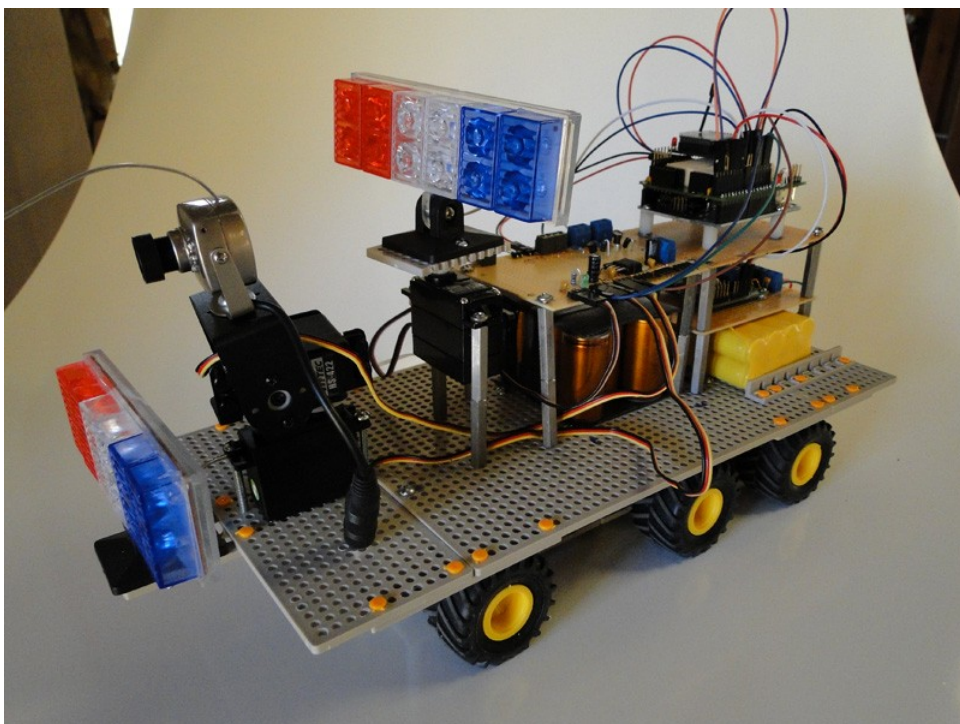


6 Wheel Robot-Experiment



Main components of the robot:

