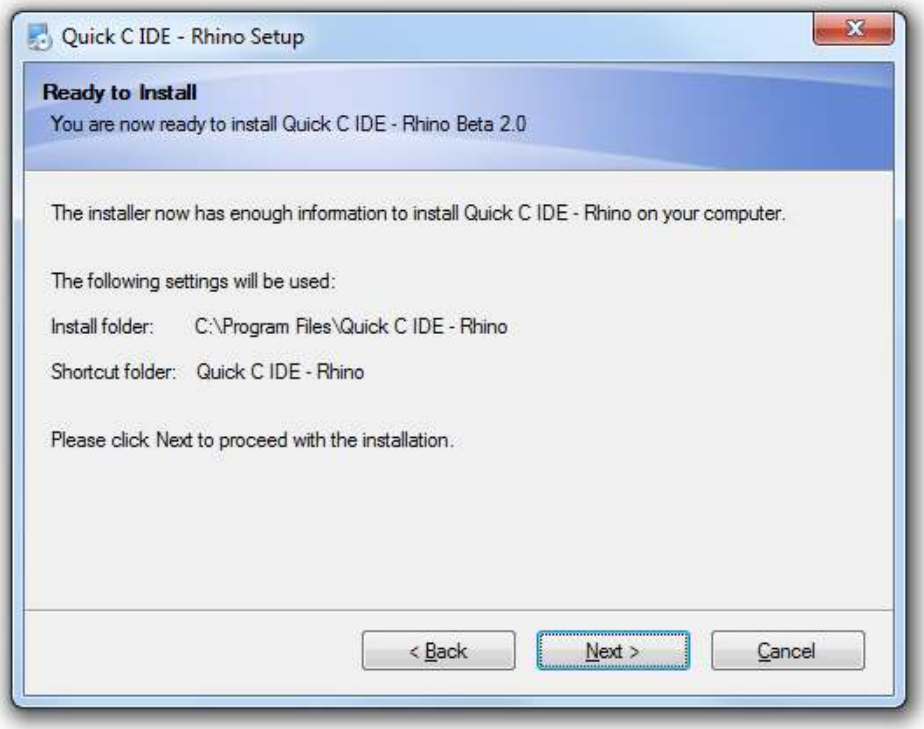
- **Open Rhino programmer from start menu.**
- **Open Bin or Hex file by clicking on "Open file"**
- **Click on "Program file to Rhino".**

Quick C IDE - Rhino Introduction

- **QuickC IDE - Rhino is easy to use software with multiple inbuilt libraries specifically for rhino board.**
- **Check QuickC IDE – Rhino Library reference file from http://www.robokits.co.in/downloads/quickclibraryref.pdf.**

