**Rocket Reaction Game Specification**

**Introduction**

The Rocket Reaction Game is a simple-to-use reaction timer that will challenge the user to react to a single instruction, and then display the results for the user to view. As long as power is supplied, the user can play the game over and over, attempting to better his or her score indefinitely. The materials required for the proper operation of this reaction timer are listed below:

* L152RE NUCLEO Board
* mbed shield with a Navigation switch, RGB LED, and LCD to plug on top of the NUCLEO board
* USB to USB 2.0 mini-B connector
* Laptop or personal computer
* A quick reaction

This game is played on an L152RE NUCLEO microcontroller with an mbed shield plugged in on top. The board will be wired to the user’s laptop or PC with the USB to USB 2.0 mini-B wire and will print messages to the user with the LCD.

To initiate proper operation, the user will power up their NUCLEO board and interact with the 5-way Navigation Switch, (the ALPS SKRHADE010), and the LCD, (the Newhaven C12332A1Z). The instructions for the game, along with the user’s reaction time results will be printed onto the LCD. Additionally, an RGB Cree CLV1A-FKB LED on the mbed shield will light up with different colors representing the different stages of the game. This game will be clocked every millisecond, and thus, be able to accurately time the user’s reaction to the nearest millisecond. However, a timing error is included in this sheet to account for the timing capabilities of the NUCLEO Board.

\*\* Timing error: all times in this specification sheet have a 250 mS error value

**Operation**

* Apply power to the NUCLEO board through the USB serial connection to a PC or laptop.
* Upon bootup, the top line of the LCD will display *“Rocket Reaction Timer”*. This will be displayed throughout the game.
* The RGB LED will be blue upon boot up of the NUCLEO board, and the instructions *“Press SEL to play!”* will be displayed on the 3rd line of the LCD. The board will remain in this state until the user presses the select button on the navigation stick.
* The user will press the select button when they are ready to play.
* At this stage, the RGB will turn yellow, line 3 of the LCD will display *“Get ready!”*. The board will remain in this state for a random number of milliseconds between 1000 and 5000, determined at every pass through this state.
* After the randomized period of time has passed, the RGB LED will turn completely off and a single character will be displayed on the 4th line on the LCD corresponding to the direction that the user should push the navigation switch:
  + *“U”* = Up
  + *“D”* = Down
  + *“L”* = Left
  + *“R”* = Right
* The user will comprehend the character printed and react by pressing the navigation switch into the correct position.
* If the user does this successfully, the RGB LED will turn green, the last two lines on the LCD will be cleared, and *“Great job!”* will be displayed on the 3rd line of the LCD.
* If the user fails to do so and pushes the navigation switch in any other direction other than the target direction, the RGB LED will turn red, the last two rows on the LCD will be cleared, and *“Nice try!”* will be displayed to the 3rd line of the LCD.
* In either case, the number of milliseconds elapsed since the target direction character was printed will also be displayed on the 4th line of the LCD, given the timing error. The user will read this as their reaction time.
* The game will remain in this state for 3 seconds. Then, the RGB LED turns blue again, the last 3 lines on LCD will be cleared, and *“Press SELECT to play!”* will be displayed on the 3rd line again.
* The game has just restarted, and the user may press select once again and repeat the process indefinitely.