Micro Controller Board: Arduino Duemilanove

Motor Controller: TReX Jr

Prototype Shield for Arduino

Breakout Board

3 Servos

Wireless camera

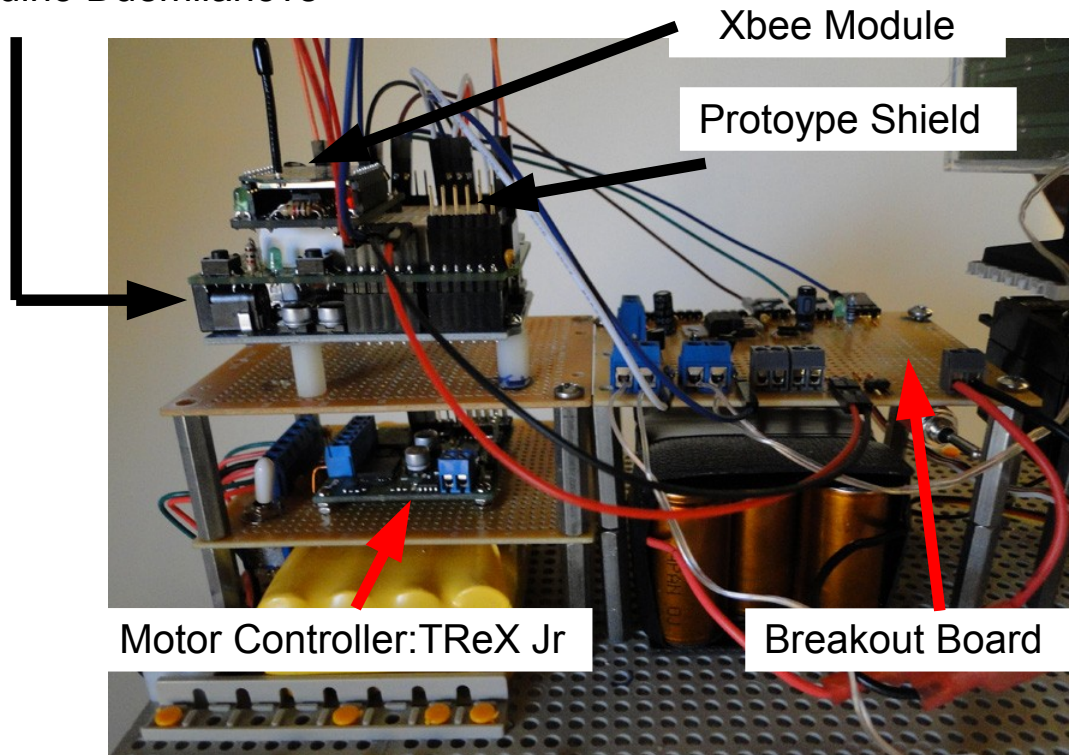
Blinking LED Panels

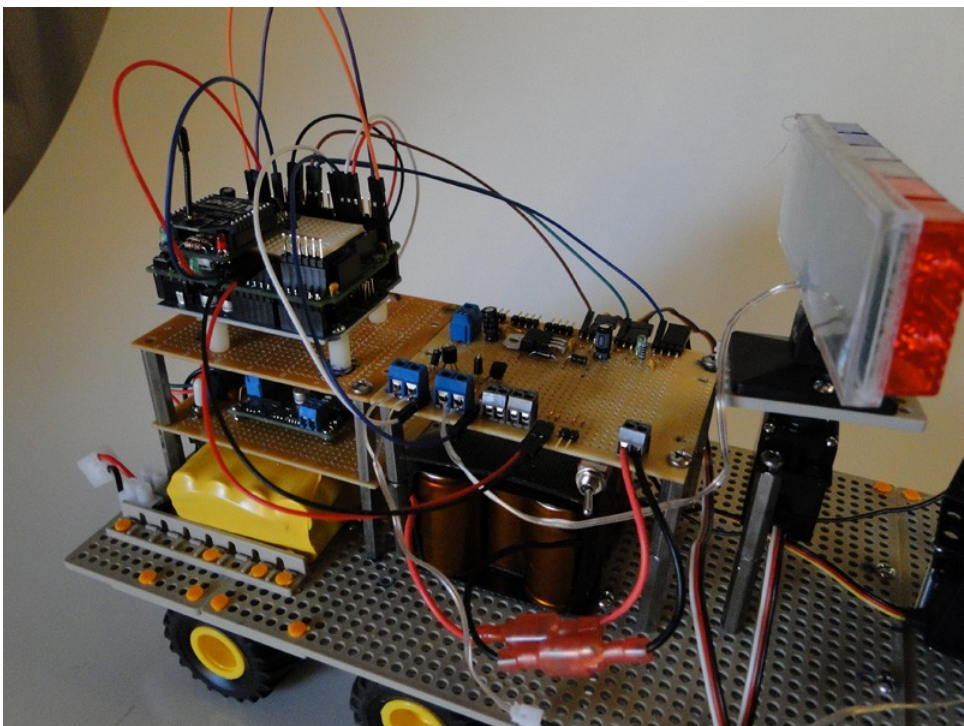
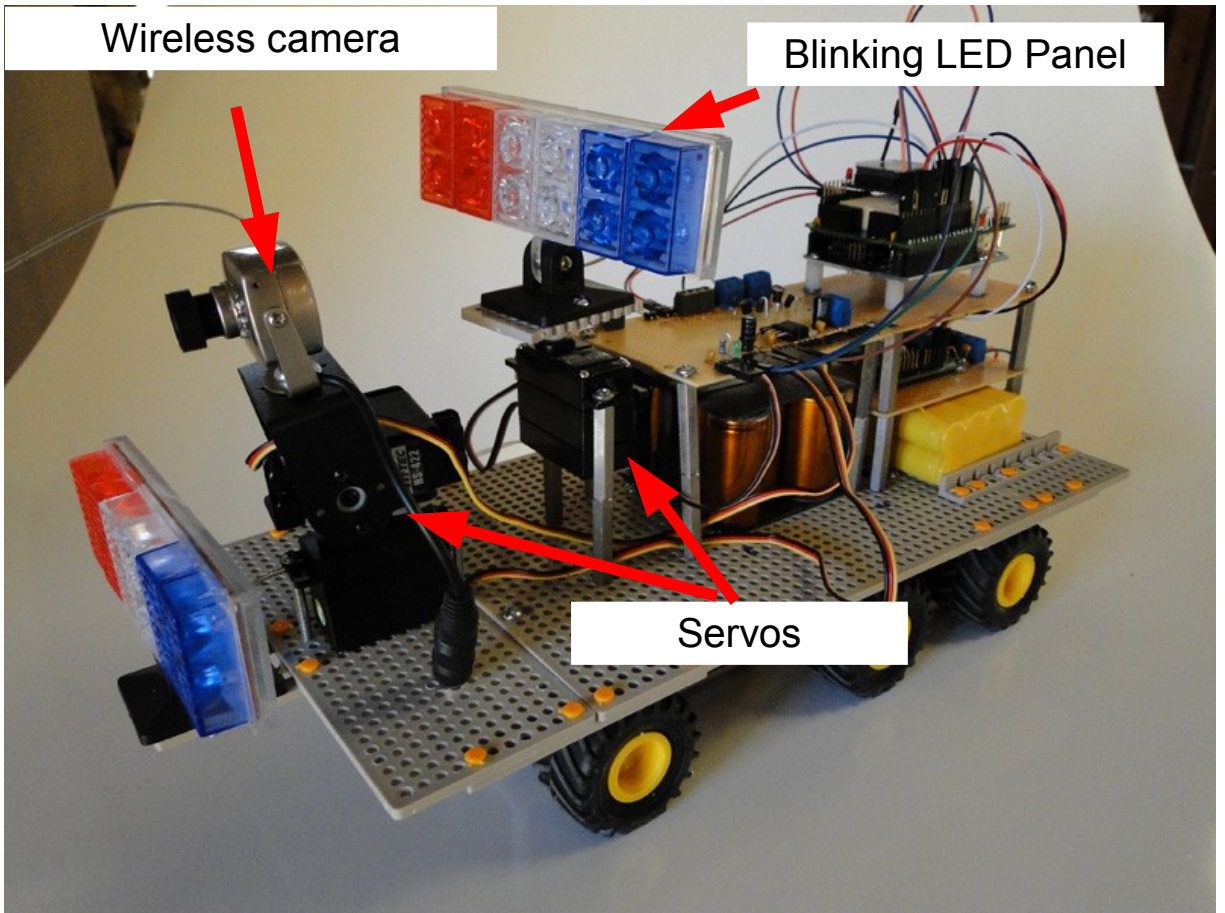
2 Xbee Modules