Quick C IDE - Rhino Installation

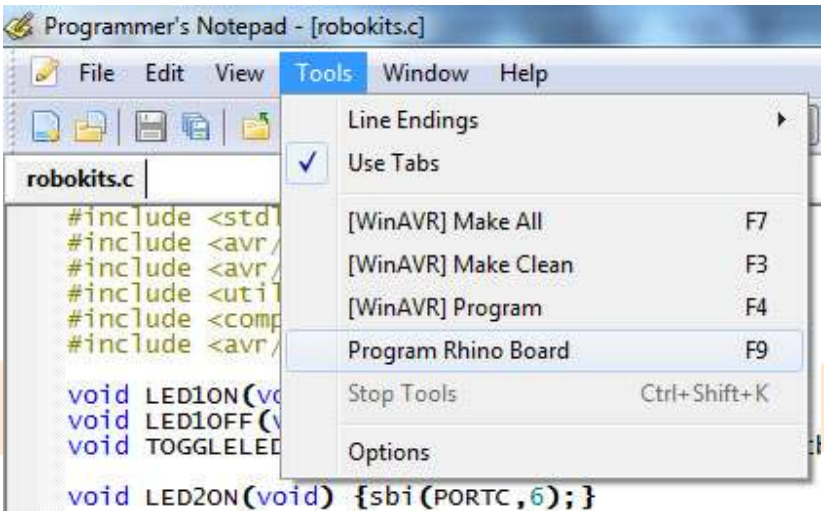
- **Run QuickC setup from CD.**

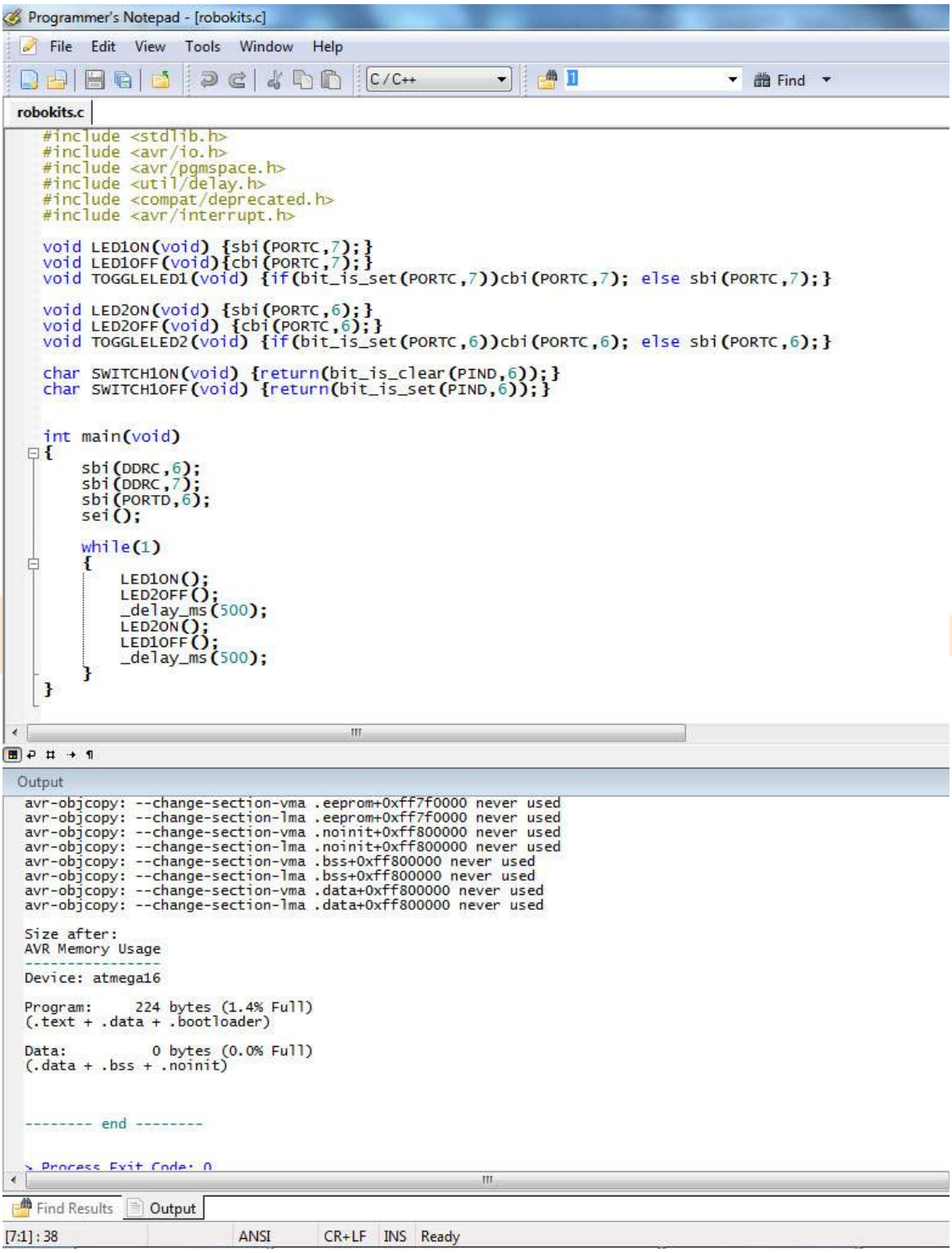

Quick C IDE - Rhino Setup
Ready to Install
You are now ready to install Quick C IDE - Rhino Beta 2.0
The installer now has enough information to install Quick C IDE - Rhino on your computer.
The following settings will be used:
Install folder: C:\Program Files\Quick C IDE - Rhino
Shortcut folder: Quick C IDE - Rhino
Please click Next to proceed with the installation.
< Back
Next >
Cancel


