Report for Laboratory Exercise 0: Getting Started

Cameron Devine

Department of Mechanical Engineering, Saint Martin's University
ME 477—Embedded Computing in Electromechanical Systems

February 20, 2022

Abstract. For lab 0, a sum of squares function was written and tested. The function was tested to ensure it works correctly and some improvements are suggested.

```
main
→sumsq
```

Figure 1: The hierarchy of functions used in Lab 0.

1 Description

For this lab, the main task is to compute and display the sum of a series of squares. This is done by creating a function `sumsq`. While this function works well, it is only possible to compute a single sum, as there is no method to reset the total back to zero or set the initial sum value. The sum is found by using a static variable which has the desired square added to it each time the function is called. The hierarchy of functions used in this lab is shown in fig. 1.

2 Testing

To test that the code is working correctly, the resulting sums were calculated by hand to be 4, 5, 9, and 18, when the initial sum value is 4, and 0, 1, 2, and 3 squared are added to the sum. Once the values were calculated, they were checked with those displayed on the LCD screen. Furthermore, the debugger was used to step through the program and check that it is operating as expected.

3 Results

The code for this lab correctly printed the required values. To allow computing multiple sums the `sumsq` function could be modified to include a second argument which could be set to `true` if the sum should be reset to zero, and `false` otherwise.

4 Source listing

The source code for this lab is shown below.

```c
/* Lab #0 - Cameron Devine */

/* includes */
#include "stdio.h"
#include "MyRio.h"
#include "me477.h"

/* prototypes */
int sumsq(int x); /* sum of squares */

/* definitions */
#define N 4 /* number of loops */

int main(int argc, char **argv) {
  NiFpga_Status status;
  static int x[10]; /* total */
  static int i; /* index */

  status = MyRio_Open(); /* Open NiFpga.*/
  if (MyRio_IsNotSuccess(status)) return
      status;

  printf_lcd("\fHello, Cameron\n\n");

  for (i=0; i<N; i++) {
    x[i] = sumsq(i); /* calculate the sum of
        squres and store the result in the
       array x */
    printf_lcd("%d, ",x[i]); /* display the
       current sum */
  }

  status = MyRio_Close(); /* Close NiFpga.
      */
  return status;
}

/* A function to calucate the sum of a
    series of squares. The sum starts
 * with a value of 4 and the argument
    provided to the function is squared
 * added to the sum.
 * x: the integer to square and add to the
    sum.
 * returns the current value of the sum.
 */
int sumsq(int x) {
  static int y=4; /* the initial value of y
      */
  y = y + x*x; /* add the square to the sum
      */
```

```
    return y;
}
```