Pong Game

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Introduction

- Two-dimensional sports game that simulates table tennis
- Originally released in 1972 by Atari
- One of the early most successful game made
- **Our Goal:**
  - Replicate the game in a small system
  - Use a budget less than 70 $
  - Use an accessible tools

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Requirements Summary

The game shall:

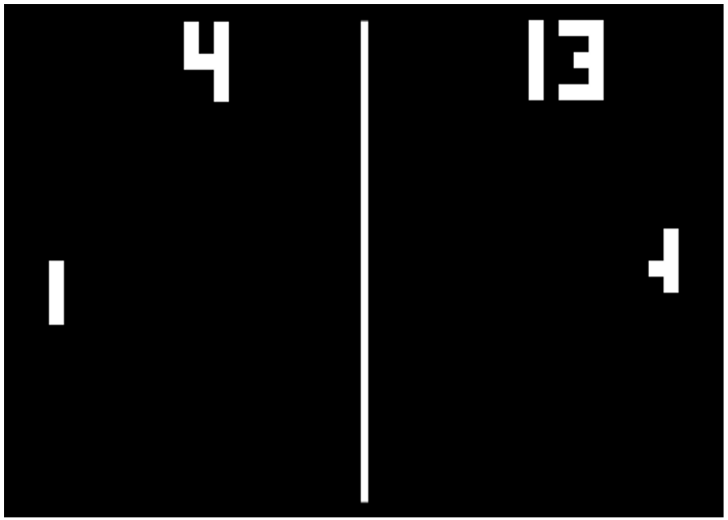
- display the paddles, ball and the scores
- generate a tick sound every time the ball hits the paddle.

The ball shall:

- change speed in function of the area in which it hits the paddle
- change position to the losing player

User shall be able to :

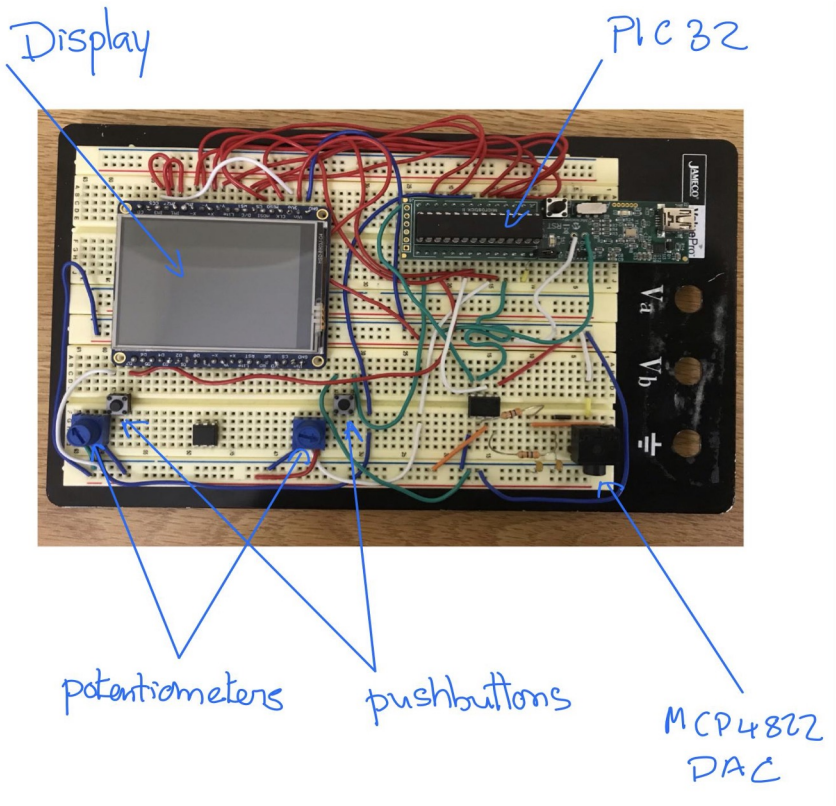
- choose the maximum score
- control the paddles via the potentiometers
- realize a serve using the pushbuttons.



