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 : Necessary Design Changes

|  |  |  |
| --- | --- | --- |
| # | Change | Reason/Notes |
| 1 | Add software reset via SW1 (P1.2) | There was no way to stop the buzzer and reset the system |
| 2 | Move from software PWM to using hardware PWM via TIMER\_A0 PWM output on pin P1.7 | Frequent timer interrupt calls were messing up the ADC timing |
|  |  |  |

**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 : Important Notes

|  |  |
| --- | --- |
| # | Note |
| 1 | MSP430FR4133 datasheet lists clock frequency as 16 MHz, but that’s just a max freq. LaunchPad is set to 2 MHz which shows internally as SMCLK at 1 MHz. This caused a lot of problems for getting the UART to work. |
| 2 | Put a header on the PCB for the servo motor we chose. |
|  |  |

# 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 : Hardware Signal Test Plan

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Signal (TP\*) | Property | Required Software Mode | Min | Nominal | Max |
| PWM Out (X) | Voltage | Buzzer on | 0 V |  | 3.3 V |
|  | Period | Buzzer on |  | 1 ms |  |
|  | Duty Cycle | Buzzer on | 0 % | 25 % | 50 % |
| A9 | Voltage | Hall Effect test mode |  | 20 mA | 25 mA |
| MS\_OUT (X) | Voltage | N/A – Analog moisture sensor | 2.3 V |  | 2.9 V |
|  |  |  |  |  |  |

\*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 : Hardware Signal Connectivity

|  |  |  |  |
| --- | --- | --- | --- |
| Signal | MSP430FR4133 Pin | LaunchPad J1/J2 Pin | Prototype Connection |
| PWM Out | P1.7 (PWM) | J2 pin 19 | U2 pin 4 (OpAmp V+) |
| Analog In | P8.0 (A8) | J1 pin 6 | Moisture sensor out |
|  |  |  |  |