Quick C IDE - Rhino Setup
Installation Successful
The Quick C IDE - Rhino Beta 2.0 installation is complete.
Thank you for choosing Quick C IDE - Rhino!
Please click Finish to exit this installer.
< Back
Finish
Cancel

Using Rhino Sample codes

- **Copy sample codes provided on Rhino bard CD to hard drive**
- **Open robokits.c file from any sample code folder using Programmers notepad.**
- **Click F3 to clean the target or go to Menu Tools -> Make Clean.**
- **Click F7 to build target or go to Menu Tools -> Make All.**
- **Click F9 to Program to Rhino board or go to Menu Tools -> Program Rhino board.**




Programmer's Notepad - [robokits.c]
File Edit View Tools Window Help
C / C++
Find
robokits.c
#include <stdlib.h>
#include <avr/io.h>
#include <avr/pgmspace.h>
#include <util/delay.h>
#include <compat/deprecated.h>
#include <avr/interrupt.h>
void LED1ON(void) {sbi(PORTC,7);}
void LED1OFF(void){cbi(PORTC,7);}
void TOGGLELED1(void) {if(bit_is_set(PORTC,7))cbi(PORTC,7); else sbi(PORTC,7);}
void LED2ON(void) {sbi(PORTC,6);}
void LED2OFF(void) {cbi(PORTC,6);}
void TOGGLELED2(void) {if(bit_is_set(PORTC,6))cbi(PORTC,6); else sbi(PORTC,6);}
char SWITCH1ON(void) {return(bit_is_clear(PIND,6));}
char SWITCH1OFF(void) {return(bit_is_set(PIND,6));}
int main(void)
{
sbi(DDRC,6);
sbi(DDRC,7);
sbi(PORTD,6);
sei();
while(1)
{
LED1ON();
LED2OFF();
_delay_ms(500);
LED2ON();
LED1OFF();
_delay_ms(500);
}
}
Output
avr-objcopy: --change-section-vma .eeprom+0xff7f0000 never used
avr-objcopy: --change-section-lma .eeprom+0xff7f0000 never used
avr-objcopy: --change-section-vma .noinit+0xff800000 never used
avr-objcopy: --change-section-lma .noinit+0xff800000 never used
avr-objcopy: --change-section-vma .bss+0xff800000 never used
avr-objcopy: --change-section-lma .bss+0xff800000 never used
avr-objcopy: --change-section-vma .data+0xff800000 never used
avr-objcopy: --change-section-lma .data+0xff800000 never used
Size after:
AVR Memory Usage
Device: atmega16
Program: 224 bytes (1.4% Full)
(.text + .data + .bootloader)
Data: 0 bytes (0.0% Full)
(.data + .bss + .noinit)
-------- end --------
Process Exit Code: 0
Find Results
Output
[7:1] : 38
ANSI
CR+LF
INS
Ready

Service and Support

Service and support for this product are available from Robokits India. The Robokits Web site (http://www.robokits.co.in) maintains current contact information for all Robokits products.

Limitations and Warrantees

The Rhino Robot Control Board is intended for personal experimental and amusement use and in no case should be used where the health or safety of persons may depend on its proper operation. Robokits provides no warrantee of suitability or performance for any purpose for the product. Use of the product software and or hardware is with the understanding that any outcome whatsoever is at the users own risk. Robokits sole guarantee is that the software and hardware perform in compliance with this document at the time it was shipped to the best of our ability given reasonable care in manufacture and testing. All products are tested for their best performance before shipping, and no warranty or guarantee is provided on any of them. Of course the support is available on all of them for no cost.

Disclaimer

This product and its documentation are supplied on an as-is basis and no warranty as to their suitability for any particular purpose is either made or implied.

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