ECE 241 Final Project The Brick Breaker Game

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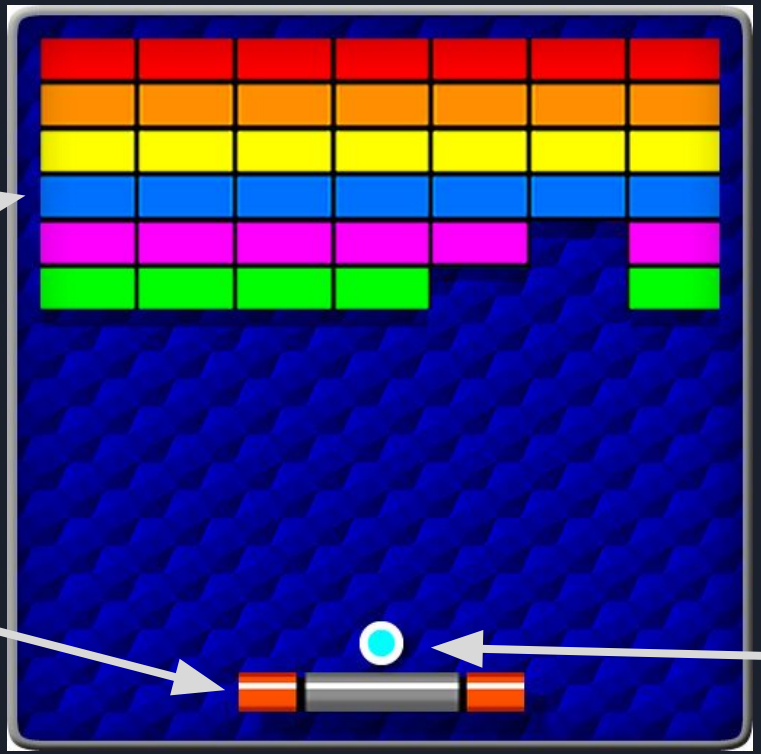
What is Brick Breaker?

Bricks: When the Ball hits a brick, the brick disappears.



Paddle: User controls paddle to hit the ball (Paddle controlled by accelerometer)

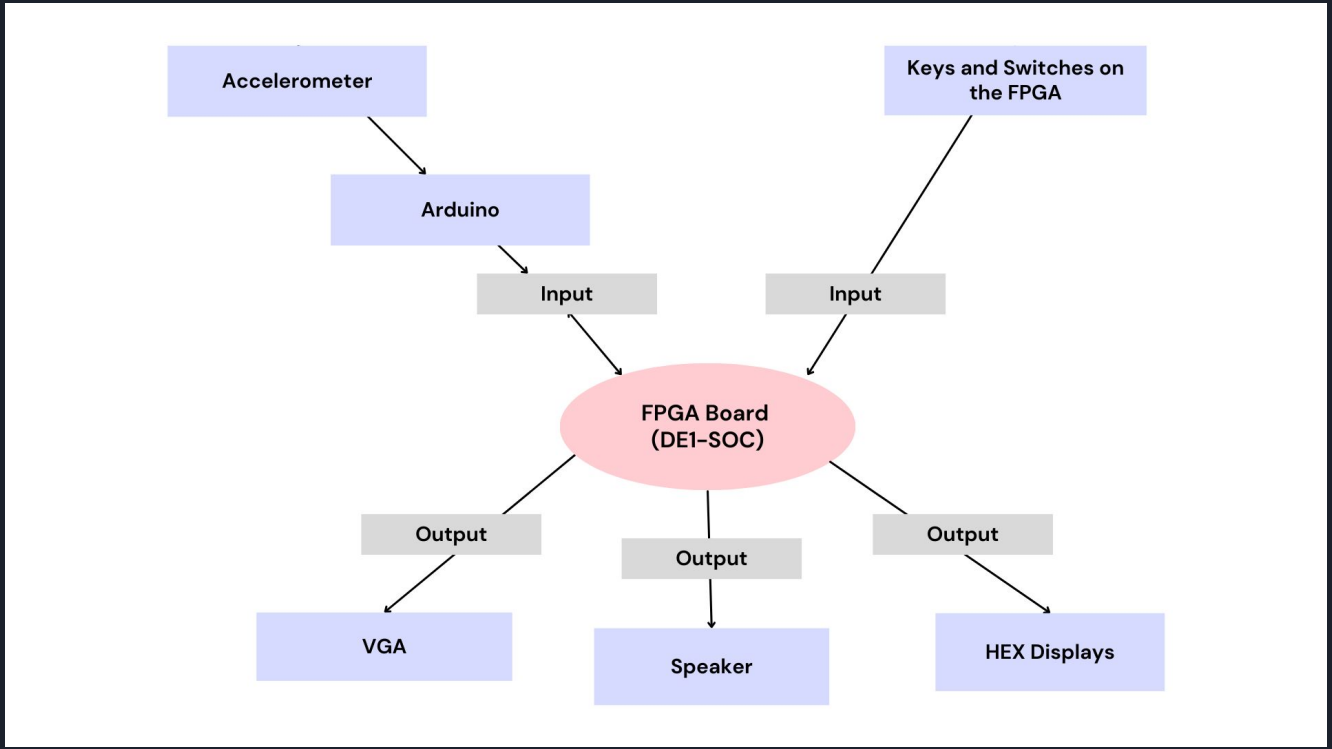
Ball: Ball bounces across the walls, paddle, and bricks.