Inventory

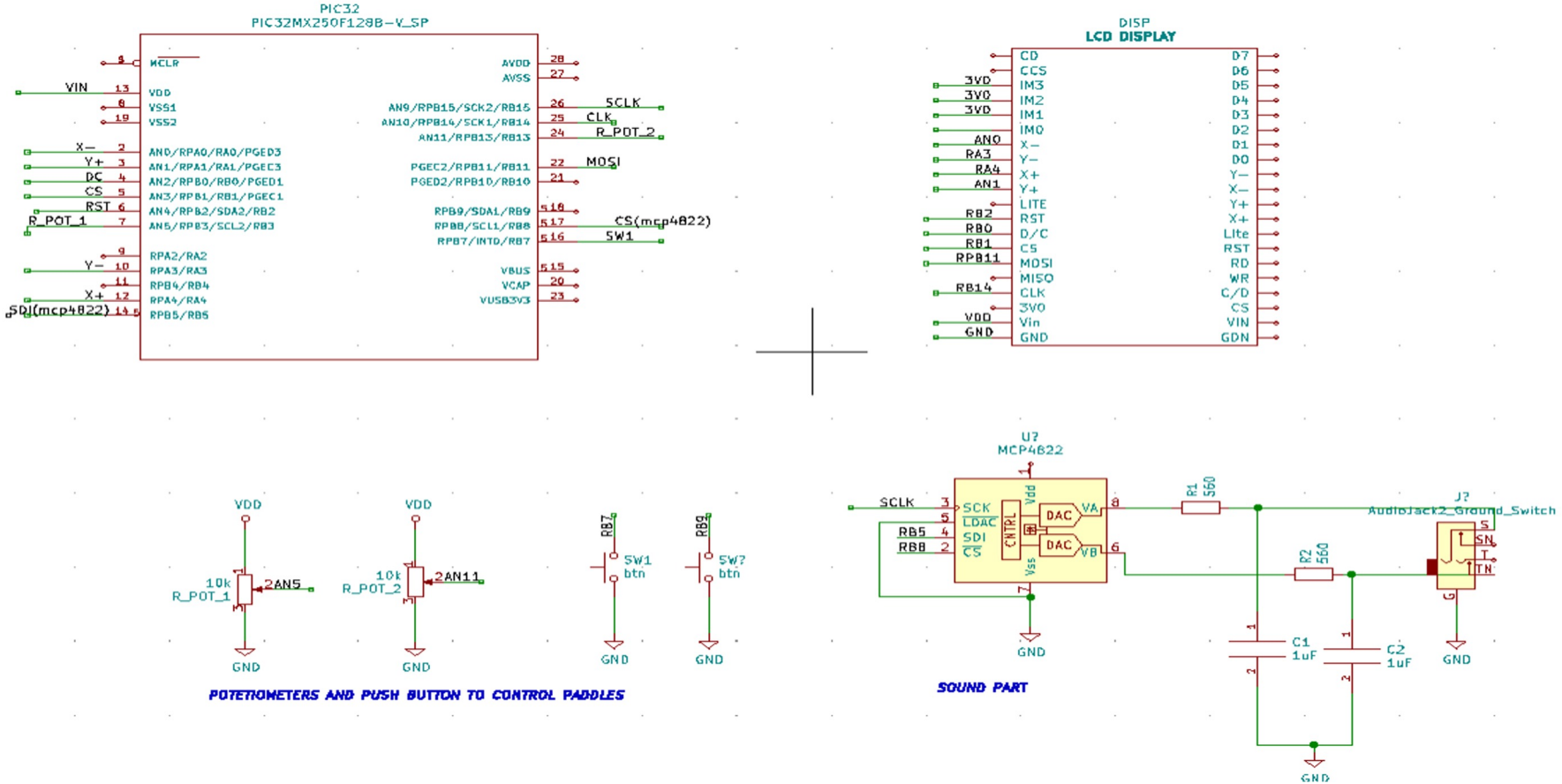
- 1 x breadboard
- 1x PIC 32
- 2 x Potentiometer
- 1x LCD Display
- 1 x Jack Female
- 1x Speaker (optional)
- 1X MC4822 DAC
- 2X 1uF Capacitors
- 2x 360 Ohm Resistors
- Wires