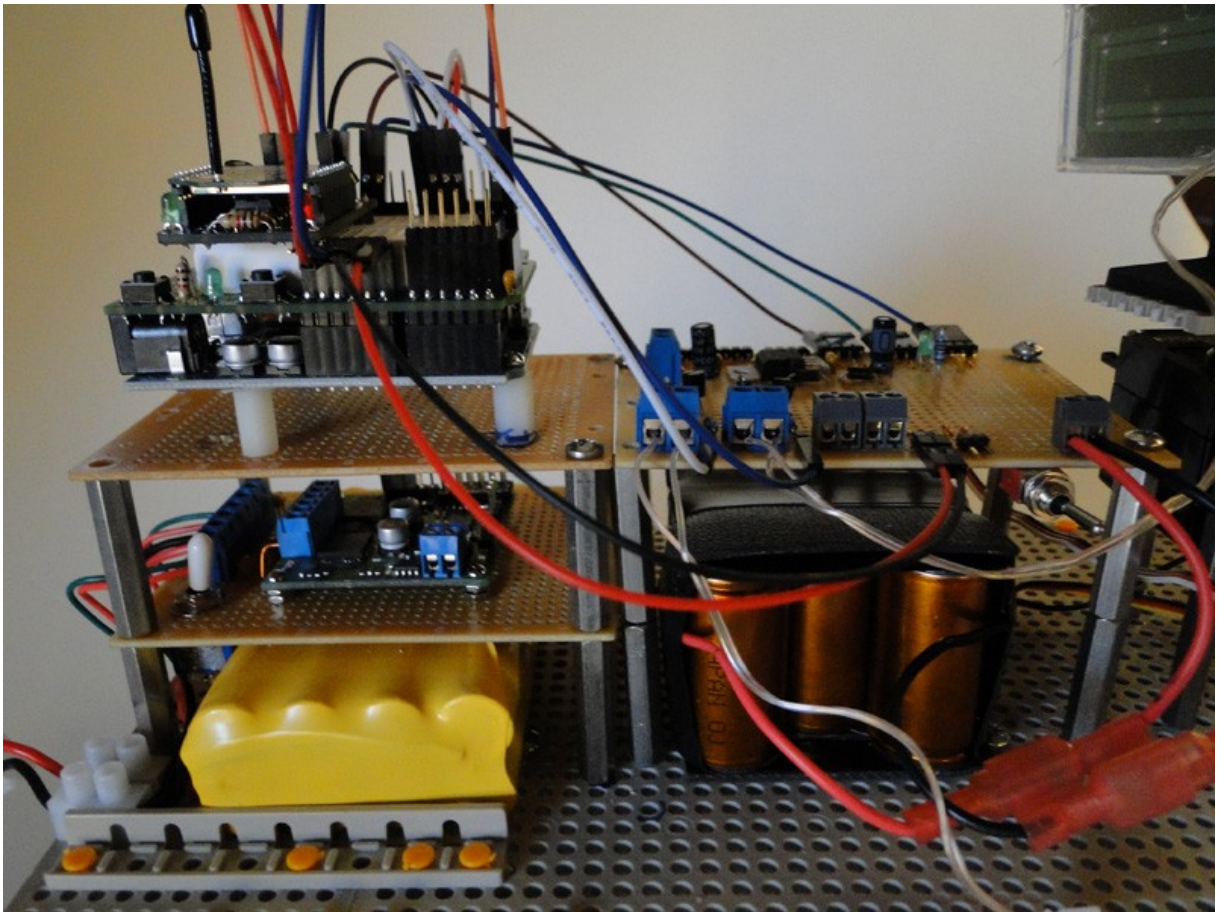
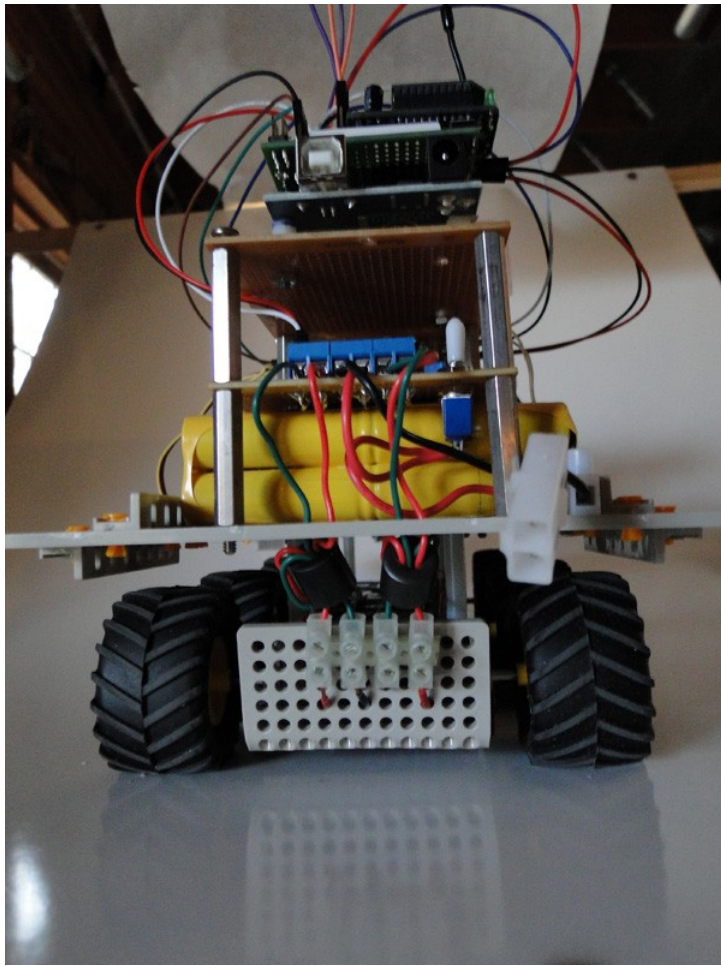
3 Double Gearboxes

