

CS209-210-MINI-PROJECT

TOPIC:

**ARDUINO/MICRO CONTROLLER BASED
DESIGN**

Name: Diksha Barnwal

Roll Number:2101AI14

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Introduction:

About Snake Game:

Snake Game has been very popular since the beginning of the Mobile phones. Initially it was come in Black and white cell phones, and soon became very famous. Then with the advancement of the Cellphones, this game has also changed a lot, and now many graphical and colourful versions of this game are available.

Snake game has also become very popular **DIY project** for electronics Hobbyist and Students. So today we are going to demonstrate, **Arduino Snake Game**, with all its basic functionalities, while keeping it simple at the same time.

About Project:

In my project, I made a snake game which can be affordable and portable at the same time using Arduino. This game is made keeping at target , the children and hobbyist.

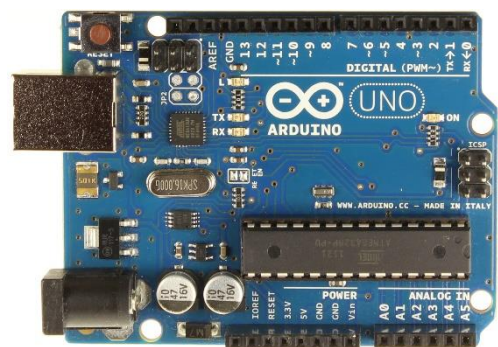
Introduction:

This project is made by using different components as well as Arduino UNO machine. The sole purpose of making this project is creating something I never did. So , Here I go.

Hobbyist and Children can play this snake game using Joystick which I used in this project, and that is very easy to handle. Its quite interesting to play with joystick in such a small 8 X 8 DOT matrix which eventually shows the score of the game as you finished the game with a message GAME OVER.

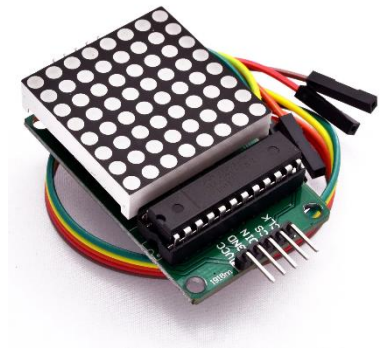
COMPONENTS REQUIRED:

- 1. ARDUINI UNO:** The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc and initially released in 2010.[2][3] The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.[1] The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable.[4] It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is similar to the Arduino Nano and Leonardo.[5][6] The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available



2. 8 x 8 DOT MATRIX DISPLAY : Dot Matrix LED 8×8

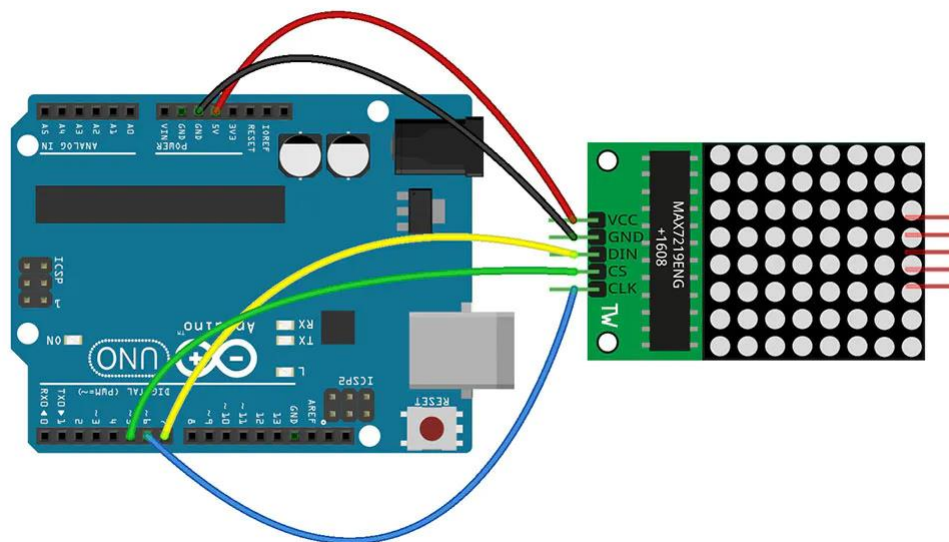
is an array of LEDs that you can display particular numbers, letters, and shapes on it. Dot matrixes are indicated by the number of rows and columns. The most popular type of Dot Matrix is its 8×8 type, which provides 64 LEDs in 8 rows and 8 columns. To control the Dot Matrix 8×8 simply, you should connect each row and each column to a digital pin, which means you need 16 digital pins! So it's not a proper way.



