Prototype Design

F2019 – Edit this document into a deliverable.

|  |  |  |  |
| --- | --- | --- | --- |
| Lab Section: | 6 | Group: | 2 |

# Necessary Changes and Notes

**Answer these questions by editing and adding to Table 1 and Table 2 below.**

**Table 1:** What changes had to be made to get your Feasibility Model working as expected?

Table 1: Necessary Design Changes

|  |  |  |
| --- | --- | --- |
| # | Change | Reason/Notes |
| 1 | Connected 4 LEDs to GPIO pins | To convey information about the proximity thresholds for the forward-facing sensor |
| 2 | Added Interrupt for PB 1 on board (1.2) | To switch between user and setup mode |
| 3 | Implemented software logic for setup mode | To effectively allow user to adjust proximity thresholds for the ultrasonic sensors |

**Table 2:** Lessons Learned – Is there anything you want to remember so that you don’t make the same mistake again? Or, not waste time on something you already figured out?

Table 2: Important Notes

|  |  |
| --- | --- |
| # | Note |
| 1 | MSP430FR4133 datasheet lists that only 7/8 of the available GPIO pins are interrupt capable. I assumed all GPIO pins were interrupt capable and this was causing problems when trying to configure the second ultrasonic sensor as I was using the 1 GPIO pin that was not interrupt capable. |

# Signal Specifications

**Answer these questions by editing and adding to Table 3 below.**

**Table 3:** For all the important signals in your Prototype:

* Name the signal
* State which signal property is important (voltage, frequency, rise time, etc.)
* State whether you need to include a Test Point (TP) on the PCB so you can probe the signal
* State which software mode will let you test the signal as indicated
  + You may need to create a special test mode in your code to exercise the signal to its limits
* State the Minimum (Min), Nominal, and Maximum (Max) acceptable values for that signal property, as appropriate
* Include signals for attached components, modules, sensors, etc. Do not include power rails.

Table 3: Hardware Signal Test Plan

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Signal (TP\*) | Property | Required Software Mode | Min | Nominal | Max |
| Audio\_Out (X) | Voltage | User mode | 0 V | 3.0 V | 20 V |
|  | Current | User mode |  | 3 mA |  |
|  | Frequency | User mode |  | 4000 +- 50 Hz |  |
| ECHO (X) | Voltage | User & Setup mode |  | 5 V |  |
|  | Current | User & Setup mode |  | 15 mA |  |
|  | Frequency | User & Setup mode |  | 40 kHz |  |
| TRIGGER (X) | Voltage | User & Setup mode |  | 5 V |  |
|  | Current | User & Setup mode |  | 15 mA |  |
|  | Pulse Width | User & Setup mode |  | 10 µS |  |

\*Indicates Test Point Required

# Signal Mapping

**Answer these questions by editing and adding to Table 4 below.**

**Table 4:** How will your Prototype design electrically connect to the LaunchPad?

MSP430FR4133 IC pin <--> BoosterPack pin on J1/J2 of the LaunchPad <--> Your Prototype

Table 4: Hardware Signal Connectivity

|  |  |  |  |
| --- | --- | --- | --- |
| Signal | MSP430FR4133 Pin | LaunchPad J1/J2 Pin | Prototype Connection |
| Audio\_Out | P1.7 | J2 pin 2 | Audio\_Out |
| ECHO | P2.5, P1.5 | J1 pin 5, J2 pin 10 | Echo\_InGPIOFwd, Echo\_InGPIOBwd |
| TRIGGER | P2.7 | J1 pin 8 | Trigger\_Out |