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A Zilog ZNEO based Self-Balancing Robot with PID control.

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This project undertakes the construction and implementation of a two-wheeled robot that is capable of balancing itself. The structural, mechanical, and electronic components of the bot are assembled in a manner that produces an inherently unstable platform that is highly susceptible to tipping in one axis.

The wheels of the robot are capable of independent rotation in two directions, each driven by a servo motor. A pololu servo motor controller provides current for the motors and generates the required pulse width modulated signals to position the servos. Information about the angle of the device relative to the ground (i.e. tilt) is obtained from two reflective object sensors mounted on the device. A Zilog ZNEO microcontroller receives sensor information from two analog-to-digital input ports and generates motor control signals on the serial output. The sensor information is fed to the microcontroller and is processed by a crude proportional, integral, derivative (PID) algorithm to generate compensating position control signals in order to balance the device.

KEY FEATURES:

- Implements true proportional, integral, derivative (PID) algorithmic control to rapidly seek and reliably maintain stability.
- Supports configuration of servo motors, sensors, and PID controller parameters via a menu-based interface over a serial link to your PC *or* directly onboard the device without any external cables.
- Highly modular design allows for thorough testing and validation of underlying components.

Zilog ZNEO Mcu

1	9V
2	Vcc
3	Vdd
4	GND
5	
6	PB0_ALG0
7	PB1_ALG1
8	PD4_TXD1
9	
10	

Pololu Motor Controller

reset	1
logic level serial output	2
logic level serial input	3
VIN (5-16 V)	4
GND	5
	6
Servo Power (4-6 V)	7
GND	8

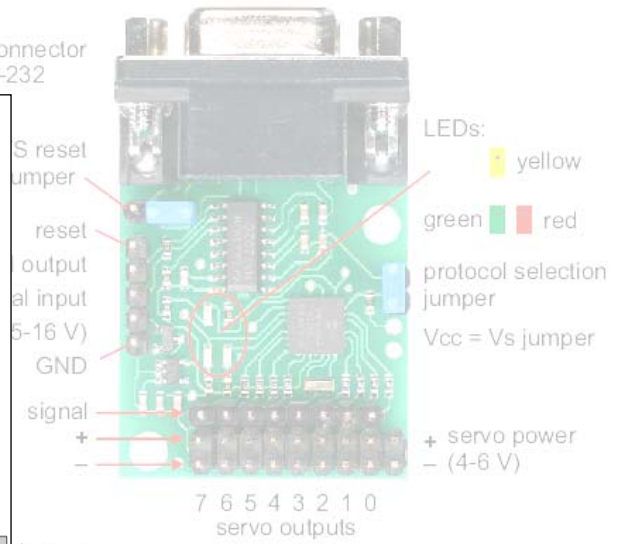
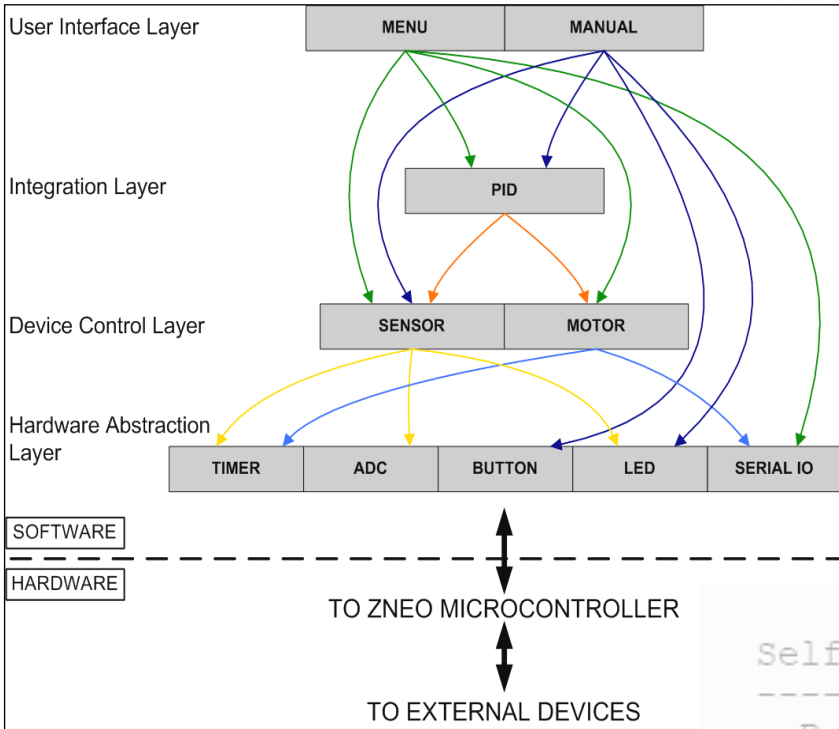
QRB-1134