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To control Dot Matrix, there are modules based on MAX72xx ICS which need to connect to 4 digital pins instead of 16. You can also connect multiple Dot Matrix (up to 8) to each other without needing any extra pin and cascades them.

Connections of 8 x 8 Matrix display with Arduino

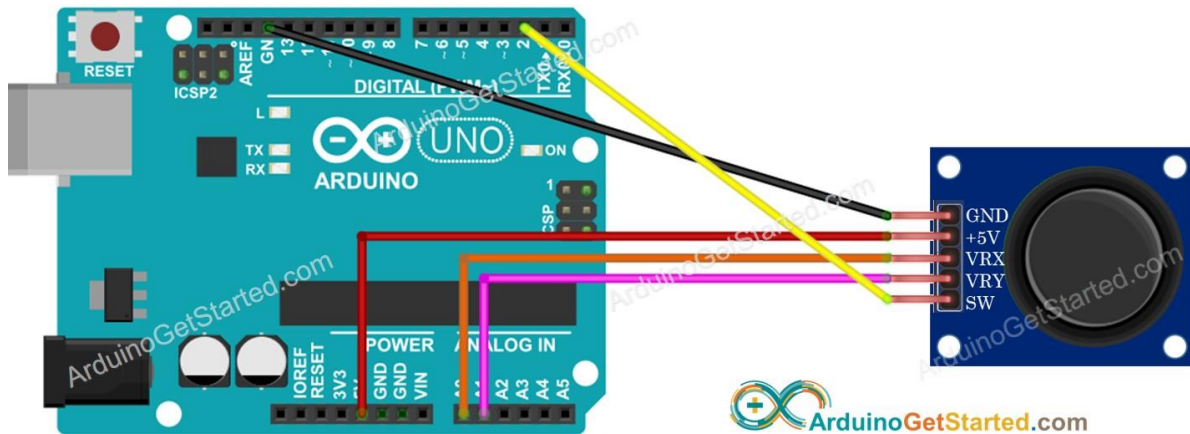


3. **JOYSTICK** : Joystick module provides an analog output to the Arduino and the output voltages provided by the sensor keeps on changing depending on the direction of joystick. Microcontroller comes with an inbuilt analog to digital converter, which interprets these voltages and provides the direction of movement. When we move the joystick in the horizontal direction, the voltage at Rx pin



changes. Similarly, the voltage at Ry pin changes when we move the joystick in a vertical direction.

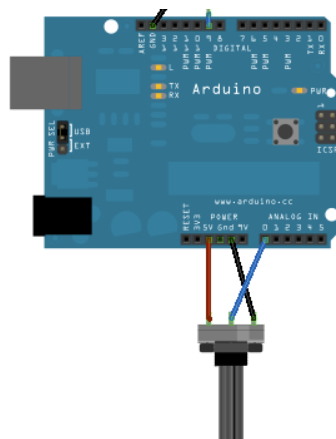
Connections of Joystick with Arduino UNO.



- 4. POTENTIOMETER 10K:** A potentiometer is a three-terminal resistor with a sliding or rotating contact that forms an adjustable voltage divider. If only two terminals are used, one end and the wiper, it acts as a variable resistor or rheostat. The measuring instrument called a potentiometer is essentially a voltage divider used for measuring electric potential (voltage); the component is an implementation of the same principle, hence its name. Potentiometers are commonly used to control electrical devices such as volume controls on audio equipment. Potentiometers operated by a mechanism can be used as position transducers, for example, in a joystick. Potentiometers are rarely used to directly control significant power (more than a watt), since the power dissipated in the potentiometer would be comparable to the power in the controlled load.



Connections of POTENTIOMETERS with ARDUINO UNO.



5. BREADBOARD : A breadboard, solderless breadboard, or protoboard is a construction base used to build semi-permanent prototypes of electronic circuits. Unlike a perfboard or stripboard, breadboards do not require soldering or destruction of tracks and are hence reusable. For this reason, breadboards are also popular with students and in technological education. A variety of electronic systems may be prototyped by using breadboards, from small analog and digital circuits to complete central processing units (CPUs). Compared to more permanent circuit connection methods, modern breadboards have high parasitic capacitance, relatively high resistance, and less reliable connections, which are subject to jostle and physical degradation. Signaling is limited to about 10 MHz, and not everything works properly even well below that frequency.



6. JUMPER WIRES : Jumper wires are electrical wires with connector pins at each end. They are used to connect two points in a circuit without soldering. A jumper wire may appear uncomplicated, and it doesn't get much more basic than other wires or cables. But there are tiny details you need to pay attention to. Generally, jumpers are tiny metal connectors used to close or open a circuit part. They have two or more connection points, which regulate an electrical circuit board. Their function is to configure the settings for computer peripherals, like the motherboard. Suppose your motherboard supported intrusion detection. A jumper can be set to enable or disable it. Although jumper wires come in a variety of colours, they do not actually mean anything. The wire colour is just an aid to help you keep track of what is connected to which.



