Learning Roomba: Teacher’s Guide
Module 1 Robotics Introduction

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1 Introduction

Before covering any of the other robot topics, it is necessary to have an understanding of what a robot is. There are many different definitions of robots available, and many of the definitions actually conflict. Is an industrial assembly worker a robot? What about a toaster? What about a remote controlled airplane? If the airplane is not a robot, then consider many current Unmanned Aerial Vehicles (UAVs). Most current UAVs are piloted by a human remotely, so they are really expensive remote controlled airplanes. To make the issue worse, often the lines between reality and science fiction are blurred. Is R2D2 from Star Wars more a robot than an automated device that builds part of a car? The Robotics Introduction Module will start by addressing these questions. However, there are no clear answers, so the best that the Module can provide is a working definition of a robot.

In addition to that concept, the module will introduce the tools, including the Roomba, that are used with the educational materials and how to utilize the tools. A brief introduction to programming in Java is provided along with instruction on using the BlueJ IDE. The module concludes with having the students run a sample program on the Roomba.

2 Educational Merit

The other modules are useless without an introduction. The students need to have an understanding of what they are interacting with prior to interacting with it. Also, as in any other subject, an introduction of the tools used is a necessity. This module attempts to cover those topics so the other modules do not need to.

3 Topics Covered

The following topics are covered by this Module:

- What is a robot?
- Difference between real robots and science fiction
- Why are robots important?
- iRobot Roomba introduction
- What does it take to build a robot?
- How does the computation work?
- Why robotics is difficult
- BlueJ introduction


- Getting started example program
- Java programming introduction

4 Programming in Java

This Module will try to introduce some of the necessary programming concepts, but will not provide a comprehensive background. If students do not have a programming background, I recommend starting with a few classes following the Karel J. Robot curriculum (See http://pclc.pace.edu/~bergin/KarelJava2ed/Karel%2B%2BJavaEdition.html). Karel J. Robot is an introductory course to programming in Java aimed at pre-college students.

5 Homework Solutions

The homework assignment is to find examples of robots and answer a few questions about them. The questions are: what tasks or responsibilities do the robots perform, how effective are they, and are they real or are they science fiction. There are no right answers to these questions. Here are two examples to provide an idea about how to answer the questions:

- WALL-E. Tasks include trash pick-up and removal. WALL-E is very good at his job, but his curiosity occasionally interferes with task completion. He is a sci-fi robot from the Disney/Pixar movie WALL-E.

- US Postal Service mail sorter. Tasks include sorting incoming mail into the appropriate delivery bin based on the address. The sorter does a pretty good time usually, but sometimes misreads the address resulting in the mail being sent to the wrong location. The mail sorter is a real robot that keeps our mail system working every day.

6 Related Resources


The *Robotics Primer* is similar to *LearningRoomba*. It is also geared for pre-college students using the iRobot Roomba. Some of the exercises can be used in conjunction with *LearningRoomba* to cover some of the topics not addressed in *LearningRoomba*. Another use of this book is to use it as a student textbook to accompany the classroom lectures.

*Karel the Robot* is an introductory course to programming aimed on pre-college students. If the students do not have any experience with programming, this may be a good curriculum to precede the *LearningRoomba* materials.


*Hacking Roomba:ExtremeTech* covers projects related to modifying the Roomba, both hardware and software, to perform new tasks. The code used to directly communicate with the Roomba through the BlueTooth Serial Device was built by Tod E. Kurt for this book.


*Mobile Robots* is a good resource discussing the lower-level details of mobile robotics. This may be a useful resource for older students interested in the electrical components of robots.


This is another resource on robotics projects, but these projects are not focused on the Roomba.


*Mind, man, and machine* discusses philosophical issues related to robots. If students are interested in the blurry lines between human, robots, and machines, this is a good resource to have them read.