2 Batteries: 9.6V

Micro Controller:
Arduino Duemilanove



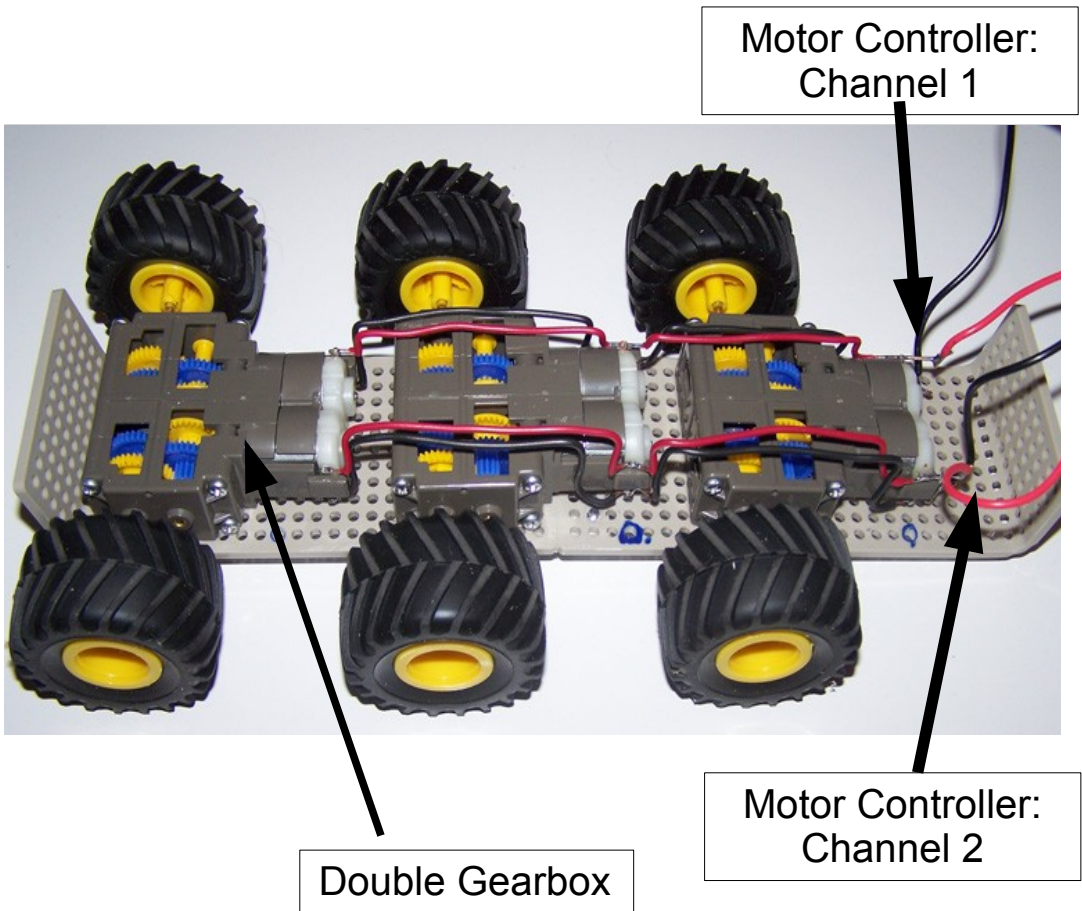




Double Gearboxes:

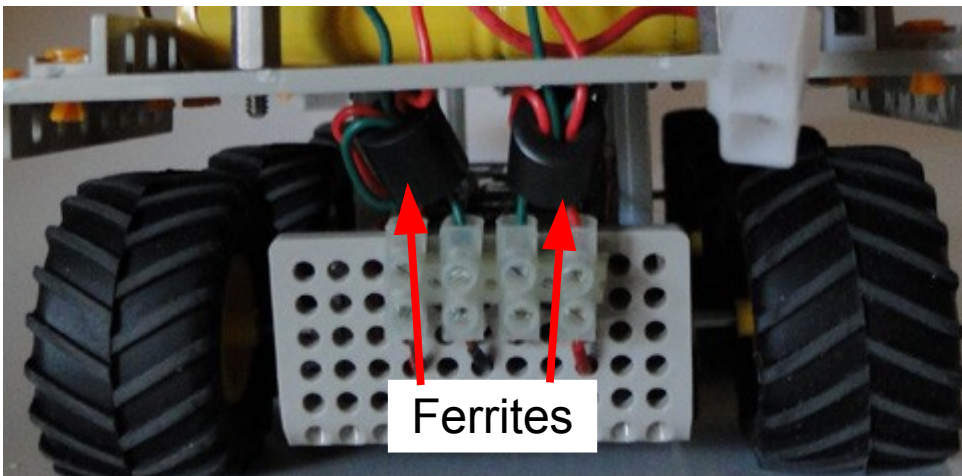
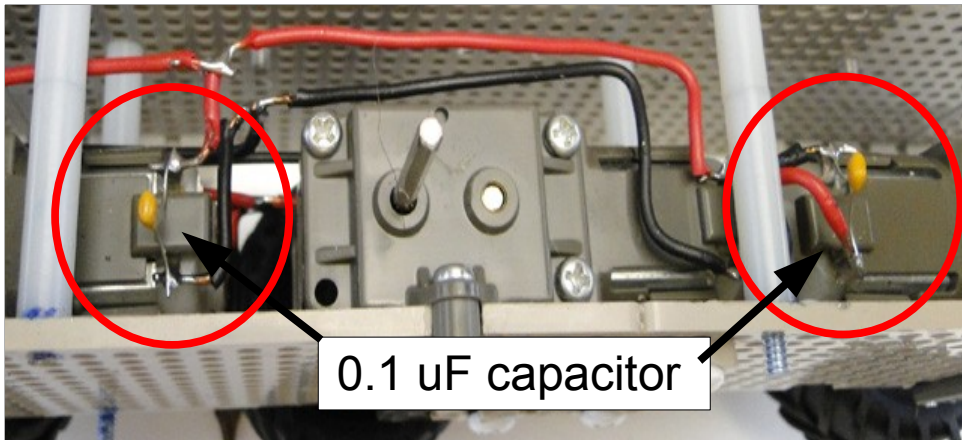
The robot is assembled with three double gear boxes from Tamiya and six off road tires.

