

How To Get Started in Robotics

Overview

There is no one right way to get started in robotics. Here are a few things to keep in mind as well as pointers to some potential starting places.

Robots can do all sorts of things. What is it about robots that interests you? Once you have an idea of what you want to do in robotics, or what sort of robot you want to create, break your large goal down in to smaller steps. Before you can make a robot waiter that is able to navigate a crowded party, converse with people, and serve your guests drinks, you will need to make a robot that can move.

A lot of beginner robotics kits are small. Small robots are less expensive, easier to work with, and less likely to roll over your cat.

When most people think of robots, they think of mobile robots. Mobile robots are a great place to start because they are fun and many kits exist to help you get started. However robots can also be stationary such as robotic artworks and sculptures or robotic devices that accomplish a task for you. Keep an open mind and don't limit your creativity.

Robotics combines computer science, mechanics, and electronics (just to name a few). Because there are such a variety of fields that make up robotics, you have different options of where to begin. Many kits and robotics programs focus on the mechanical design of the robot. However if you are more interested in designing control programs and behaviors for your robot, you might consider purchasing an assembled robot or a very simple kit.

The suggested starting places described below are grouped based on your area of interest. You can also see a larger and more detailed list of robotics references under the resources section.

I am an educator.

The Lego Mindstorm platform is commonly used in middle school, high school, and college level robotics education. One easy way to introduce robotics to your school is to join an existing competition such as Botball or FIRST LEGO League for middle school; FIRST Robotics Competition or FIRST Tech Challenge for high school; or RoboCup for college. Some of these competitions use Lego and some use other platforms.

I want to invent new robots.

Web sites such as Lynxmotion, Acroname, and the Robot Store offer a wide variety of robot parts as well as kits and instructional materials.

I want to build a robot kit.

There are many robot kits available for varying prices and skill levels. Here are just a few sites where you can purchase kits:

<http://www.robotstore.com>

<http://www.hobbytron.com/RobotKits.html>

<http://www.superdroidrobots.com/shop>

I want to buy a programmable robot.

The Create and Garcia robots come fully assembled and include various sensors. The Create with command module is programmable in C. Garcia is programmable in C, C++, or Java.

The TeRK robot platform offers programming at the iconic scripting, beginning Java programmer, or advanced programmer level. You can build your own robot or follow step-by-step instructions to make a simple robot.

CMUcam3 is a programmable embedded vision platform which can be used to create simple robots.

Microsoft Robotics Studio can be used to program simulated or real robots.

I want to compete in a robot competition.

Botball or FIRST LEGO League for middle school; FIRST Robotics Competition or FIRST Tech Challenge for high school; or RoboCup for college. There are also various mini-sumo competitions.

Resources

Robots & Robot Kits

There are various robot kits on the market. These kits are a good first step for someone with no robotics experience. They can give you experience building and/or programming simple robots.

CMUcam3

<http://www.cmucam.org>

CMUcam3 is a programmable embedded vision platform that can be used to create simple robots.

Garcia

<http://www.acroname.com/technology/104/abstract.html>

The Garcia robot comes assembled and ready to program in C, C++, or Java.

iRobot Create with Command Module

<http://store.irobot.com/family/index.jsp?categoryId=2591511&cp=2600059>

The Create robot comes assembled and includes various sensors. It is programmable in C.

Kits

Many simple robot building kits are available on the market. A few of these kits also allow you to program the completed robot. Here are just a few sources:

<http://www.robotstore.com>

<http://www.hobbytron.com/RobotKits.html>

<http://www.superdroidrobots.com/shop>

Lego Mindstorm

<http://mindstorms.lego.com>

Lynxmotion

<http://lynxmotion.com>

Lynxmotion has kits with assembly guides and tutorials for controlling the robot once you build it. They are also a nice source of useful robot parts.

Microsoft Robotics Studio

<http://www.msdn.microsoft.com/robotics>

Microsoft's Robotics Studio programming environment can be used to control simulated and real robots.

PPRK

<http://www.acroname.com/robotics/info/PPRK/overview.html>

The PPRK or Palm Pilot Robot Kit lets you turn a palm pilot in to a robot.

Society of Robots

<http://www.societyofrobots.com>

The Society of Robots website contains numerous tutorials on how to build robots. This is a good source if you want to build a robot from parts you may already have around your house.

Tekkotsu

<http://www.cs.cmu.edu/~tekkotsu>

The Tekkotsu programming environment is a good introduction to robot programming. Currently Tekkotsu supports AIBO robots but support for other platforms is under development.

TeRK

<http://www.terk.com>

TeRK provides step-by-step tutorials on how to build several robots. The robots can be programmed. (Qwerkbot, Flower, Create)

Vex

<http://www.vexlabs.com>

Radio controllable or programmable robots.

Competitions & Curricula

Many organizations run robotics competitions. Often these competitions are designed for school groups. You may be able to form or join a local team, or you can just browse the competitions for ideas.

Botball

<http://www.botball.org>

The Botball website describes the program as follows:

Students are given about seven weeks to design, build and program a team of mobile, autonomous robots as well as document their process on a weblog. Participants compete against each other on a 4' x 8' playing field in a fast paced, non-destructive regional tournament. The robots are student built and programmed to maneuver on the game board without the need for remote control.

FIRST

<http://www.usfirst.org>

FIRST has several different programs for different age groups. The following descriptions are taken from the FIRST web site.

FIRST Robotics Competition (FRC) is a unique varsity sport of the mind designed to help high-school-aged young people discover how interesting and rewarding the life of engineers and researchers can be. The FIRST Robotics Competition challenges teams of young people and their mentors to solve a common problem in a six-week timeframe using a standard "kit of parts" and a common set of rules. Teams build robots from the parts and enter them in competitions designed by Dean Kamen, Dr. Woodie Flowers, and a committee of engineers and other professionals.

The *FIRST Tech Challenge (FTC)* is a mid-level robotics competition for high-school students. It offers the traditional challenge of a FIRST competition but with a more accessible and affordable robotics kit. The FIRST Tech Challenge grew out of the existing FIRST Robotics Competition and the FIRST Robovation platform. FIRST, RadioShack, and Innovation First collaborated to develop an improved version of the FIRST Robovation kit. The new kit is significantly upgraded and is called the Vex Robotics Design System.

FIRST LEGO League (FLL) is an exciting and fun international robotics program that ignites an enthusiasm for discovery, science, and technology in kids ages 9 to 14 (16 outside of the U.S. and Canada).

Northwest Robot Mini-Sumo Tournament <http://www.robotroom.com/SumoRules.html>

Various groups hold mini-sumo competitions in which the robots must push their competitors out of a sumo ring. The rules may vary slightly from group to group, but

many groups in the United States follow the Northwest Robot Mini-Sumo Tournament rules.

RoboCup

<http://www.robocup.org>

RobotCup is a robotics soccer competition suitable for college level teams.

Robotics Academy

<http://www-education.rec.ri.cmu.edu>

Various robotics curricula are available from the National Robotics Engineering Consortium (NREC).