

EL203 Embedded Hardware Design Project

SNAKE RUN GAME on a 6 X 6 Red LED Matrix using ARDUINO

• Team Members and Responsibilities

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Embedded Hardware Design project was a good opportunity for us to work as a team and accomplish the project aims. The success of this project is a result of a great group effort. Besides that, after initial meetings to finalize upon an idea to work upon, we decided to broadly classify ourselves into different responsibilities for better accountability.

Anuj Kosambi and Amit Masani were majorly involved in coding the snake game which was to be uploaded on the arduino board . Tanmay Awasthi and Shubham Saxena played a key role in component assembly and hardware designing for the Snake Game. Akshay Ratan and Utkarsh Bhatla were responsible for the algorithmic design and project documentation.

. Project Requirements and Specifications

We all have played the basic Snake Run game in our childhood. Before making the game on a basic 6 x 6 Red LED Matrix board , we had to decide on certain rules for the game which constitutes the basic idea of our project.

1. General Requirements

Snake Game has the following general requirements::

- The interface (LED Board) and objective of the game should be clear enough to the user.
- The switch used should be perfect in its role and be able to move the snake left or right.
- The cost of overall production should be low.
- The software should be modular.
- There should be a possibility for an upgrade in future.

2. Functional Requirements

The Snake Game have these features:

- The basic child snake starts from the length of 1 single LED

- It is navigable by switches to eat the food packet/apple and it grows its size maximally upto 6 (as our LED board is 6x6).
- The boundary hindrance is not taken into account.
- As soon as length of snake > 6 by consuming the food packet , the game starts again with faster pace(we call it level 2) and with snake size reset to the original 1 LED.
- As soon as the game is reset , snake speed increases.
- Food Packets appear randomly.

3. Dimensional and Display Requirements

- 6 x 6 LED Board
- Boundary collisions ignored
- Snake reappears from opposite boundary instead of terminating in collision

4. Hardware Specifications

- Arduino AtMega32
- 6 x 6 Red LED Matrix Board
- Two toggle Switch
- Six Resistances of 4.7k
- Jumper Wires
- A couple of breadboards

• Design Methodology

1. Hardware Designs

This simple implementation of the game Snake is based on Arduino AtMega32 platform, with a toggle switch ,6 x 6 Red LED Matrix Module , two breadboards.

Connecting the toggle switch to the Arduino, we needed 10 piece of wires, 4.7k resistor and a breadboard. Also we used a cable to connect the modules to the Arduino. We also connected the +5V and GND to the Arduino board we were using.