The motors/gearboxes on each side are connected in parallel. So that each channel of the motor controller TReX Jr can drive one side of the robot.



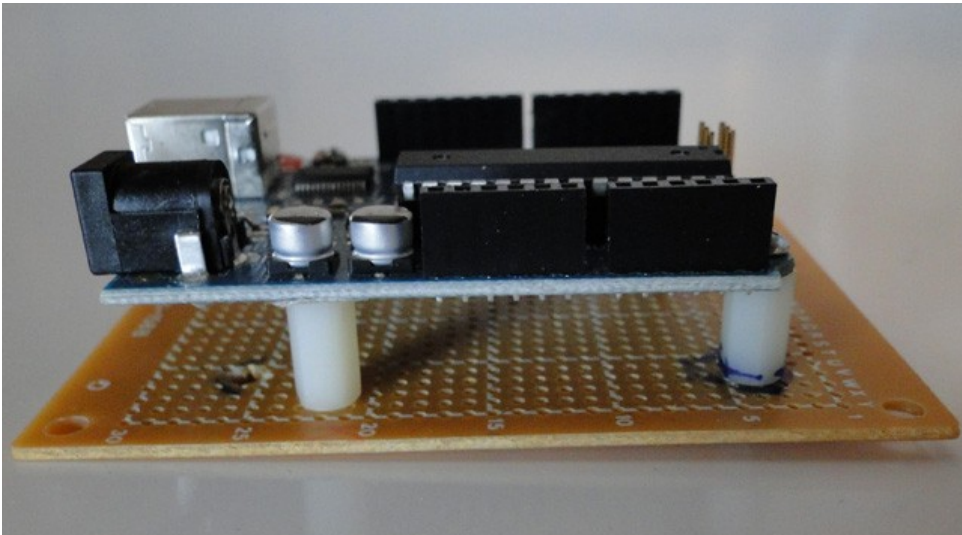
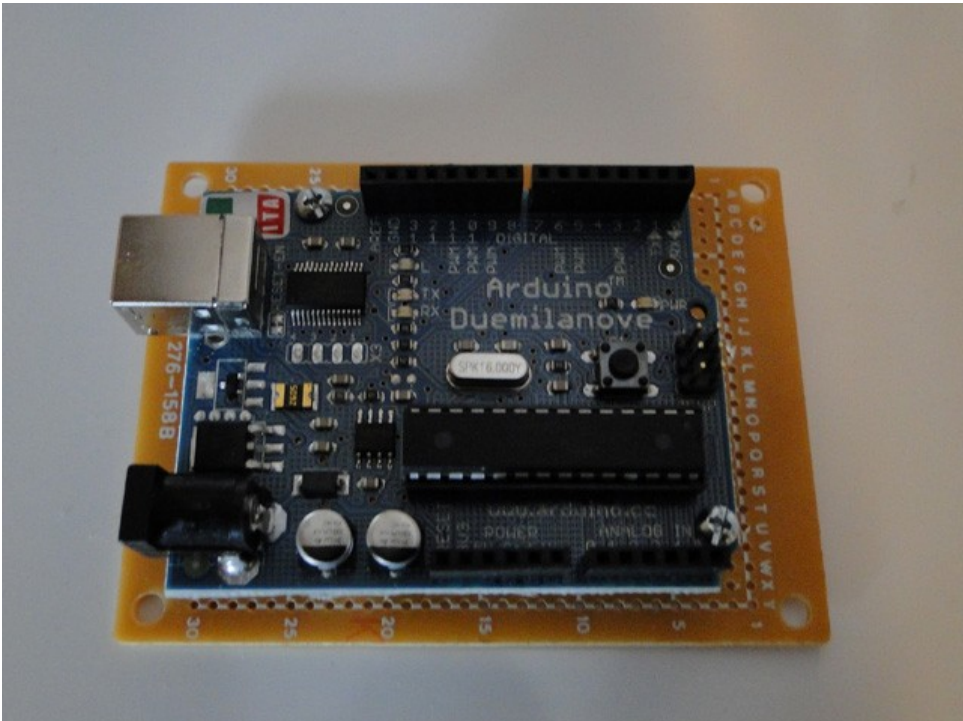
Double Gearboxes:

For noise reduction a 0.1uF capacitor has been soldered across the terminals of each motor. Two ferrites are also inserted in the power line to the motor controller to reduce the interference of the micro controller by noise coming from the motors.