WORKING:

This is little complicated game to build. To make this project, we have used an 8×8 red colour Dot matrix display for displaying the snake and its food dot, 1 joystick for giving directions and start the game , a 10k Potentiometer to control the voltage and finally an Arduino UNO for controlling the whole the process.

Connection Description:

8 X 8 Matrix :

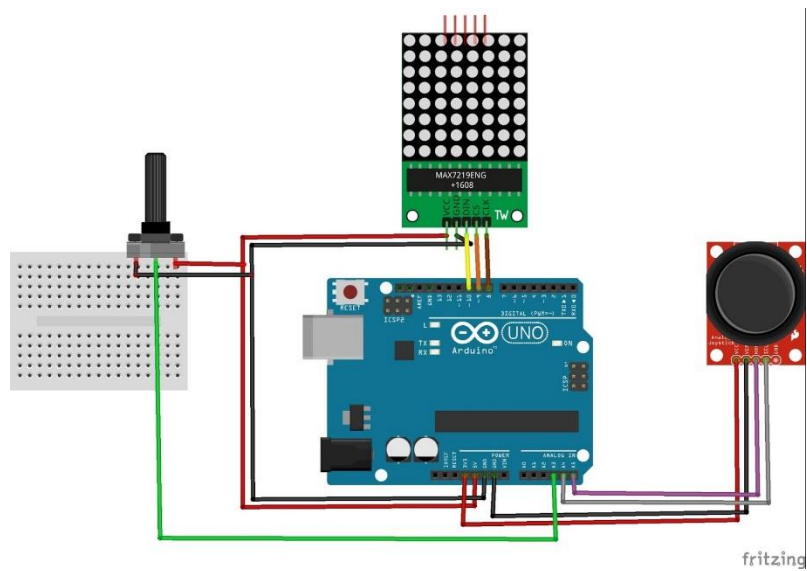
VCC – 5 V	DIN – 12	CLK – 10
GND – GND	CS – 11	

JOYSTICK:

