TinyBot

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Contents

1 Introduction

There are many different components of a robot; the most important being the microcontroller (the brain), the motors (the legs), and any sensors (how the robot sees the world).

This guide will take you through building a simple robot dubbed TinyBot. It has 2 wheels, a caster wheel, a battery, an arduino, and a breadboard.

2 Components

Component	Quantity	Price	Sources
Arduino Uno	1	$5-$80	Arduino's are discuessed in Section 4. A genuine Arduino will cost about $80, however Arduino clones can be bought online for as little as $5. Ebay is a good starting point for finding an Uno.
Breadboard	1		
N20 Motor	2		
H-Bridge	1		
Wheels	2	$0	The wheels for this project are 3D printed, and are supplied by the club.
Caster Wheel	1	?	The caster wheel consists of 2 parts, a marble and it's 3D printed casing. The 3D print will be supplied by the club at no charge, however you must source your own marble.

Additional sensors can be bought and integrated with TinyBot, however that is not covered in this project guide.

3 Construction

4   Microcontroller

Figure 1: A Microchip

A microcontroller is a really small microcomputer on a very small chip, see Figure 1. These are used in a variety of devices; including robots, vending machines, phones, computers, etc.

Arduino's are a development board; consisting of an microcontroller, power regulation, and input/output (also known as IO) pins. As microcontrollers are very tiny prototyping with them or using them to build something would be really difficult. The purpose of an arduino is to provide a medium that allows easy development with microcontrollers. There are many different kinds of arduinos, each using a different microchip.

The Arduino used in this project is the Arduino Uno, which has an ATMega328p microchip as shown in Figure 1. Figure 2 is what a real Arduino Uno looks like, though the colour and text may be different from brand to brand. Genuine Arduinos are quite expensive, and there are many clones available which are much cheaper. Figure 3 shows a stylised view of an Uno, labelling all the different pinouts.

Figure 2: An Arduino Uno

Arduino's and other development boards are used extensively by hobbyists, they are cheap, easy to use, and extremely versatile. Arduino's are used in nearly every project that CRoC runs, and so are very useful to learn to use.
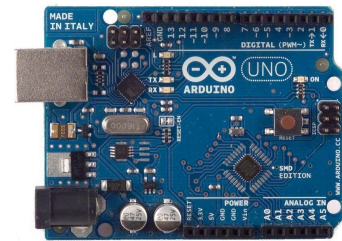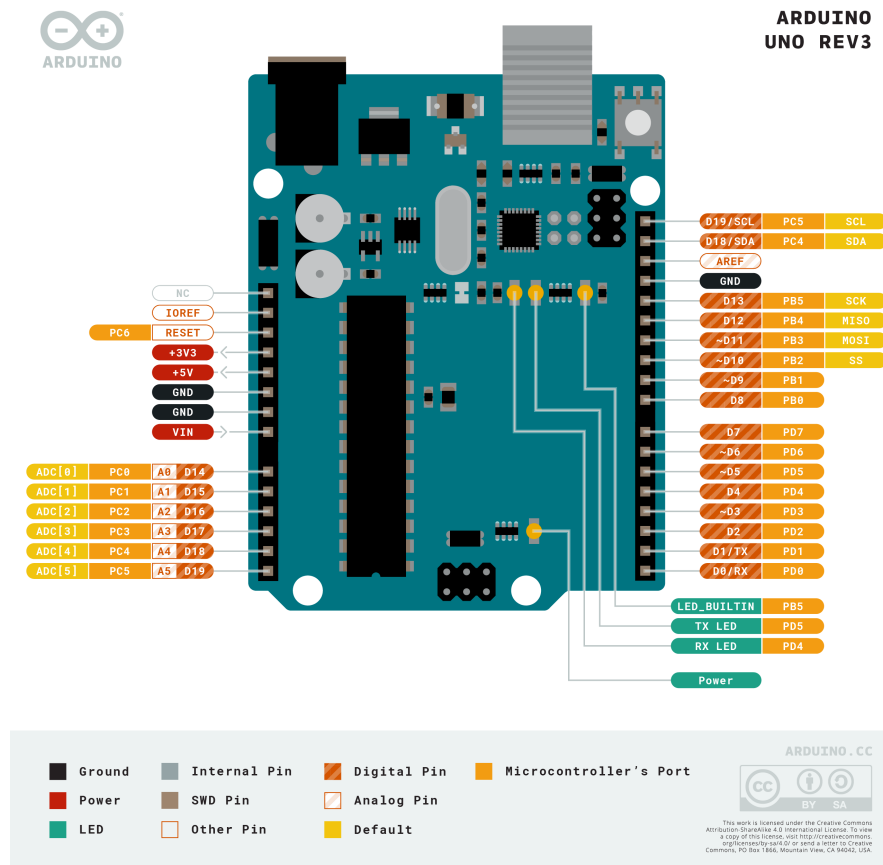
Figure 3: Pinout of Arduino Uno
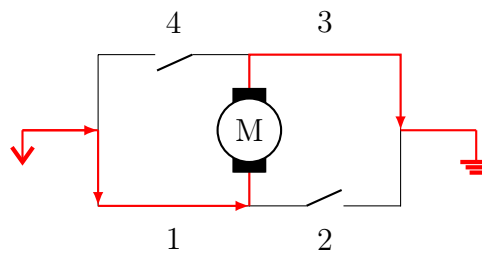
5 Motor

gearbox, motor

6   Motor Controller

The simplest way to drive a motor is to run a signal through the motor. This will make the motor run in one direction, though it is impossible to control the speed, direction, or to stop the motor.

A simple solution to this is using a h-bridge. The simplest h-bridge is shown below, the voltage source is on the left and ground on the right.
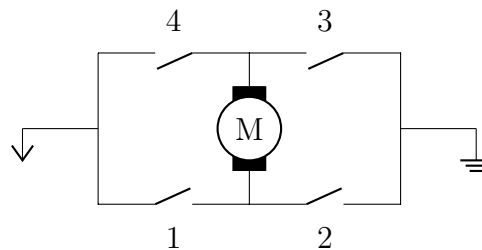
When switches 1 and 3 are closed, the current will flow through the in the motor will flow in one direction.

7   Driving