Microcontroller Board: Arduino Duemilanove

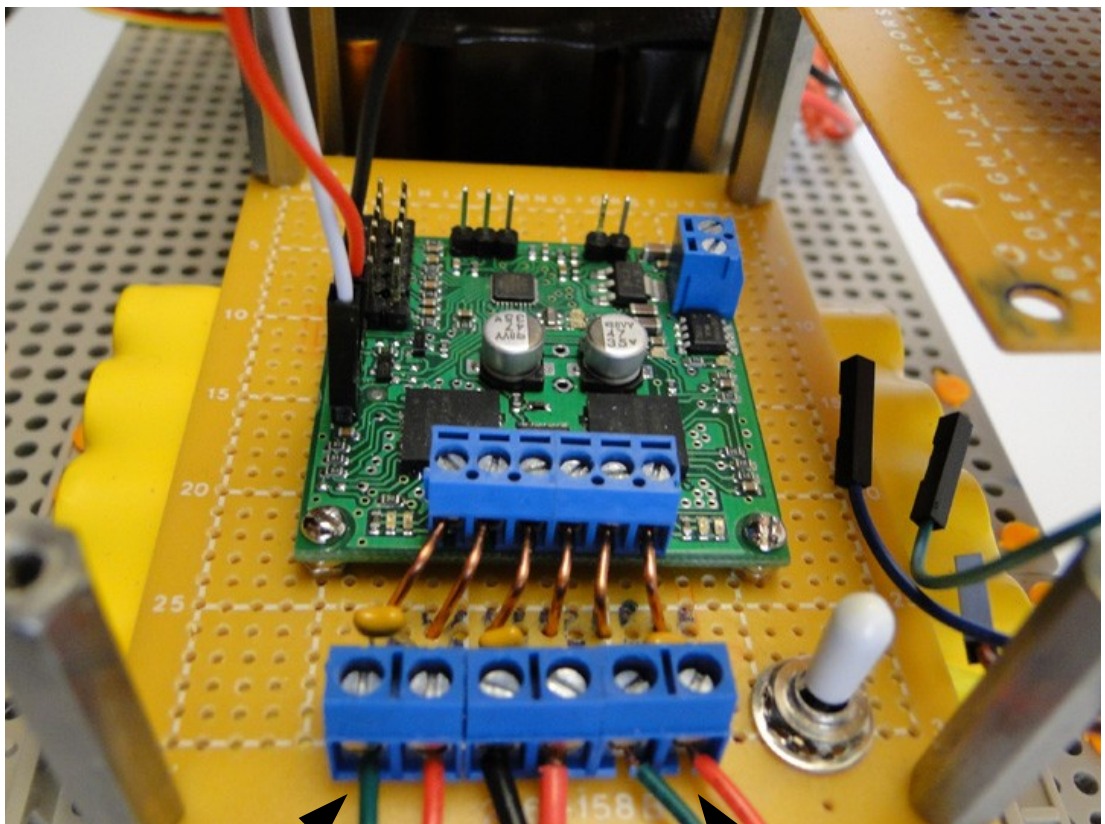
The micro controller board is mounted to a prototype PCB for easier handling, assembly/dis-assembly or moving to another project without touching the controller. Mounting the micro controller as well as the motor controller on prototype PCBs also allows the use of standoffs and stacking of multiple PCBs with different dimensions on top of each other.



Motor Controller: TReX Jr

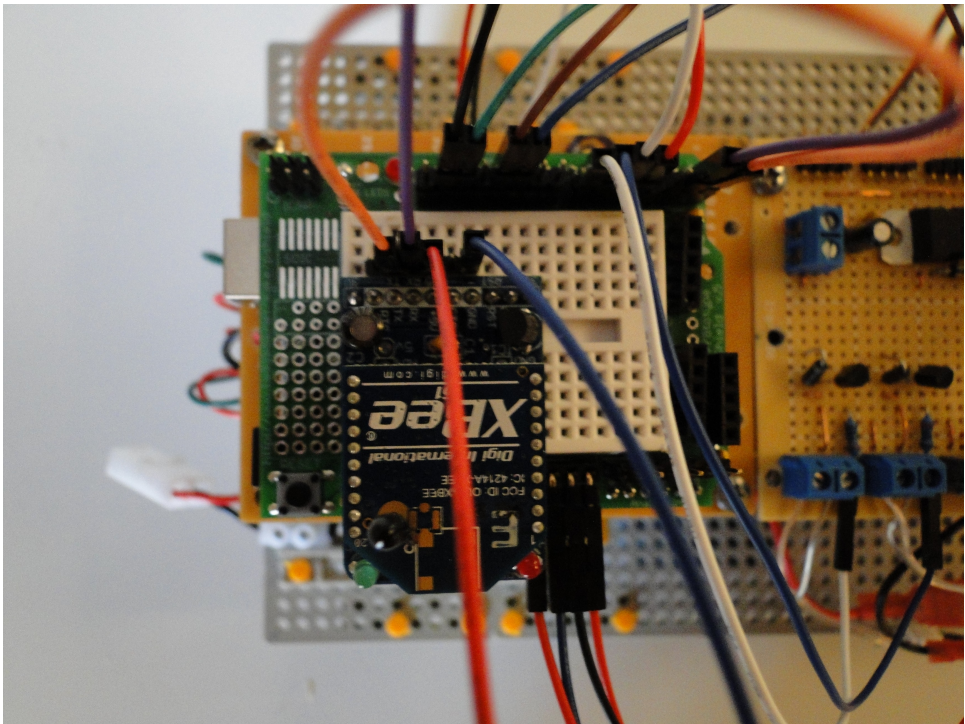
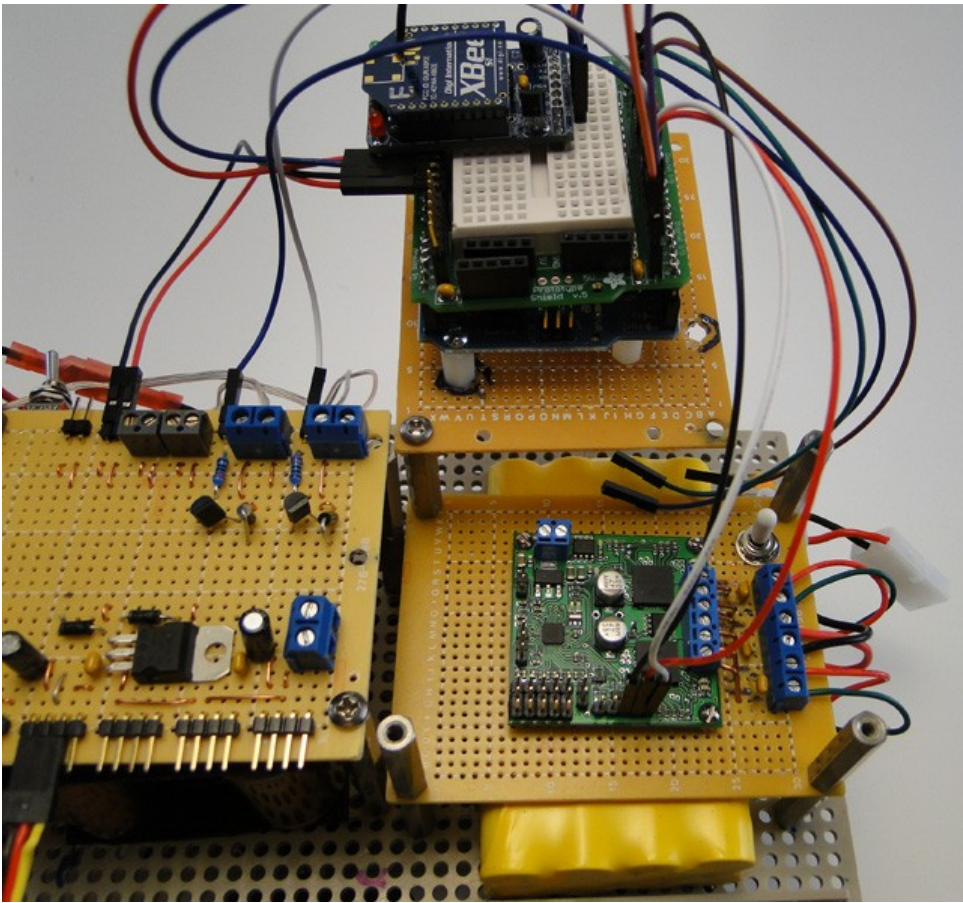
Similar to the micro controller board, the motor controller is mounted to a prototype PCB.

