2015 Kansas BEST Breakout Sessions

Robot Programming – Linda Manfull
September 19, 2015
ROBOT PROGRAMMING AGENDA

- OOTB Operations
  - Review of Cortex
  - BEST Default Program
- Simulink
  - Installation notes
  - Tour of the Workbench
  - Programming
- EasyC
- Robot C
- Comparison of Environments
ROBOT PROGRAMMING
VEX CONTROLLER

Standard Serial Interfaces (UART, I2C)

USB

Gnd +5v Sig
(Blk) (Red) (Wht)

Analog in

1

2

8

1

Digital in/out

12

SP

Speaker Out

1

2

10

9

2-wire motor

3-wire PWM servo/motor ctrl

2-wire motor

Sig +5v Gnd
(Wht)(Red) (Blk)
## BEST Default Program

<table>
<thead>
<tr>
<th>Motor/Servo Port</th>
<th>Function</th>
<th>Joystick Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Port 1 Not Allowed</td>
<td>Channel 1 (Lt, Rt)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Channel 2 (Fwd/Rev)</td>
</tr>
<tr>
<td>2</td>
<td>Right Motor</td>
<td>Channel 3 Inversed</td>
</tr>
<tr>
<td>3</td>
<td>Empty</td>
<td>Channel 4</td>
</tr>
<tr>
<td>4</td>
<td>Empty</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Servo</td>
<td>Channel 1 (Lt, Rt)</td>
</tr>
<tr>
<td>6</td>
<td>Motor</td>
<td>Channel 2 (Fwd/Rev)</td>
</tr>
<tr>
<td>7</td>
<td>Empty</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Empty</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Left Motor</td>
<td>Channel 1 (Lt, Rt)</td>
</tr>
<tr>
<td>10</td>
<td>Port 10 Not Allowed</td>
<td>Channel 2 (Fwd/Rev)</td>
</tr>
</tbody>
</table>
New content criteria has been added to the Project Engineering Notebook regarding Software Design and Simulation as follows:

- Evidence of custom software design versus using the default robot program
- Evidence that a software design process was followed
- Demonstration of design of functionality applicable to the defined task.
- Evidence of use of software simulation (e.g., Simulink, virtual worlds, etc.) to verify the correct operation of the robot program.
- Evidence that good software design practices, testing/debugging techniques and efficiency and portability were all considered.
Each team should have received an email from Karen Reynolds around 8/21 with licensing instructions for all software offered this year.
Robot Programming Resources

www.bestinc.org ➔ Files ➔ Public Resources & Training

BRI File Manager | Welcome - Linda Manfull

Create a Folder  ➔ Upload a File

Up One Folder

Current Folder - MAIN / Public Resources & Training

- CAD Models
- Coach Survival Guide
- HEXBUG Fundraisers
- Kits
- Software
- Team Registration Info
- Team Resources
- Technical Training

Filename

- BEST Raytheon 2015.pptx
- Mobile ScoreBoard for iPhone or Android.pdf

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QUESTIONS ON THE DEFAULT PROGRAM OR NEW NOTEBOOK REQUIREMENTS?
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Simulink for BEST Robotics 2015

MathWorks is excited to offer complimentary Simulink software to all the BEST teams. Simulink and the VEX Microcontroller Support Package to program your robot.

Request software for your team at: www.mathworks.com/BESTinstall. You receive your installation keys and instructions within three business days.

NOTE: Ensure that you have a connection to the internet and administrator permissions on the computer at its installation. Contact your teacher/mentor if you need help. Software products provided by MathWorks may be installed and used only to support participation in the sponsored student competition.

Key features of the software:
- Online download and installation of the Simulink and VEX Support Package
- Ability to use and learn MATLAB and Simulink (no programming knowledge required)
- Step-by-step tutorial and help built in Simulink and downloaded to VEX capabilities
- Windows and Mac OS support
- Documentation, examples, tutorials, and training video available
- BEST Simulink Design Award

More info:
- Ask questions about setting up licenses or using Simulink by contacting support@mathworks.com
- Contact us directly at bestrobotics@mathworks.com

ROBOT PROGRAMMING
Simulink

- Videos

- Simulink Quick Start

- Vex ARM Cortex Hardware Support Package (download)
  http://www.mathworks.com/hardware-support/vex-arm-cortex.html?
  refresh=true

- Build your first robot model
SIMULINK

- Build and Download video:

- Live Demo
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ROBOT PROGRAMMING
EASYC INSTALLATION NOTES

- Minimum System Requirements
  - XP/Vista/7/8, 256MB RAM, 250MB HDD, 1024x768 Display
- Administrator Access on the PC
- 1 USB port available for Cortex programming

- Software & Installation
  - www.bestinc.org, click on ‘Login’ and (following instructions provided by Karen Reynolds), navigate to: Files -> MAIN -> 2014 Game Files / Software
  - Open the file: 2015 Programming Software Download Instructions.pdf
  - Locate the section for easyC, then ‘Download easyC v5 – 5.0.0.2’
  - 100MB executable file downloaded
Must use the administrator account (or administrator mode)

Right-click on the easyCv4 icon and select “Run as Administrator”

Follow the on-screen instructions

Check the “Install Prolific USB to Serial adapter driver“ checkbox before clicking the Finish button, the driver installer will startup after a few seconds

Sample projects are copied into a “Intelitek” subfolder in the Documents (or My Documents in XP) folder

Sample projects must be copied to each user’s folder if the software will be shared by multiple users on the same machine.

On the first startup of the software, there will a prompt for registration code

Enter the registration code provided by Hub
ROBOT PROGRAMMING

easyC TOUR OF THE WORKBENCH
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Robot Programming

RobotC Tour of the Workbench
ROBOT PROGRAMMING
RobotC RESOURCES..

Get started programming with ROBOTC

Learning Resources
- CORTEX Video Trainer
- Webinars

Support
- Technical Support
- ROBOTC Forums

2014 BEST Competition Season

Get started with ROBOTC for BEST Teams:

1) 2014 License Details
   - License good until 12/31/2014
   - Full License to ROBOTC 4.x
   - Full License to Robot Virtual Worlds 4.x
   - For BEST Competition Team Use Only

2) BEST Team License Instructions
   There is NO License File this year -
   Contact your regional hubs for licensing information.

Annual License Pricing - 365 Day License
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<table>
<thead>
<tr>
<th>Feature</th>
<th>easyC</th>
<th>RobotC</th>
<th>Simulink</th>
</tr>
</thead>
<tbody>
<tr>
<td>C Programming text editor</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Graphical Programming Interface</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Online Debugger</td>
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<td>X</td>
</tr>
<tr>
<td>Boot Download to Cortex</td>
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<td>X</td>
</tr>
<tr>
<td>Tutorials</td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>Sample Programs</td>
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<td>X</td>
</tr>
<tr>
<td>Hardware Simulation</td>
<td></td>
<td>X</td>
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<tr>
<td>Hardware Test</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support for Mac OS</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Robot Programming Troubleshooting

- Cortex Debugging
  - On the BRI File Manager
  - MAIN / Public Resources & Training / Technical Training / Cortex_Debugging_Guidelines.pdf
  - MAIN / Public Resources & Training / Technical Training / CORTEX_Quick_Start_Guide_050710.pdf
  - MAIN / Public Resources & Training / Software / Programming Reference.pdf
ROBOT PROGRAMMING ASSISTANCE

- Linda Manfull
- Email: linda.manfull@bestinc.org
- Cell: 316.755-0464
- www.bestinc.org
- Simulink links
- Q&A