Inspiration: Brick Breaker was a popular game on BlackBerry devices.

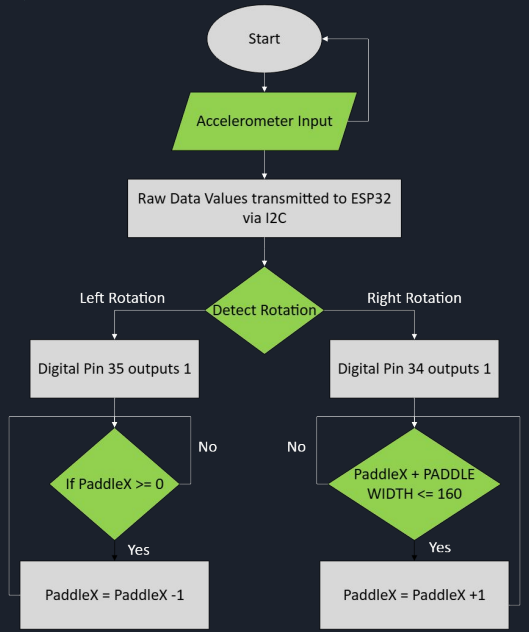
Game Over:
Player Loss: If the player misses the ball three times, the game is over.

Player Win: If all the bricks are destroyed.

