
Interactive NeoMatrix

Challenges

Building and Programming robots in TINKERCAD

Using the NeoMatrix through TinkerCAD. This workshop aims to develop your text programming skills.

Getting started

Activity containing
pre-made circuit

The screenshot displays the 'Aber Robotics Club 23-24' interface. At the top, there is a back arrow and the title 'Aber Robotics Club 23-24' with the teacher 'AberOutreach'. Below this is a navigation bar with tabs: 'Students', 'Activities' (highlighted with a blue underline and a green 'New!' badge), 'Designs', 'Notifications', and 'Co-teachers'. The main section is titled 'Recent class Activities' and contains three activity cards. The first card, 'Neo-Matrix', is dark blue and has an arrow pointing to it from the text box on the left. The second card, 'Valiants', is green. The third card, 'Electronics', is blue. Each card shows the activity name and the date it was added.

Activity Name	Date Added
Neo-Matrix	Added Jan 9, 2024
Valiants	Added Jan 9, 2024
Electronics	Added Dec 13, 2023

g Started

The diagram illustrates a digital logic circuit setup. An Arduino Uno is connected to a breadboard and eight 74HC04 hex inverters. The breadboard contains a 74HC04 and a 74HC00. Wires connect the Arduino's digital pins to the inverters, and the inverters' outputs back to the breadboard. The breadboard also contains a 74HC04 and a 74HC00.

Neopixel and GFX APIs

- NeoPixel:
https://adafruit.github.io/Adafruit_NeoPixel/html/class_adafruit_-_neo_pixel.html
- GFX API: http://adafruit.github.io/Adafruit-GFX-Library/html/class_adafruit___g_f_x.html#a59178a0e0c845a14a39b457c43567dd9

Key functions

- `matrix.fillScreen(matrix.Color(r,g,b));`
- `matrix.drawPixel(x,y,matrix.Color(r,g,b));`
- `matrix.fillRect(x, y, width, height, color);`
- `matrix.drawRect(x, y, width, height, color);`
- `matrix.fillCircle(center_x, center_y, radius, color);`
- `matrix.drawCircle(center_x, center_y, radius, color);`
- `matrix.getPixelColor(num)`
- `matrix.clear();`
- `matrix.show();`

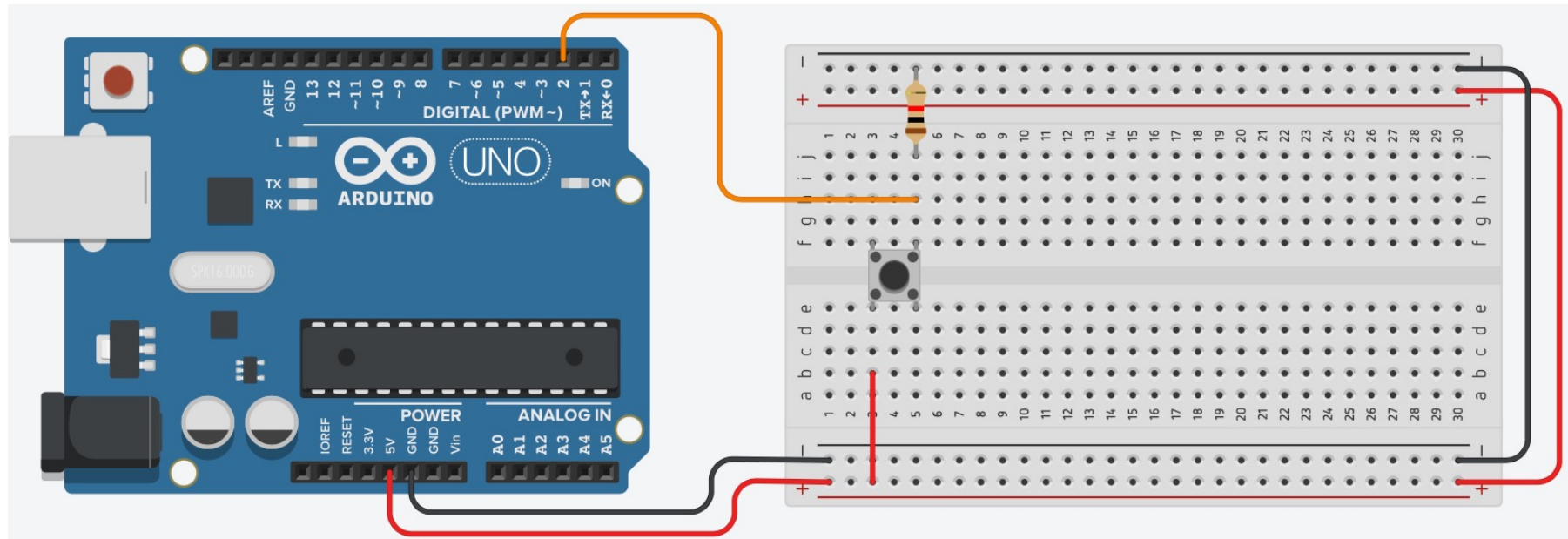
Notes on getPixelColour

- Note, the matrix uses uint16_t colour range
- The function getPixelColor(n) returns a colour in the range uint32_t
- This will therefore be different to the number generated by matrix.Color(r,g,b);
- As only a small range of colours are needed here, the best option is to save the uint32_t values generated for comparison

BRONZE Challenge:

Steps:

1. Add four buttons to the circuit on pins 10-13. Below is a reminder of how to wire in a button:



SILVER

Challenges

GOLD

Options:

This term, the aim is to develop one or more interactive games that can be played on the neomatrix. The neomatrix in TinkerCAD is 12x8 whilst the challenge day neomatrix is 32x8

1. Mastermind game [https://en.wikipedia.org/wiki/Mastermind_\(board_game\)](https://en.wikipedia.org/wiki/Mastermind_(board_game))
2. Obstacle avoidance driving game
3. Space invaders game
4. Side scrolling platform game
5. Other ideas you may have

SILVER

Challenges

GOLD

Things to consider:

1. Orientation of the neomatrix, horizontal or vertical
2. Use of arrays for tracking current state of display
3. Functions for updating display, shifting image left/right/up/down
4. Levels of difficulty