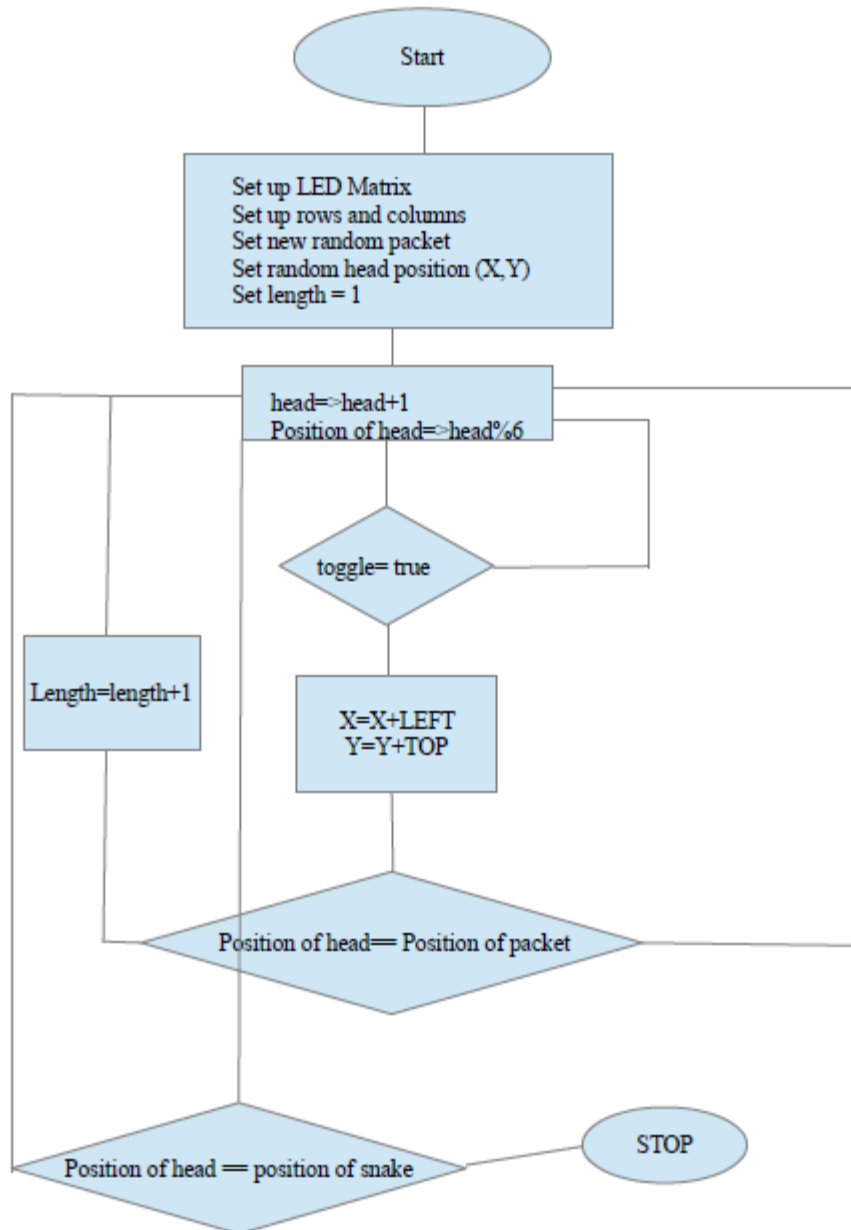
2. Software Design/Flowchart

• Software Algorithm and Hardware Schematic

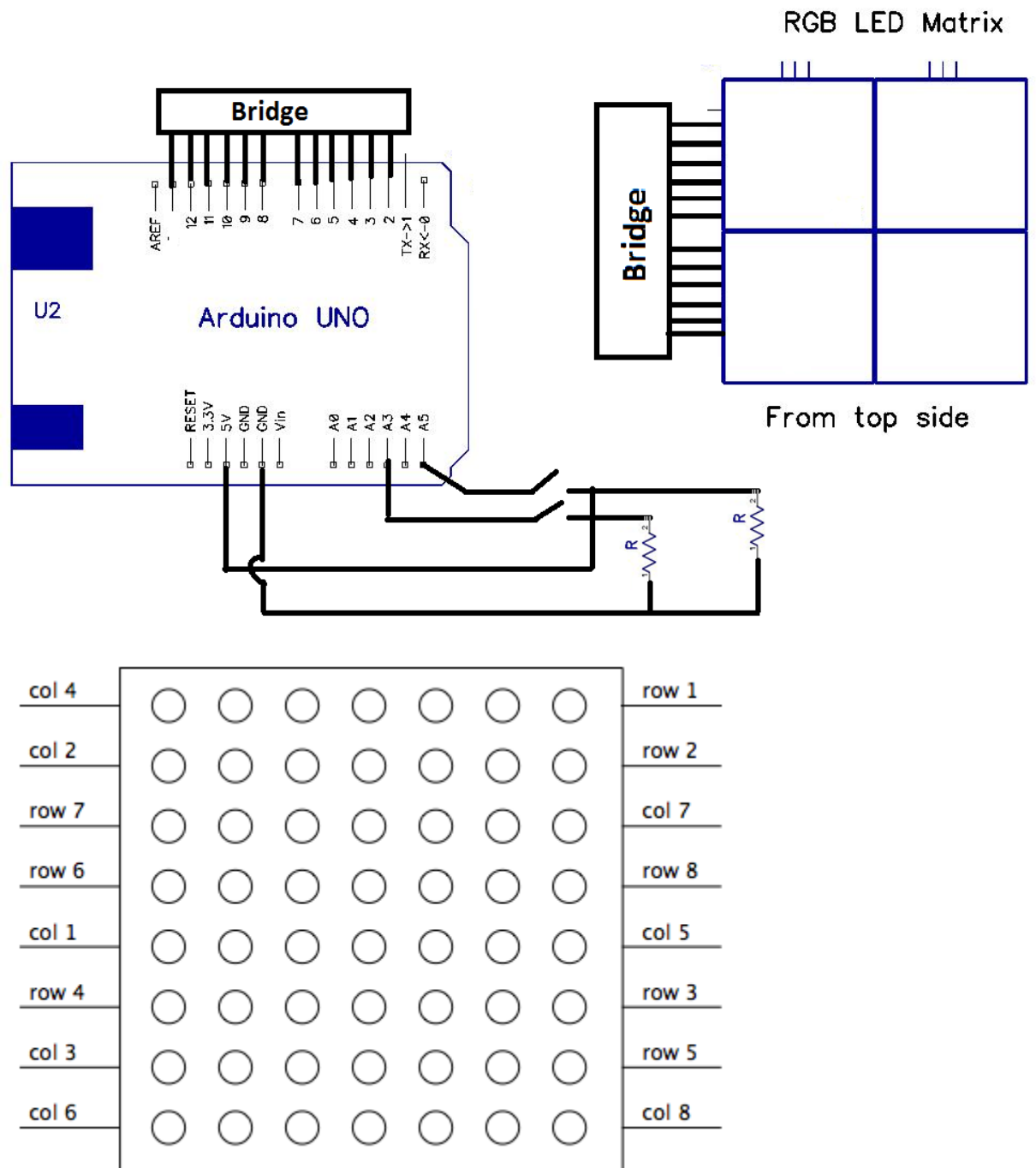
• Software Algorithm

- Start
- Set up LED Matrix
- Set up rows and columns
- Set new random packet
- Set random head position (X,Y)
- Set length = 1
- Movement of snake

- head=>head+1
- If toggle= true
 - X=X+LEFT(If moving in Y direction, change to X)
 - Y=Y+TOP(If moving in X direction, change to Y)
- If Position of head== Position of packet
 - length=length+1(add tail)
- If Position of head == position of snake
 - Stop



- **Hardware Schematic**



Software Testing

Testing this project was indeed fun as it involved playing Snake Run Game once again after so many years.

The snake started as a single LED long child, and toggle switches are used to move it left or right with respect to its moving direction. When the snake goes to the position of random appearing food packet, it increases size maximum ofcourse upto 6 and then after one more consumption of packet, game gets reset with snake size getting back to 1 LED and speed increasing which becomes obvious after 2-33 rounds.

Boundary collision is ignored and testing saw snake appearing from boundary in a circular fashion.

Conclusion: Snake Game works perfectly fine as intended. Toggling directions also work fine.

Video link : <http://www.youtube.com/watch?v=f8GgFtwcvlg&feature=youtu.be>