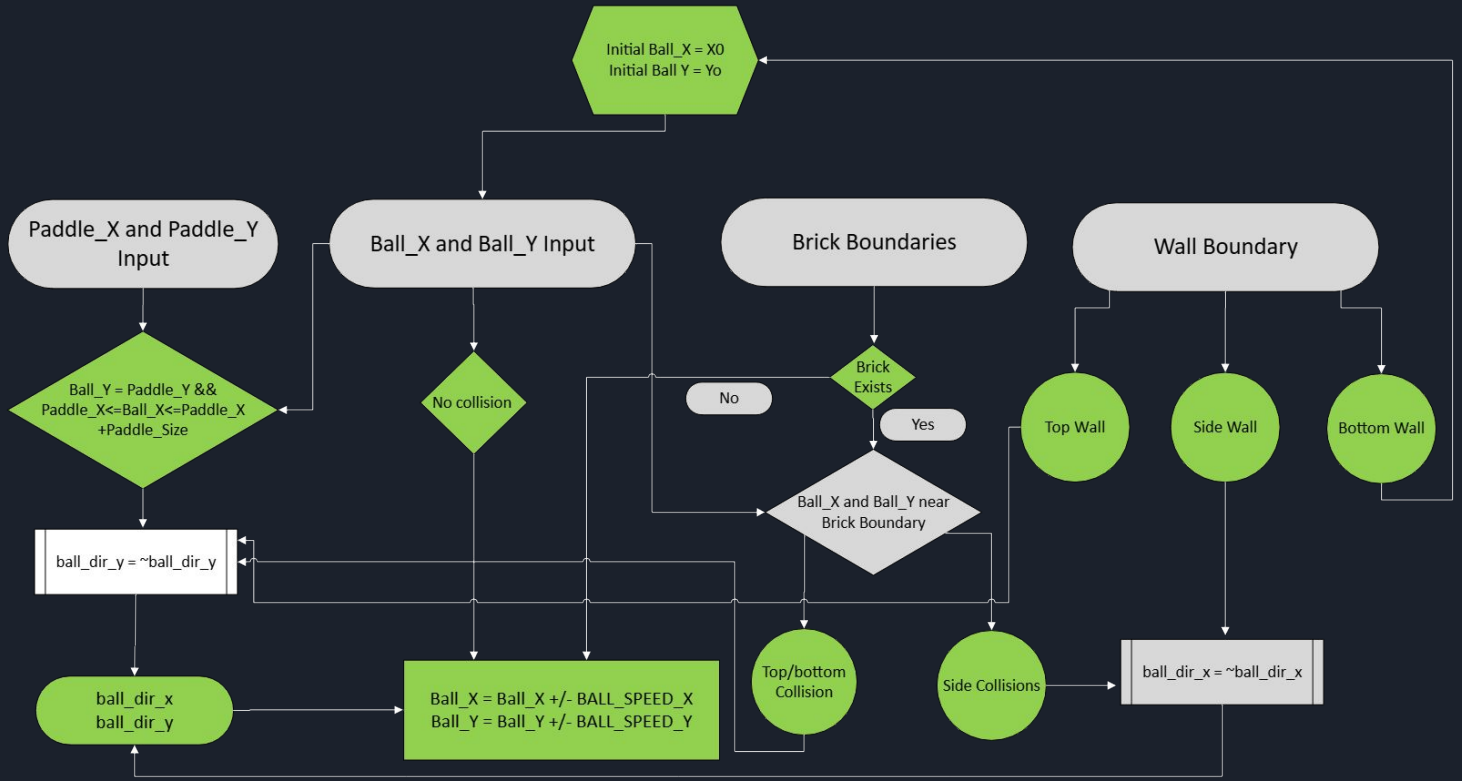
High-level Block Diagram



Paddle Movement Block Diagram



Ball Movement Block Diagram



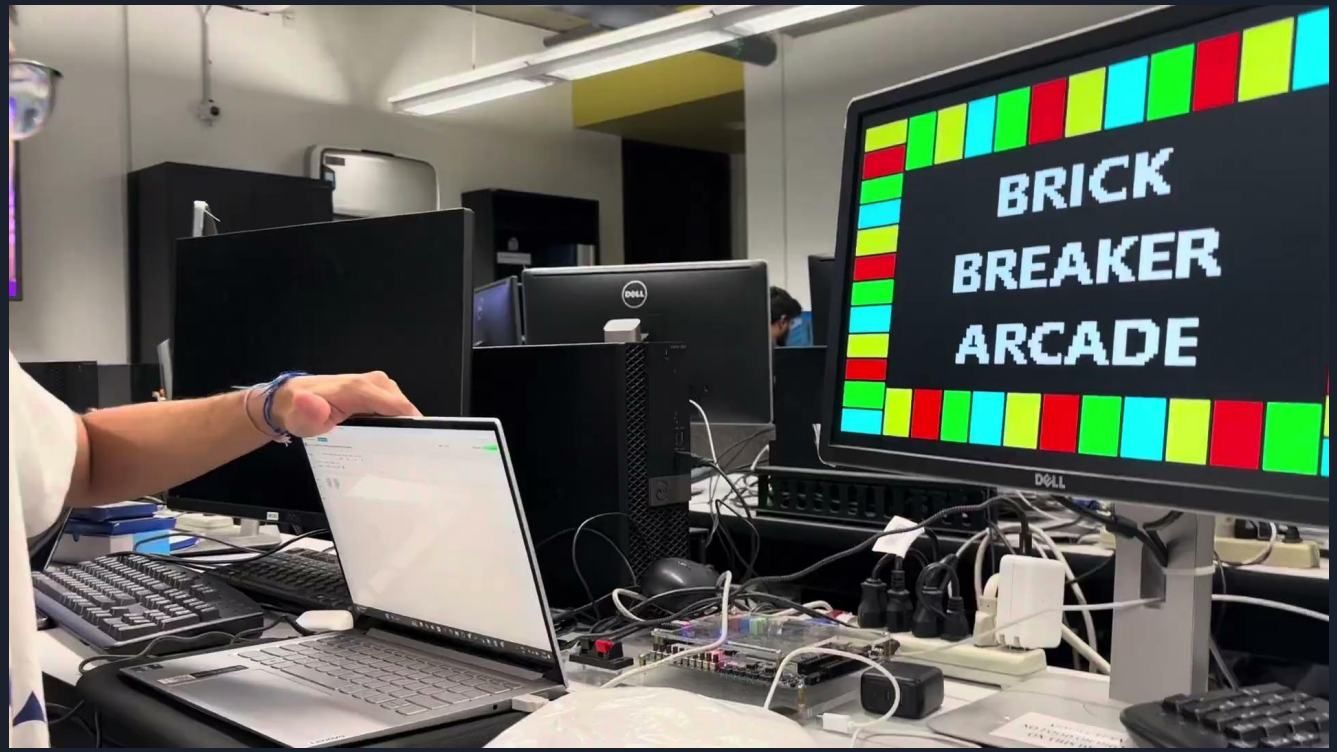
Project Pictures

Home Screen

Playing State

Game Over state

Project Video

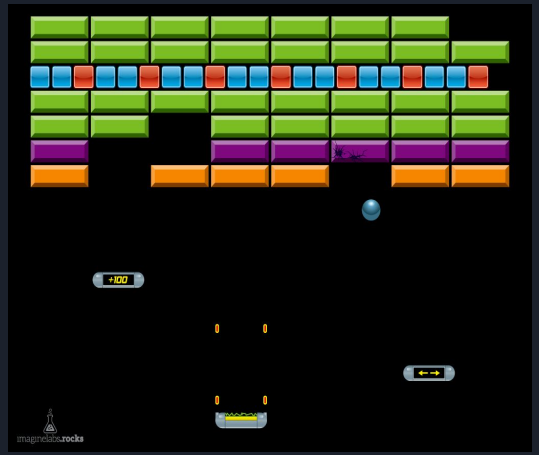


Bugs and issues we encountered

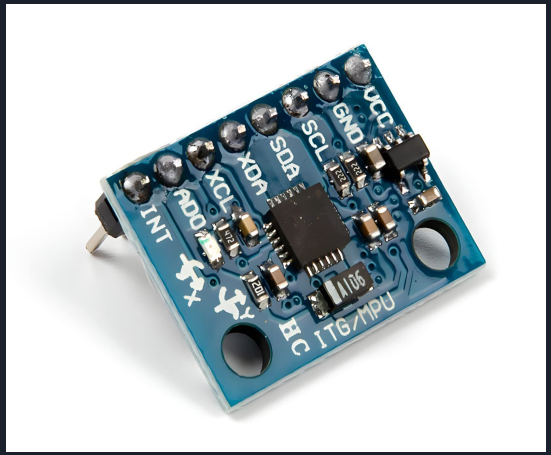
- Issue with VGA Adapter: In Milestone 1, we used an FSM to move the paddle and display the background separately. For Milestone 2, integrating components revealed the FSM approach was too complex, leading us to adopt a simpler pixel-by-pixel drawing method.
- In Milestone 2, we used for loops to detect collisions and reverse the ball's velocity. However, the ball still bounced off "erased" bricks. To fix this, we hardcoded brick coordinates and added a signal to indicate whether each brick existed.

Future Work

1) Implement power ups in our game as in the original Brick Breaker.



2) The accelerometer is currently connected to the FPGA through a microcontroller, which uses digital signals for communication. In the future, the accelerometer will be connected directly to the FPGA through I2C or SPI.



Work Distribution

Aarnav	Jeyan	Together
Brick Module	Paddle Module	Development of game logic, & Debugging
Ball Wall	Ball Brick Collisions	VGA Home screen for the game
Speaker	Accelerometer integration	Ball Movement Module