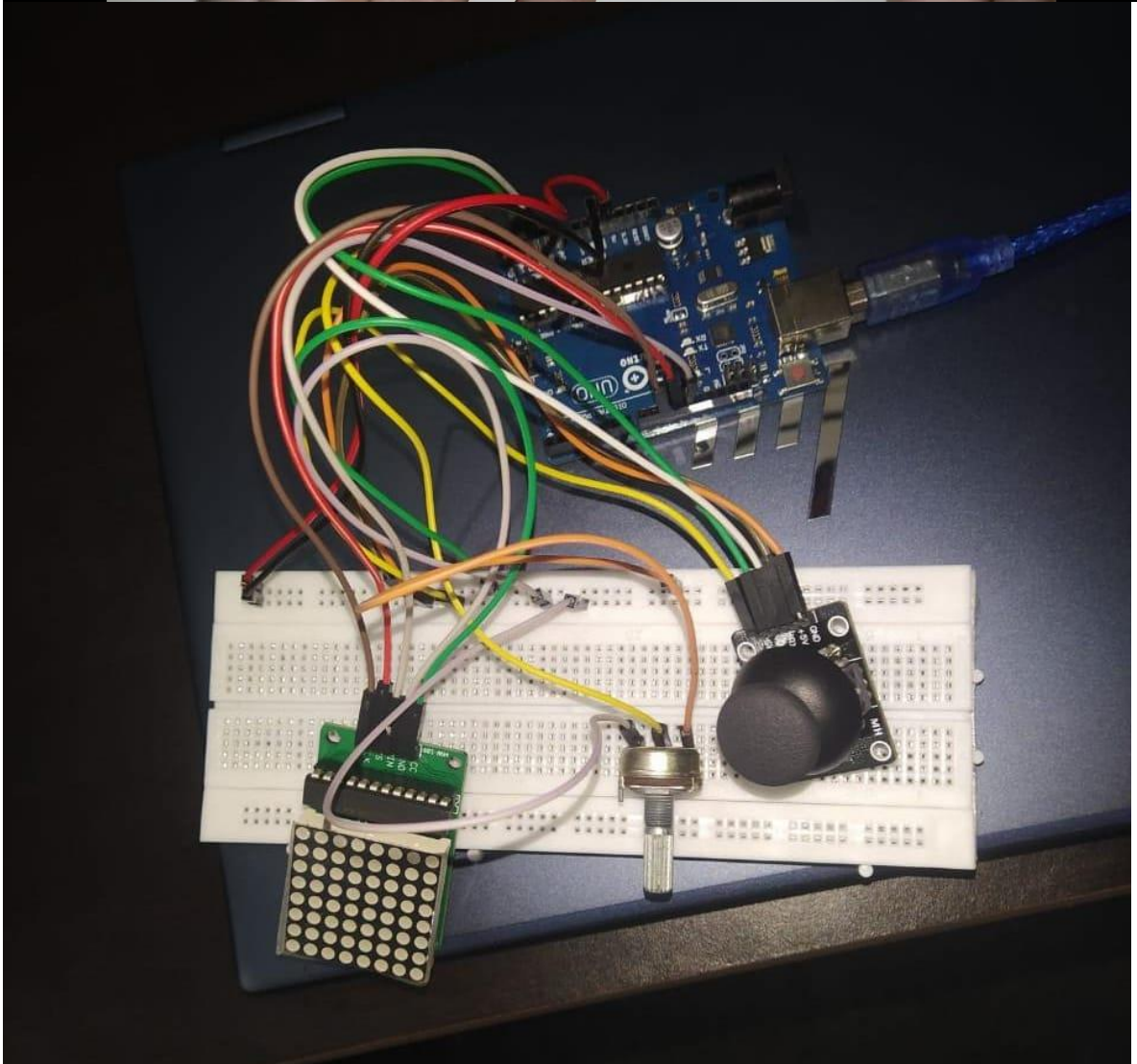
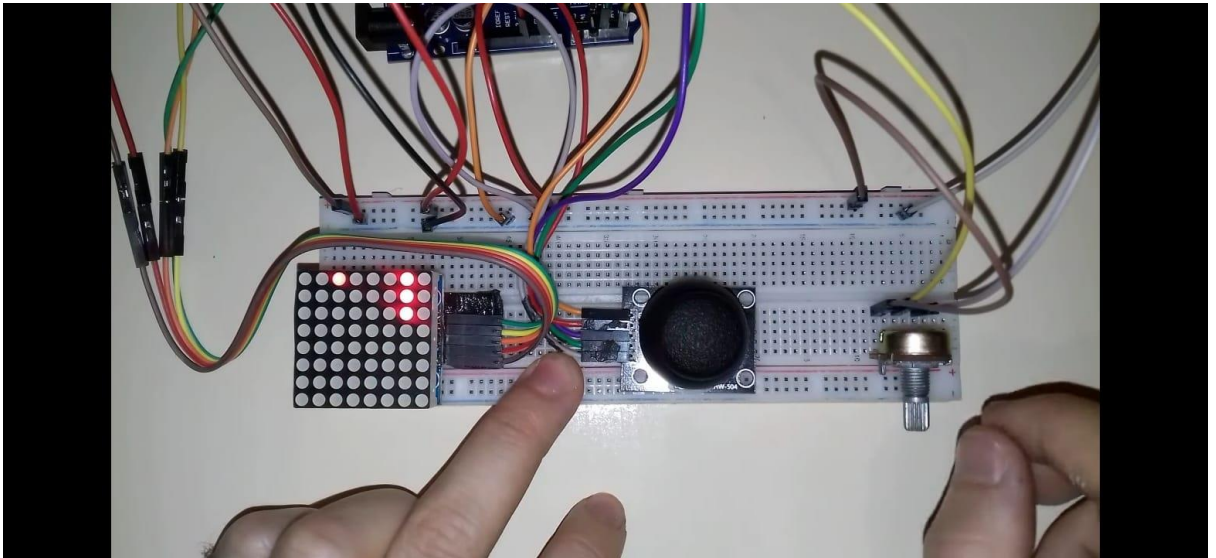
GND – GND
VCC – 5V
VRX – A2
VRY- A3
SW- 5V

POTENTIOMETER

RIGHT – 5V
MIDDLE – A5
LEFT – GND

FULL CIRCUIT CONNECTION:

FULL CIRCUIT IMAGES:



WORK FLOW –

As we move the joystick , the snake will follow the same direction and game will over as soon as snake will hit itself or reached its maximum height. The food of the snake is shown by blinking LED dot. After eating one food the length of snake is increased by 1 dot and so on.

At the end of the game when the snake hit itself , a Gameover message with score is displayed on 8X8 dot matrix.

SCOPE OF IMPROVEMENT :

This project can be improved by controlling the movement of snake using mobilephone and displaying the score on LCD. But the LCD , I was using in this project was not in fine condition. That's why I didn't use.

Specific to the snake problem, modifications can be made to create completely new and interesting problems , such as non rectangular board, obstacles within the game board, or multiple pieces of food.

Conclusion :

I have completed our knowledge of embedded system design after I finished the project and obtained more experience of hardware/software co-design. Since it was the first time I built an embedded system , a lot of problems were encountered during my work on project. But at the end , It was quite interesting to work on this cool project, looking forward to do more such project.

Thank You