Estimated Total cost= **$67.43**

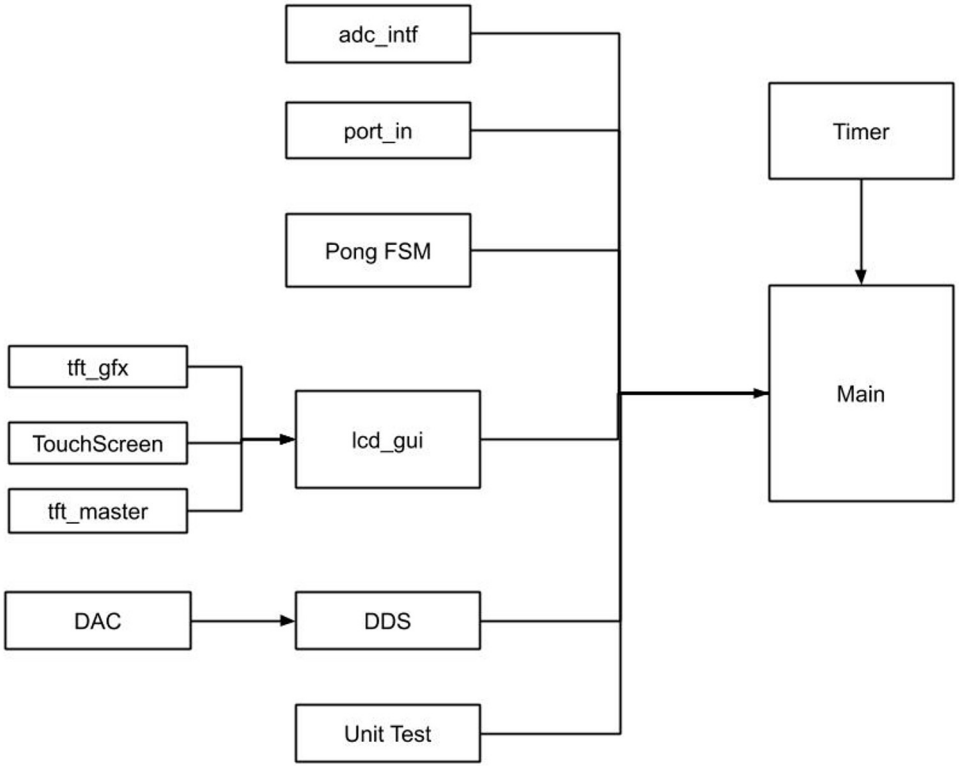


High Level Design

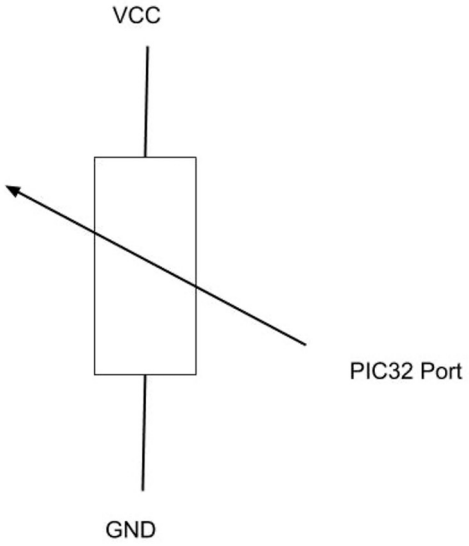
Hardware Schematic

