

## **Microprocessors Course Project**

### **Gaming Console**

You are required to implement a gaming console, same look and feel as Atari 2600, Nintendo Switch, or Gameboy Advance.



The console must support 2 different working games.

Any software must be written in ARM assembly, no physical connection should be present between the game console and any other external device (not connected to the computer)

#### **Components:**

- Any ARM-based microcontroller
- TFT screen display, with an internal ILI9341 controller (displays with other controllers are allowed, but you will interface with this controller in your labs). Touch screen is not required.
- 4 arcade buttons for movement.
- 2 arcade buttons for control.
- Power supply circuit
- Outer casing

Basically, it should be easy to handle and play with.

## **Restrictions:**

- 1) There should be a main menu screen that prompt us to choose which of the two games, like so:



- 2) Both games should be different from each other, don't make chicken invaders and space invaders on the same console.
- 3) No two teams share the same game, make it unique and customized so collisions do not happen.
- 4) Both games should be working as expected, no bugs, no crashes.
- 5) Survival games that have no win/lose conditions and no discrete levels, should be incrementally harder as time goes on.
- 6) For leveled games, you must make 2 levels, if you win the first level, you jump to the second level.
- 7) Score is required to be always visible, whether it be a health bar, score points, number of the current stage, all status should be visible to the player.
- 8) Indicative animations are required, if a spirit dies, don't just make it disappear, otherwise implement simple animations to indicate death, movement, shooting, etc. Don't make the spirit a static image floating around.
- 9) Outer casing should be fit and easy to handle, it should protect the inner components from damage.
- 10) Buttons should be put in convenient places.
- 11) If you don't need the entirety of the 4 movement buttons, make the useless buttons do a specific function like jump, crouch, defend, shoot, etc.

## **Deliverables**

### **Project Proposal:**

A simple document describing the chosen two games, a detailed description is required. You should show the win/lose conditions, the scoring system, what to expect from your game and what the game expects from the user. Explicitly describe the hero's actions, enemy types, enemy actions, game mechanics, etc.

Try to incorporate sample screenshots drawn using any pixelart software.

This document is only required to ensure that the game is stable and difficult enough to entertain anyone, not just a boring pong game.

**Proposal's deadline :** 25 November

**Project deadline:** 4 January

## Team Formation

Maximum 8 members per team.

Each team should assign a team leader, just as a spokesperson, also to maintain a sheet with all the bought items and their prices.

Team members are expected to have nearly-equal workloads.

## Bonus Points:

- 1) No Artificial intelligence is required for the enemies, make them move and act randomly, but if you incorporate any intelligence in the enemy mechanism, you can be rewarded with a bonus for it (for example, make the ghosts in pacman target pacman and move towards it).
- 2) No sounds are required, if you implement retro sounds, you will be rewarded with a bonus.

# Sample Ideas for games

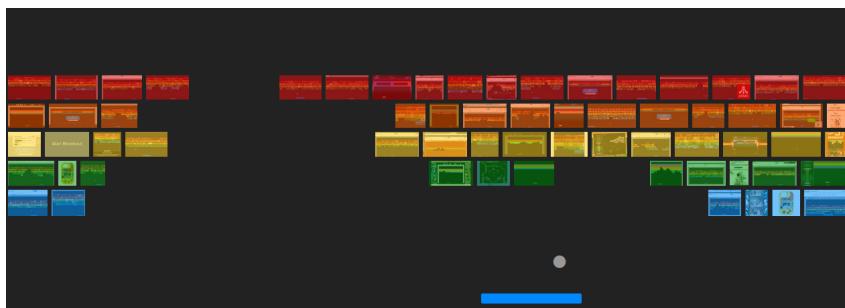
You can reference from those videos:

- 1) [This](#)
- 2) And [this](#)
- 3) And [this](#)

Games seem to fall into one of these **categories**:

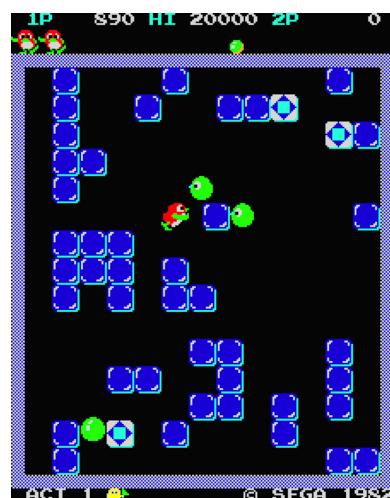
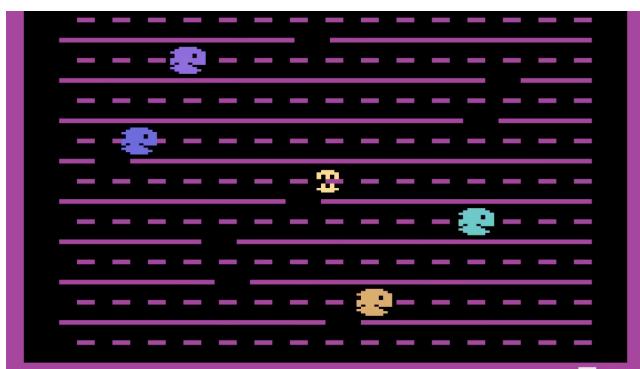
## ● Pong-like

Games that require a finite platform and has a ball/bomb/missile bouncing around that this platform must catch. The game is lost when the platform fails to catch this bouncing ball.



## ● Pacman-like

A spirit constantly moving in one direction unless commanding it to change its direction, it can only change directions at conjunctions. Usually there is a score to achieve in order to win the game, the score might be collecting coins, or killing ghosts or clearing out objective cubes.



