Ahmed Alhaj
CMPE 311
Section MN 4:515
project report

In this project we are supposed to implement a guessing code using avr assembly and our toolkit. The goal is to make the user enter a 4-digit sequence code using butterfly joystick.

Then we are supposed to tell him whether or not his entry right or wrong and carry out some actions in either case.

My implementation has diverted to a completely different state machine map. One of the things that I assumed I did it very differently, is matching the entered code with secret code. I did not used the data segment but instead I used counter to keep track of number entries, and register 19 to keep track of correct entries by increment r19 by 2 using subi r19, -2. In this way I was able to compare the counter to 4 and branch to test_passed which in turn checks the value of register 19. Then, if the value of a register19 equal $8 that means the entered code sequence match the secret sequence otherwise.

With regard to completion, I have my code tested using serial output printing. And print message that says congrats you won. Although, I have to confess that I was not able to test subroutine in the game but they have been test separately. The subroutines includes TURN_ON_LED, LOST, print_lost, jump back to install state. The reason is that I run into error later at night that says branch out of reach. But I tested all of them separately. And this issue, did allow to call print_lost subroutine, and make call to transition to start a gain. It is fully complete running wise as whole. But they run fine as if test these block of code separately.

Here a sample test.

```
##################################
                    HELLO PLEASE ENTER CODE
                                         UP
                                    I AM FINIH LOOP
                                              I AM AT CONTINU
E
 DOWN  I AM FINIH LOOP
                 I AM AT CONTINUE
                           LEFT  I AM FINIH LOOP
                                   I AM AT CONTINUE
                                           RIGHT  I AM FINIH
LOOP
    CONGRAT YOU WIN
                TERMINATE
```

Some parts are not in the runnable code but they are there commented. Those parts work fine due a weird error "branch out of reach" I could not used them.

Quick note, I actually start coding on friday, I have an OS project that took me till friday to finish. I start very late, I was not able to see TAs. but I spent both saturday and sunday fully. The biggest part that I struggled with is making counterpart of DEBOUNCE, it took me more than 10 hours to figure it out. Because initially I was able to get the input but it wont wait for the user to enter it just keep running, I tried a long delay statement and it allowed to make sure that are some entries are being captured. Eventually, I figured it out, but there is one problem I solved. At one point, everything seems ready to be tested. When I call all the block, I run into "brach out of error " in test_passed flag. Which prevent me from being able to call "turn_on_led", "print_lost"subroutines, " LOST" flag at which I will be executing the blocks carry the lost result. Which includes calling "print_lost", "beepnoise", "jmp to start" . any rjmp or rcall statement I add to my code will result in "brach out of reach". But file that I submitted fully running. The area where I have issues are being commented.

   Lastly, my code runs fine, it is able to get 4-digit code from joystick, it is able to tell if code is correct or false.

These subroutines and flag are implement and test separately but are being commented
TURN_ON_LD:
BEEP NOISE
print_lost
LOST:
Rjmp to start:

All these parts of code are tested and worked, when I tried in the flow of the game kept of giving one error "branch out of reach".