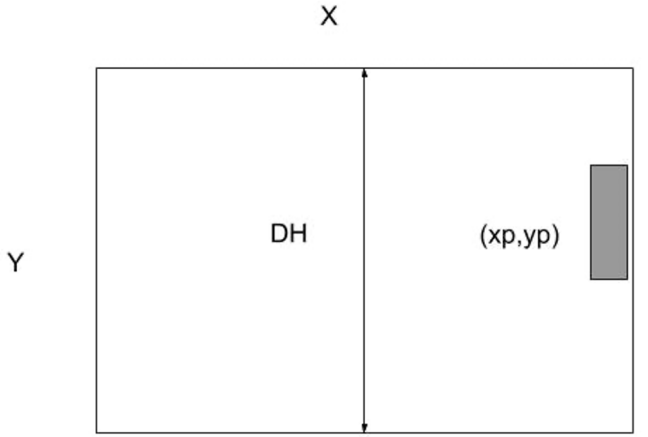


Software Modules



Potentiometer Reading

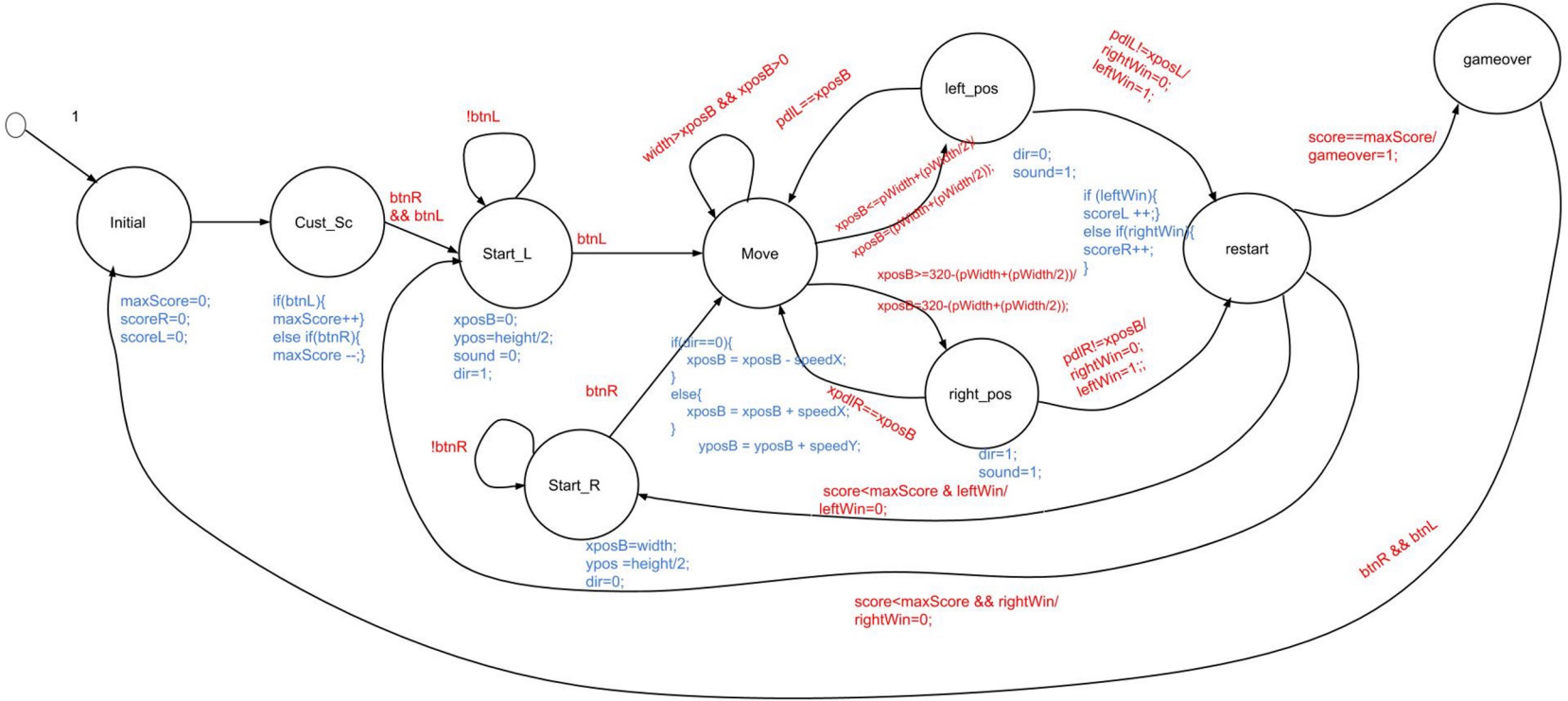




5.7=1023/(WidthLCD-PaddleWidth)

