

Flappy Bird Game for Arduino

Introduction

This project is a Flappy Bird game designed to run on an Arduino Uno board with a 1.8" LCD STT735 display and a breadboard. The game is based on the popular mobile game Flappy Bird, and the objective is to navigate a bird through a series of pipes without colliding with them. This project was created by Rizan Gabriel-Adelin.

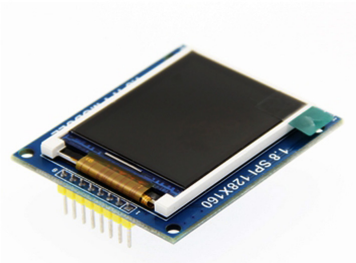
General Description

The project consists of the following components and modules:

Arduino Uno board



1.8" LCD STT735 display



Breadboard



Buttons for controlling the bird



Buzzer



Wiring and connections to link the components



The LCD display shows the game screen, including the bird, the pipes, and the score. The buttons are used to control the bird's movement, and the breadboard provides the necessary power and connections between the components.

Hardware Design

The hardware design includes the following:

List of components used
Wiring diagram and connections
Any additional diagrams or schematics

List of Components: - Arduino Uno board - 1.8" LCD STT735 display - Breadboard - Button (for controlling the bird) - Jumper wires

Wiring Diagram:



Software Design

The software design includes the following:

Description of the code used
Libraries used
Overview of the algorithms and structures used

The code was developed using the Arduino IDE, and the following libraries were used:

- Adafruit_GFX.h
- Adafruit_ST7735.h

The game code implements the following algorithms and structures:

```
Game loop
Bird movement
Pipe generation and movement
Scoring system
Collision detection
```

Code explanation

The given code is an implementation of the Flappy Bird game for an Arduino board with an attached 1.8" TFT screen. Let's analyze the software design behind this code:

Libraries and Definitions: The code begins by including the necessary libraries for working with the TFT screen and defining various constants for pin connections, screen dimensions, game settings, colors, and sprites.

Setup Function: The `setup()` function is responsible for initializing the Arduino board and the TFT screen. It sets the required pin modes and initializes the screen using the `initR()` function.

Main Loop: The `loop()` function is the main game loop. It calls three main functions: `game_start()`, `game_loop()`, and `game_over()`. These functions handle the game's different stages: start, gameplay, and game over.

Game Loop: The `game_loop()` function is the core of the game. It contains a nested loop that runs the game logic and rendering at a target frame rate. It updates the game state, including the bird's position, pipe movement, collision detection, and score. It also handles user input for making the bird jump. The function uses the `millis()` function to control the game's frame rate and avoid blocking the loop.

Drawing Functions: The code contains several functions for drawing different elements on the screen. For example, there are functions to draw pixels, pipes, the bird, the floor, and the grass stripes. These functions use the Adafruit GFX library and the TFT screen's methods to manipulate the pixels and colors.

Collision Detection: The code checks for collisions between the bird and the pipes or the ground. If a collision occurs, the game over condition is

triggered.

Game Start and Game Over: The `game_start()` and `game_over()` functions handle the start and end stages of the game. They display relevant messages on the screen, wait for the user to press a button, and then proceed to the next stage.

Game Initialization: The `game_init()` function initializes the game state by resetting the score, setting the initial position of the bird, generating a random seed for the pipe gap, and setting the initial position of the pipe.

Overall, the software design follows a modular approach with separate functions for different game stages and tasks. It uses the TFT screen's capabilities to draw graphics and handles user input through a button connected to a specific pin.

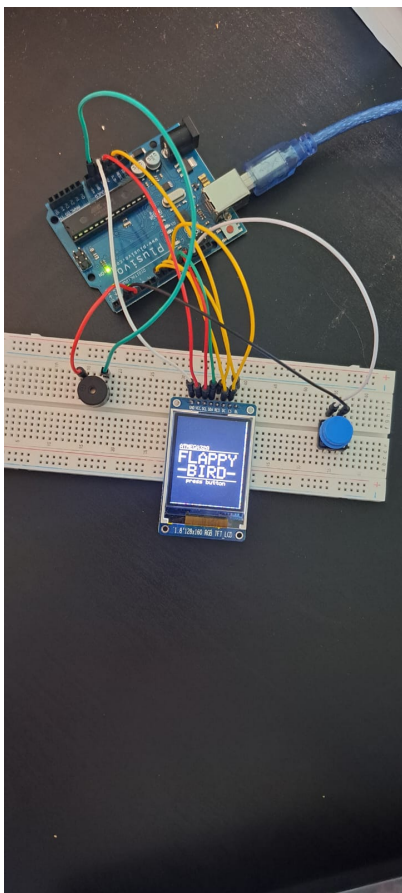
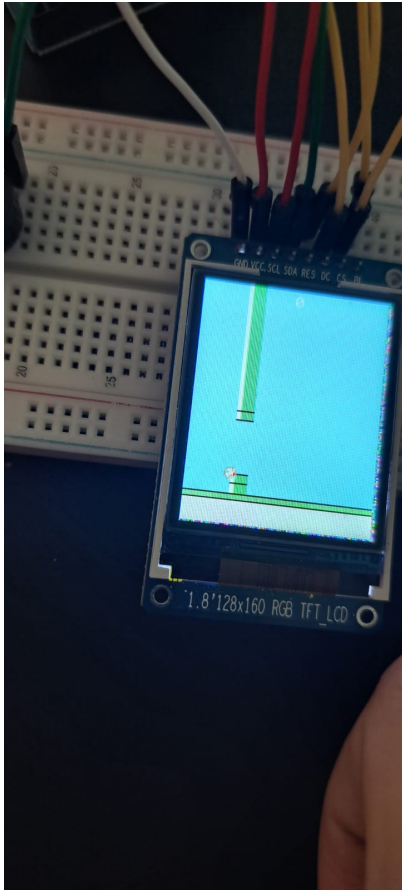
Code provided below

[codeflappybirdrizan.txt](#)

Results

The completed project successfully runs the Flappy Bird game on the Arduino Uno board with the 1.8" LCD STT735 display and the breadboard. Users can control the bird's movement using the buttons, and the game keeps score and displays it on the screen.







Conclusion

Overall, the Flappy Bird game project demonstrates the capabilities of the Arduino Uno board and the 1.8" LCD STT735 display when used in combination with other components. It also showcases how complex games can be programmed and run on microcontrollers like the Arduino.

Bibliography/Resources

List of resources used in the project:

Adafruit libraries
Arduino IDE
1.8" LCD STT735 datasheet
Flappy Bird game design

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