

**High level description of custom lab:-** This is a simple game called “fast finger” I have created. User follows the onscreen instructions and depending on which level he chooses (Easy or hard) he will get the random number that will tell how many points the user needs to score in order to win the game. Winner of the game will be decided on how fast one can press the button to score many points.

User Guide:-

1. There are two LEDs that will light up when starting the game. This tells the user game has started successfully.
2. Next, nokia 5110 LCD screen will now display a message to select the game level Easy or Hard.
3. User is given two buttons to select the level. Pressing the button1 (look at pin diagram) will select the easy level and the message Easy selected will appear on the nokia screen. Similarly, pressing the second button (button2) means a hard level is selected and a message “Hard selected” will be displayed on screen.
4. When user selects EASY level:-
  - a. Random number will be generated between 1 and 20 and message will be displayed “# is your Easy random number”.
  - b. After this, the user will be given 15 seconds and will have to score greater or equal to the given number in remaining seconds. Message will be displayed on the screen telling “time remaining and you have 15 seconds”.
  - c. To score points the user will be pressing the increment button (button3) as many times as wants and once the time ends if the button has been pressed whatever the random number is then a message will be displayed “you won the game”.
5. When user selects HARD level:-
  - d. Random number will be generated between 20 and 40 and message will be displayed “# is your Hard random number”.
  - e. After this, the user will be given 10 seconds and will have to score greater or equal to the given number in remaining seconds. Message will be displayed on the screen telling “time remaining and you have 10 seconds”.
  - f. To score points the user will be pressing the increment button (button3) as many times as wants and once the time ends if the button has been pressed whatever the random number is then a message will be displayed “you won the game”.
6. After user wins or loses the game, pressing the x button on SNES controller will take to

the main screen and from here the game basically starts all over again. Message from First screen select level easy or hard will be displayed again on the screen.

Technologies and components used in custom lab

- Breadboard
- ATmega 1284 software
- Microcontroller
- Wires
- Buttons
- LEDs
- Resistors
- USB cable

Three Complexities and description

1. **Nokia 5110 LCD screen:-** This screen is responsible for displaying all the game instructions to the user. There are libraries I have used which can be found in separate folder. More detailed pinouts and images are included in the separate folder.
2. **Random Number:-** As said earlier the game generates the random number without using srand function. For example, I have used the method called middle square. What it does is we take any four digit number and multiply that number by itself. After that we divide that number by 100 and take the modulo 10,000 which generates a pseudorandom number. As long as we pick the different four digit number it will generate a random number according to that in a specific range.
3. **SNES controller:-** I have used this complexity to go back to the main menu after the game ends. I have researched the specification for this and attached the link at the end. Also, I had to use the previous SNES controller projects to see how exactly this works. I have also attached a link for that as well.

Link to each source file and a few-word summary of file's purpose:-

1. [Nokia LCD AVR Library:-](#) This github has all the important c and header file that have been used to turn on the screen.
  - a. [Nokia 5110.c](#) :- This includes the c code and important functions like writestring, writechar, setcursor, clear and render.

- b. [Nokia 5110.h](#) :- This is a header file for the above c file. This file contains more detailed information on how to use and what each function does.
- c. [Nokia 5110\\_char.h](#) :- This nokia's char file that lists the characters including spaces and special characters.
- d. [Example.c](#) :- This is the sample example code I used when first starting the nokia lcd screen to see if it works properly.

2. [Middle Square method](#) :- This is a wikipedia article I looked at. Since I was not allowed to use srand function I had to tweak the method a little bit. For example instead of using seed I came up with four random integer that does the Calculation and gives me the random integer.

3. [SNES Controller Specifications](#) :- This is the article by JChristy where he lists All the information for the pinout and what each button does. He talks about Each button to clock pulse assignments and explains latch and ground.

Short description for a resume which shows the technologies you learned:-

This is my project for UCR class CS/EE 120B. I developed a game that can be played by one person and he/she scores the points to win the game. I have used nokia 5110 LCD screen, SNES controller and generated random numbers without using a srand function, ATmega 1284 with atmel studio. All of these things took me some time to grasp but eventually I was able figure it out and in the future I can continue developing more of the code and add more features in the game using more technologies.

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