orange	1
green	2
blue	3
white	4

QRB-1134

orange	1
green	2
blue	3
white	4

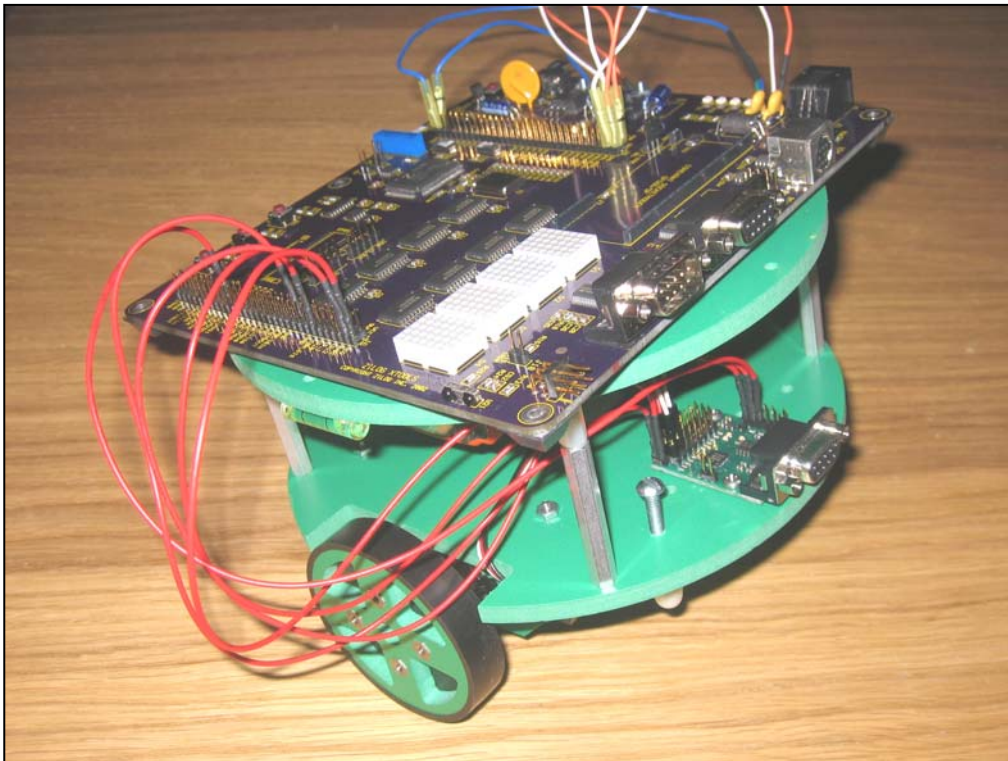
DB9 connector for RS-232



Self-Balancing Bot Motor Menu

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B Back to main menu.
M Toggle which motor is being controlled.
  O Turn motor on or off.
  D Toggle motor direction.
  S Set motor speed range. [15 - 15]
  V Set motor speed. [0 - 0]
  P Set motor position. [62 - 62]
  A Set motor position absolute. [0 - 0]
  N Set motor neutral position. [0 - 0]
  M Set motor neutral position absolute. [0 - 0]
  R Set motor neutral position absolute. [0 - 0]
  S [RSPANC]:
  
```



Attention embedded developers: ALWAYS remember to check your sensor's datasheet for range and response characteristics lest you obtain a non-linear behaving device and lose your mind!