Lab 3 Body Fat Monitor

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9/23/2021

**Purpose of the Lab**

The purpose of Lab 3 is to familiarize oneself with logic gates and Arduino pins. Arduino pins and logic gates are much different than the traditional C language. To understand it better we made a body fat monitor that does two main things. The first one is the actual calculations, in which we determine the gender and from there we determine if the body fat is ‘Low’, ‘Normal’, ‘High’, and ‘Very High”. The second thing is to pass that onto visual cues using the Arduino pins via LEDs. We do this to light up different LEDs depending on the level of body fat.

**Description of Solution**

The program I wrote was a lot of branching. I started by breaking it down and branching out by gender, then by age group, and finally by body fat. To streamline the program, I checked and compared the age, as well as the body fat, in decreasing order just so I wouldn’t have to check both the upper and lower bound. In other words, instead of checking if age of 25 was more than 20 but less than 40, I checked if it was greater than 60, then if it was greater than 40, etc. For the blinking, instead of attaching a blinking function at the end of every classification of weight, I passed the LED I selected to the blinking function, so the blinking function was only written once.

**Test Results**

For this program, I tested every single branch. I tested every combination of gender, age, and body fat, and of course I tested the chart in the lab page. The main problem that I found was that I hadn’t put a loop or and RET at the end of where it selected the LED so it would go to the next line and would select another LED. Another minor problem that I had was the blinking function, what I hadn’t realized is how short a clock cycle was which is like 1 millionth of a second. I had to use a nested loop for this.

**Answers to Questions**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| GENDER | HEX | AGE | HEX | BODY FAT | HEX | LIGHT |
| M | 0A | 24 | 18 | 45 | 2D | ALL 3 |
| F | 0F | 52 | 34 | 33 | 21 | GREEN |
| M | 0A | 45 | 2D | 21 | 15 | GREEN |
| F | 0F | 33 | 21 | 25 | 19 | GREEN |

**Discussion**

I learned a lot in this lab, more specifically about how branching and variables are stores. I figured out how branching can be utilized in the same way of how functions are used in C/C++. It is by far the most entertaining lab assignment I have had so far. I think this is because, apart from being challenging, I also had the freedom to experiment with different methods of approaching the same problem.

**Contribution to Team Work**

Assignment was done by me.

**References**

*The AVR Microcontroller and Embedded Systems using Assemble and C*