# ECE 540 Project 2 List of Files
## (Last updated 14-Oct-2014)

| Documentation files | |
|---|---|
| **Name** | **Description** |
| docs\BotSim Functional Spec.pdf | Functional specification of the BotSim external interfaces |
| docs\BotSim Theory of Ops.pdf | Internal theory of operation for the BotSim Simulator. You don not need to understand this material for Project 2 but you may find it interesting. |
| docs\project2.pdf | The Project write-up |
| docs\Proj2Demo Example Design Description.pdf | Theory of operation for the demo example. Includes description of the user interface |
| docs\RojoBot World Video Controller.pdf | Theory of operation and task list for adding the video controller to your Rojobot system. Your demo will be based on this system coupled with the map that includes left and right turns. |
| docs\Bot Tracker.rtf | Text file showing the simple right-turn-only track for the Rojobot. You may use this file to check that your Rojobot system is running correctly before you have the video controller. |
| docs\ECE 540 Project 2 List of Files.pdf | This document |

| Verilog and constraints files for Part 1 (demo and no video) | |
|---|---|
| **Name** | **Description** |
| debounce.v | Not included in the release. Use the same modules as Project 1. Debounces pushbuttons and switches |
| sevensegment.v | Not included in the release. Use the same modules as Project 1. Seven segment display interface |
| kcpsm6.v | Not included with the release. You should download the latest Picoblaze from the Xilinx web site. Xilinx PicoBlaze for Artix Series 7 FPGA on the Nexys4 board. |
| nexys4fpga.v | Not included with the release – you need to create it. You may find the nexys4fpga.v file from Project 1 to be a good starting point. |
| nexys4_bot_if.v | Not included with the release- you need to create it You may find the file *kcpsm6_design_template.v* which is part of the Picoblaze release helpful in creating this. You can get the I/O port address map from some of the constants in proj2demo.psm included with the release. I/O interface between the application CPU and the Nexys 4 board periperhals and the Botsim. |
| hdl_part1\proj2demo.v | Program file for the application Picroblaze CPU. Produced by the kcpsm6.exe assembler from proj2demo.psm |
| hdl_part1\bot.v | BotSim top level module. Instantiates a PicoBlaze and the Rojobot simulator program, world_if.v, and map.v |
| hdl_part1\bot_pgm.v | Program file for the BotSim simulator. Produced by the kcpsm6.exe assembler. |
| hdl_part1\map.v | |
| hdl_part1\ world_if.v | The register-based interface to the BotSim Simulator |
| hdl_part1\world_map.v | Instantiates a 16Kx2 bit dual-port ROM, produced by Xilinx *Core Generator*, which holds a map of the RojoBot's virtual world |
| constraints\nexys4fpga_novideo.xdc | Vivado Constraints file for the demo. There are no VGA signals included. Use nexys4fpga_video.xdc once you have implemented the Rojobot video controller. |

| Verilog and constraints files for Part 2 (with video) | |
|---|---|
| **Name** | **Description** |
| nexys4fpga.v | Not included with the release. Top level Verilog file for the demo. You will have to modify your nexys4fpga.v from the Part 1 of the project to include the VGA signals |
| nexys4_bot_if.v | Notincluded with the release. I/O interface between the application CPU and the Nexys4 board periperhals and the Botsim. You may have to modify you nexys4_bot_if.v from the Part 1 of the project if you add additional registers to the interface |
| hdl_part2\dtg.v | Generates the video raster timing signals vert_sync, horiz_sync, video_on, and pixel_row and pixel_column, which indicate the current vertical and horizontal pixel position on the screen. |
| hdl_part2\bot_pgm.v | Program file for the BotSim simulator. Produced by the kcpsm6.exe assembler. The Rojobot moves more quickly through the output track if you include this file in your project instead of the bot_pgm_v from Part 1 |
| constraints\nexys4fpga_withvideo.xdc | Vivado Constraints file for the demo. This file includes the VGA signals. Use nexys4fpga_novideo.xdc if you have not included the video controller in your top level |

| **World Maps** | |
|---|---|
| **Name** | **Description** |
| world_maps/world_map_part1/world_map.ngc | This is a simple world map that includes only right turns. You can use this file to check and/or debug your Rojobot implementation. Copy world_map.ngc to your synthesis directory for the project. The world_map_basic/map directory contains a file called worldmap_basic.doc which shows the layout of the track |
| world_maps/world_map_lr/world_map.ngc | This is a the world map you should use for your demo. It contains both left and right turns. Copy and overwrite world_map.ngc in your synthesis directory for the project. The world_map_lr/map directory contains a file called worldmap_lr.doc which shows the layout of the track |
| world_maps/world_map_loop/world_map.ngc | This is a fun map that contains loops but only right turns. You can use it to debug your video logic before you add the video controller to the project. . Copy and overwrite world_map.ngc in your synthesis directory for the project. The world_map_loop/map directory contains a file called worldmap_loop.doc which shows the layout of the track |
| world_maps/world_map_part1/map, world_maps/world_map_loop/map, world_maps/world_map_lr/map | Each of the world map directories contains a directory called map. The map directory contains the text I use to generate a track, a .coe (Xilinx coefficients file) that the Core Generator uses to initialize the Block RAM and a perl script that can be used to convert the .txt file to a .coe file. Perhaps the most useful file in the directory is a .doc file which shows the layout of the virtual world. |
| **Firmware for the BotSim** | |
| **Name** | **Description** |
| firmware_part1\proj2demo\proj2demo.psm | PicoBlaze Assembly language source code for the Proj2Demo program |
| firmware_part1\proj2demo\proj2demo.v | Copy of the file hdl_rojobot\proj2demo.v |
| Firmware_part1\proj2demo\ROM_form.v | Template used by the Picoblaze assembler. This file includes support for JTAG program updates. See kcpsm6 User Guide for details |