The TreXX Jr. from Pololu is a DC motor controller that can control two bidirectional motors and one unidirectional motor. For this robot the controller is configured to drive the three gearboxes on the left and right side of the robot independently via the asynchronous serial control interface.

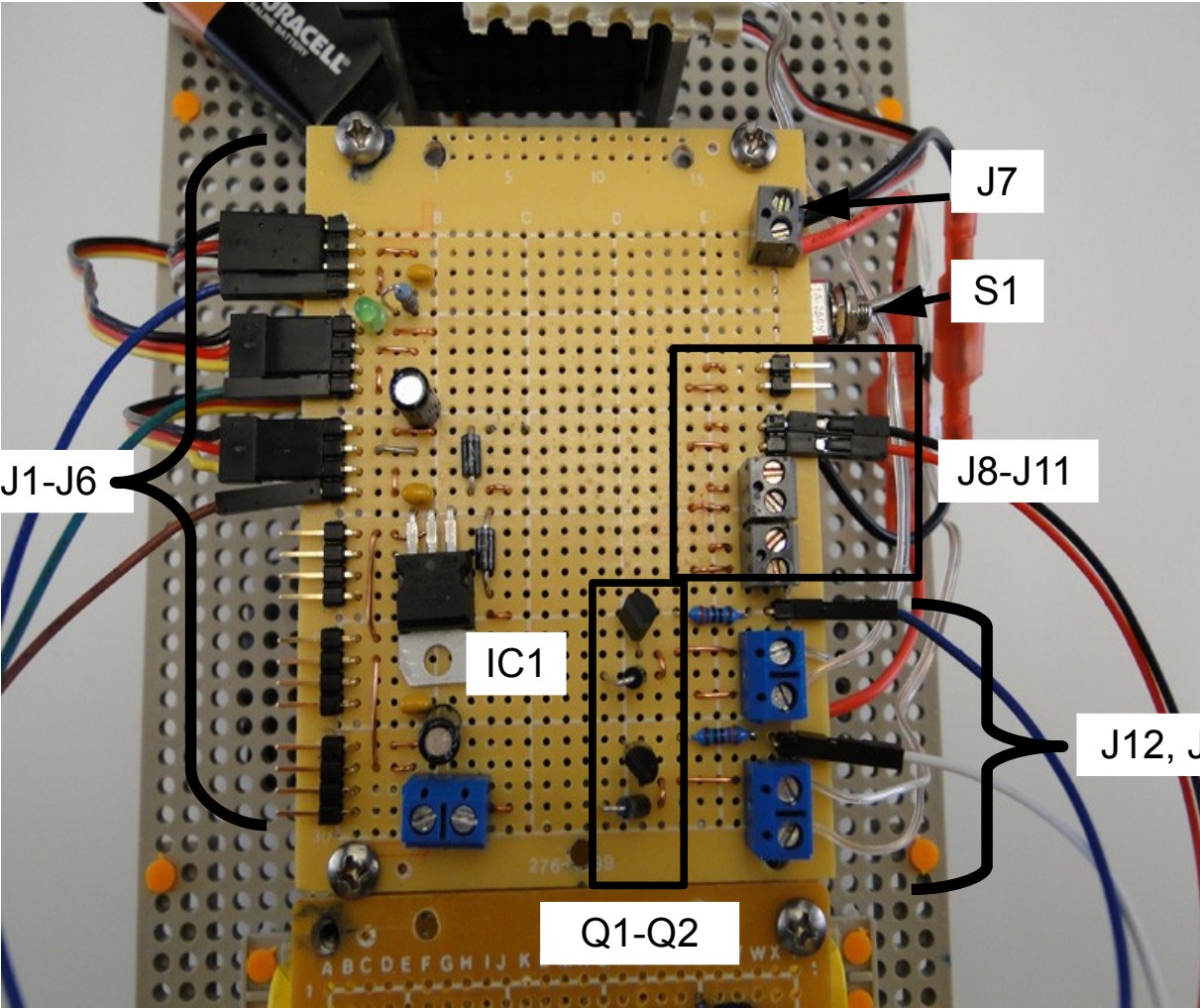


Channel 2:
Motors Right

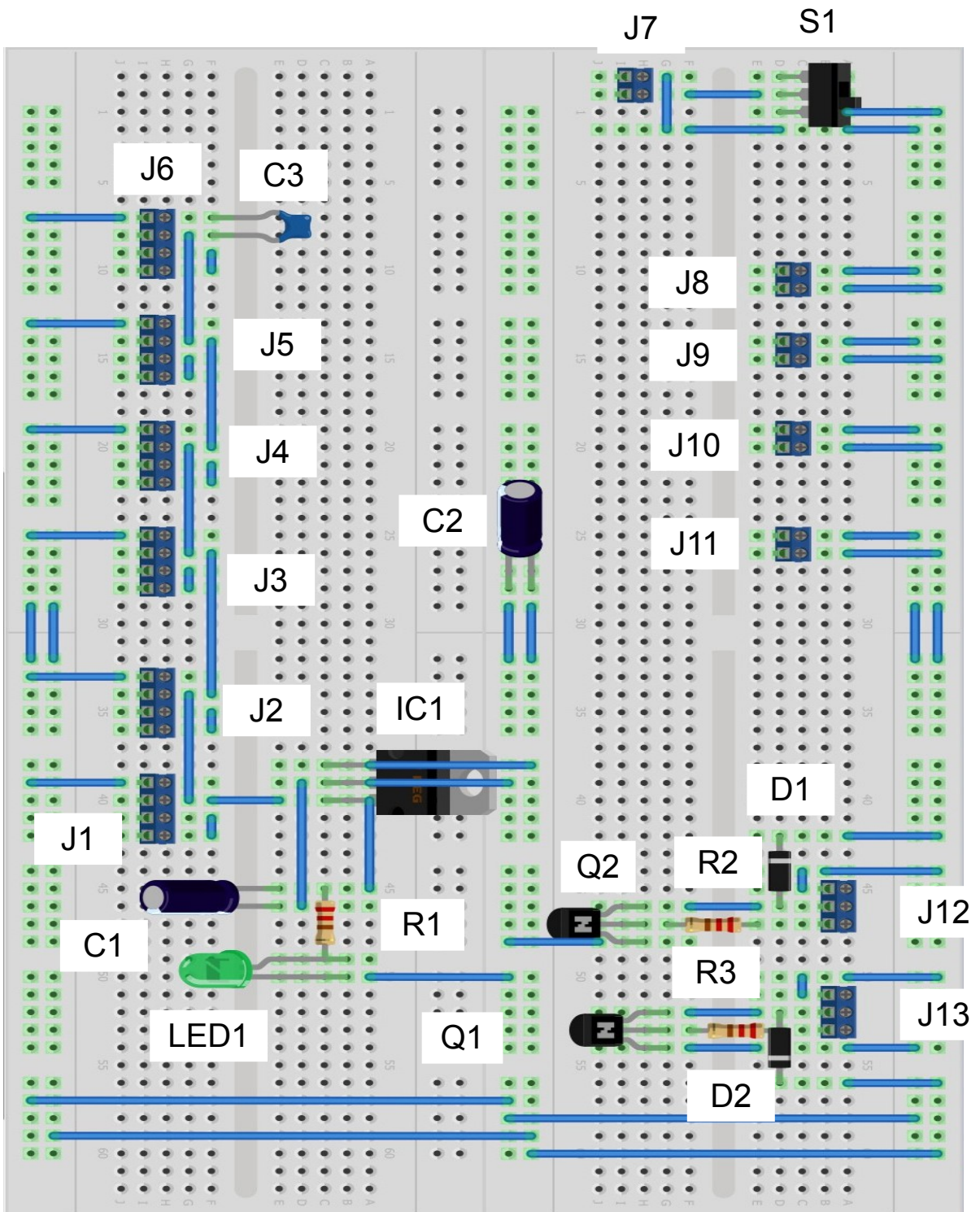
Channel 1:
Motors Left



Breakout Board/Prototype PCB:



Schematics of the breakout board shown on a Bread Board:



Main components of the breakout board:

C1:	10 μ F electrolyt. capacitor
C2:	10 μ F electrolyt. capacitor
C3:	0.1 μ F ceramic cap.
IC1:	5V Voltage regulator, used as power supply of servos
Q1, Q2	2N7000 transistor, driver transistors for terminals (J12,J13), in this application used to switch LED Panels on/off.
D1, D2:	2N4001 or 2N4007
S1:	Main switch
J1-J13:	Terminals (as available)
R1:	1K Ω resistor
R2, R3:	220 Ω resistor
LED1:	LED (color as available)
J1-J6:	Terminals for up to 6 servos.
J8-J11:	Terminals to connect other loads to the battery .
S1:	Main switch.
J7:	Main terminals to connect the power supply/battery.

Software/Programming:

The Arduino software has been installed on a desktop computer as well as on a net book for mobile application. Computer and robot are communicating via two Xbee modules and the Serial Monitor of the arduino software.

Blinking of the LED Panels is realized by calling a function at the beginning and at the end of the main program loop. The LEDs toggle between ON and OFF each time this function is called. The program is about 80ms long, this creates the blinking effect.

The wireless camera is mounted on two servos. The camera can switch between pan mode or fixed mode, pointing forward, when driving. Switching between modes is done by pressing e key on the keyboard.

Forward/backward driving and turning of the robot is also handled via the keyboard of the connected computer.

Details can be found in the attached listing of the program code.

References/Resources:

TReX Jr:

<http://www.pololu.com/catalog/product/767>

http://www.pololu.com/file/0J12/TReXJr_Commands_v1.2.pdf

http://www.pololu.com/docs/pdf/0J5/TReX_Jr.pdf

Arduino Main Page:

<http://www.arduino.cc/>

Arduino Forum:

<http://arduino.cc/forum/>

Other Arduino resources:

<http://www.ladyada.net/learn/arduino/index.html>

http://www.adafruit.com/index.php?main_page=tutorials

Fritzing: PCB Design/Bread board:

<http://fritzing.org/>