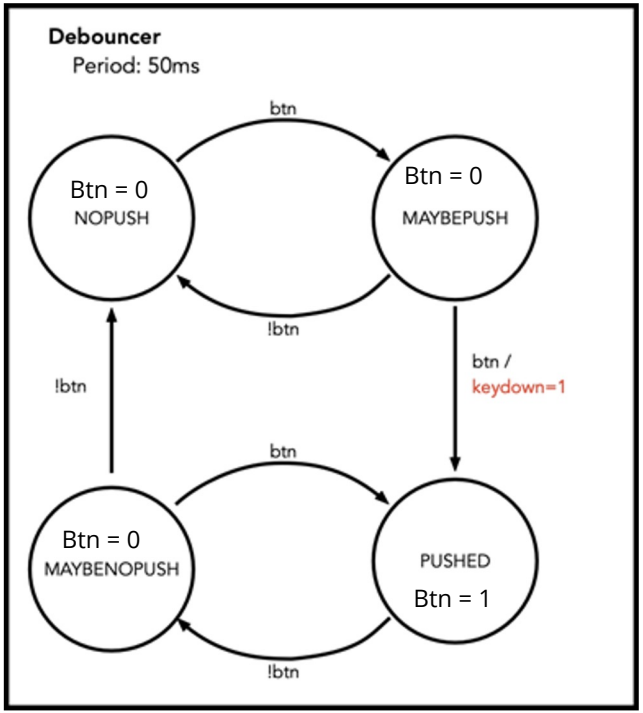
Ypaddle=readADC(port)/5.7

PONG Finite State Machine

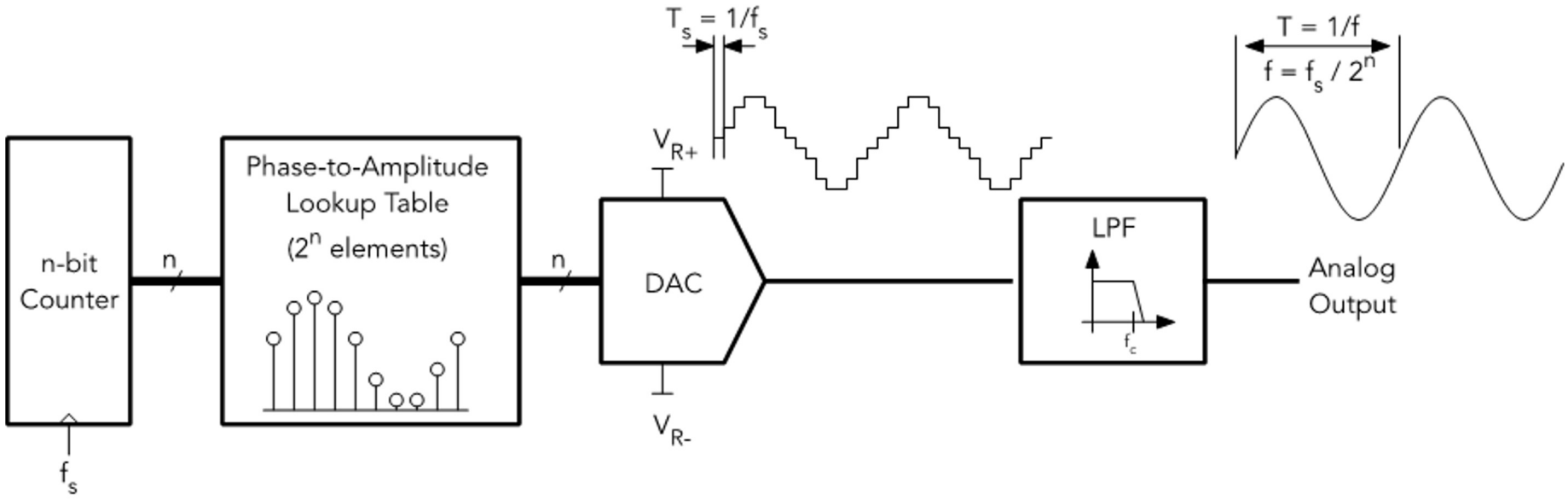


Debouncer

- **Problem:** Mechanical buttons exhibit bounce, noise
- **Solution**: Software debouncing
  - “filter” out bouncing, noise



Direct Digital Synthesis



Test Summary

Each module : individually tested using a Unit Test Program

T1.1 : Verify if the display shows all pong components.

T1.2 : Verify that the potentiometer moves the paddle

T1.3 : Verify that the sound module generate tunes

2 : Verify if the ball bounces when pushbutton pressed

3: Verify that game is over after the maximum score is reached

Test Summary

TEST	REQUIREMENT													
	1	2	3	4	5a	5b	5c	5d	5e	5f	5g	5h	6	7
T1.1		P												
T1.2			P											
T1.3													P	
2	P	P	P	P	P	IP	P	P	P	P	P	P		
3	P												P	P

P-Pass

F-Fail

IP- Improved and Passed

Project Summary

Summary

- Replicated the pong game using PIC32 and LCD
- Project met all requirements

Future Improvement:

- Add counter to the game
- Allow to change game speed by changing game level
- Make one player mode option

Project History

DATE	TASK
Week of Nov 2	Design Brainstorming
	Wriiting Implementation Plan
Week of Nov 9	Implementing the Hardware Connections
	Implementing he Potentiometer Reading
Week of Nov 15	Coding the Pong FSM module
	Implementing the GUI
Week of Nov 23	Debugging and Main module
	Implementing the Sound Module

Reference

"Pong". Killer List of Videogames. Retrieved 22 October 2008.

Driving a piezo speaker with a PIC. (n.d.). Retrieved November 30, 2020, from http://hades.mech.northwestern.edu/index.php/Driving_a_piezo_speaker_with_a_PIC

Lowood, H. (2009). "Videogames in Computer Space: The Complex History of Pong". IEEE Annals of the History of Computing. 31 (3). pp. 5–19. doi:10.1109/MAHC.2009.53.

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