University of Toronto, Faculty of Applied Science and Engineering

Department of Electrical and Computer Engineering

**ECE 243S – Computer Organization – 2016**

**Project Proposal Form**

After ensuring that your project idea is unique, you will use this form to describe your project (point form preferred), assess its difficulty, and outline what you expect to achieve each week of your project work. You **must submit the filled form on Blackboard two days before your scheduled project lab session and bring it to the first project lab session.**

The TA will advise you if changes are needed to your project proposal so it is sufficiently, but not overly challenging. After you implement the changes, **the TA will then approve your project proposal.** You will then make **two copies** of the final filled form: one will be kept by the TA, and the other one will be for your reference. Your ability to successfully implement all that was approved in your proposal will determine your project functionality marks.

# Group Info

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| --- | --- | --- | --- | --- |
| **Station Number** | **First Name** | **Last Name** | **Student Number** | **Contribution [0..100]**  **(filled during 3rd lab)** |
| 38 | Devesh | Nischal | 1002895539 |  |
| 38 | Danil | Ojha | 1003098328 |  |

# One Sentence Project Description (as posted on Piazza)

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| Light/Movement sensing robot using lego controller that patrols the edge of a surface and if something is found it pushes it off the surface. Robot also resistant to external force. Displays info on HEX/VGA display. |

# Technical Description of the Project

Describe your project in more technical details and include a system block diagram.

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| - Robot will be propelled by 2 motors  - Two wheels connected to each motor will me needed for it to move smoothly  - With one motor connected to each wheel, turning will be easy to accomplish  - The lego structure on the top will be heavy as it is to push objects  - Sensors will be on the front to sense objects infront of the robot  - Two modes:  - Mode 1: Patrolling with pushing enabled  - Mode 2: Patrolling with pushing disabled  - Devices:  - Lego Controler (Value, Possibly State?) - to control robot and get input from sensors (with interrupts enabled)  - Timer – To control drawing on the VGA (animation and interrupts enabled)  - PS/2 Keyboard – Key to change modes and for it to start/stop  - VGA – To show mode, path of robot and if something was found  - C program utilization to parse sensor info or to create values for VGA  Block Diagram:  Lego Controller  Code  PS/2 Keyboard  VGA  Timer |
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# Technical Description of the Project Core

The project core is a minimum part of your project that you are committing to deliver. Failing to implement this part will result in loss of functionality marks.

Describe your project core here.

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| - Want to implement the robot movement around a surface  - Get interrupts working with sensor values on lego controller so robot stops it motion and starts to push the object out  - Get keyboard to control the robot |

# Assessment of Project’s Difficulty

Please check off each accomplishment you propose in your project and indicate whether that accomplishment is part of the project core and whether it is interrupt-driven (if applicable). For accomplishments with multiple units such as the LEDs, switches, motors, etc., indicate the number of such units used. For example if you are using two Lego motors place the number 2 in the column instead of a checkmark.

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| **Accomplishment** | **Proposed?** | **Project Core?** | **Interrupt?** | **Demonstrated?**  **(to be filled by your TA)** |
| Push buttons |  |  |  |  |
| Digital protoboard |  |  |  |  |
| VGA | X |  | N/A |  |
| Lego motors | X | X | N/A |  |
| Lego sensors (value mode) | X | X | X |  |
| Lego sensors (state mode) |  |  |  |  |
| Linking C with assembly | X |  | N/A |  |
| JTAG UART transmit |  |  |  |  |
| JTAG UART receive |  |  |  |  |
| Timer | X |  | X |  |
| Hexkeypad (rows or columns only) |  |  |  |  |
| Hexkeypad (rows and columns) |  |  |  |  |
| DMA transfer |  |  |  |  |
| Nios II Custom Instruction |  |  | N/A |  |
| Audio Codec output to speakers |  |  |  |  |
| Audio Codec input from microphone |  |  |  |  |
| PS/2 Keyboard | X | X |  |  |
| PS/2 Mouse |  |  |  |  |
| SD Card Reader |  |  |  |  |
| Custom Bus Component |  |  |  |  |
| Ethernet |  |  |  |  |
| IrDA UART |  |  |  |  |
| Video input |  |  |  |  |
| ADC |  |  |  |  |

Please describe any other devices or complex software algorithms you will use. Remember to keep this relevant to ECE243 (not fancy electronic circuits or complex mechanical systems).

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| Will use nested interrupts to control the timer and the lego sensors at the same time  Will use C to parse info from sensors or to create values for VGA |

# Project Milestones

Describe what parts of your project you will have fully implemented in each of the three project lab sessions. Keep in mind that you will have to demonstrate your project during the third project lab session. The key here is to design incrementally: get something working quickly and keep adding to it. TAs will not accept the “integrate everything in week 3” approach.

## First project lab session

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| Build robot  Move Robot  Turn Robot wheels based on sensor values |

## Second project lab session

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| Implement keyboard  Detect an object and do appropriate movements  Create modes |

## Third project lab session – Demo

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| Resist external force  Implement VGA interface |

# TA Notes

This page is filled by your TA.

## Approval

Approved by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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## First project lab session

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## Second project lab session

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## Third project lab session – Demo

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