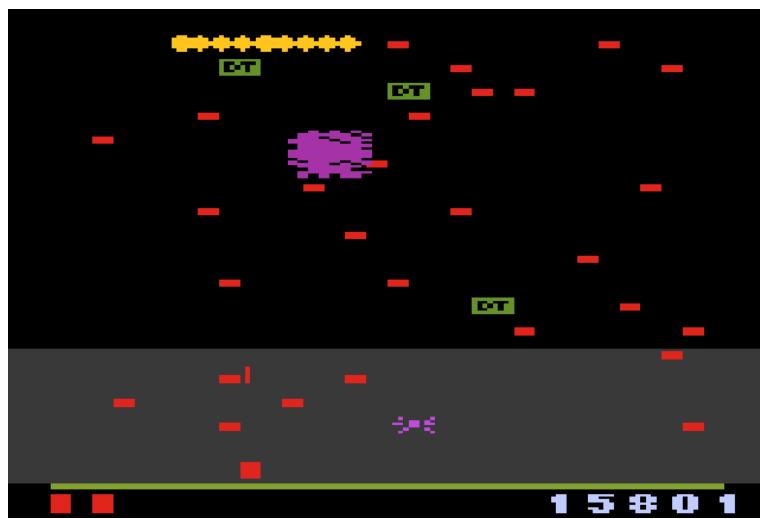
## ● DigDug-like

A spirit digging into sand to reveal some secret utilities or bombs that harm you, there are some enemies also digging in the sand that you must kill, you cannot shoot bullets into sand, so if you wanna kill an enemy, you must shoot it when no sand is between you and him.



## ● Space Invaders-like

The infamous Invaders game, there is a battle ship at the bottom moving left-right and shooting upwards, its goal is to destroy all enemy ships before any ship moves past you. The enemy ships also shoot down at you periodically.





## ● Enduro-like (Car racing)

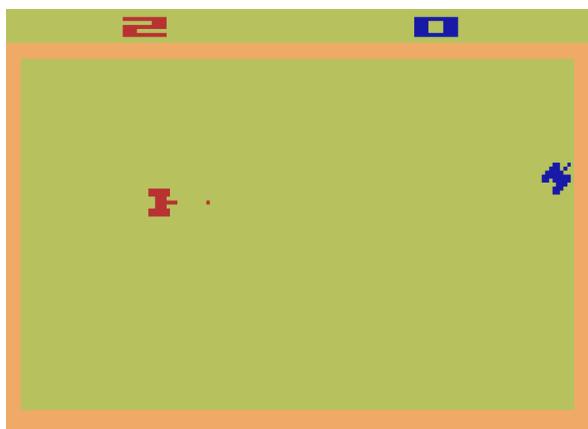
You drive a car at the bottom of the screen, you can only move left and right to avoid incoming traffic, speed is incremented at each time step so the game gets harder with time. Also the track might take curves which can throw your car out of track so you have to move your car towards the curve to avoid exiting the track.



## ● Asteroids-like

A single spirit in the middle of the screen, rotating 360 degrees and shooting at this angle, you are required to brush off all enemies/obstacles for as long as possible until an enemy touches you, then you die. The game gets harder with time as more enemies approach you at increasing speeds.

The game might be modified to allow the spirit to move forwards in the direction of the angle, like the game of tanks.



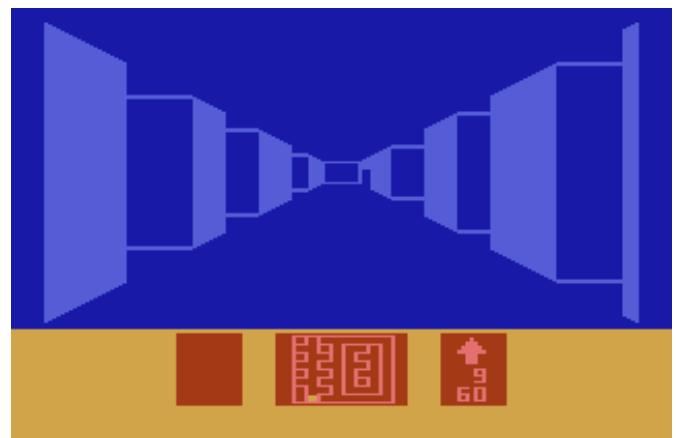
## ● Frogger-like

You are a frog, your mission is to cross the road, you have to avoid incoming cars and only hop on a platform that is not water.



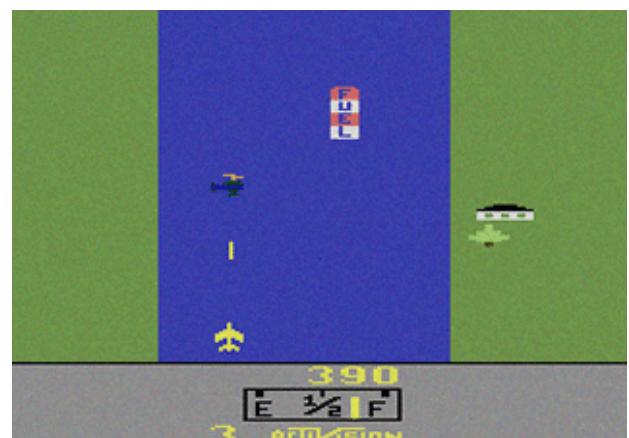
## • 3D simulator

First person shooter games, you are the hero, you turn around 360 degrees and only move/shoot forwards. This is sooo hard considering implementing the game in assembly as it requires a lot of math and trigonometry behind the scenes.



## ● Flying planes

A plane or spaceship moving in one direction and only shoots in this direction, you can command it to move up, down, left or right but its pointing direction will not change. You have to survive for as long as possible.



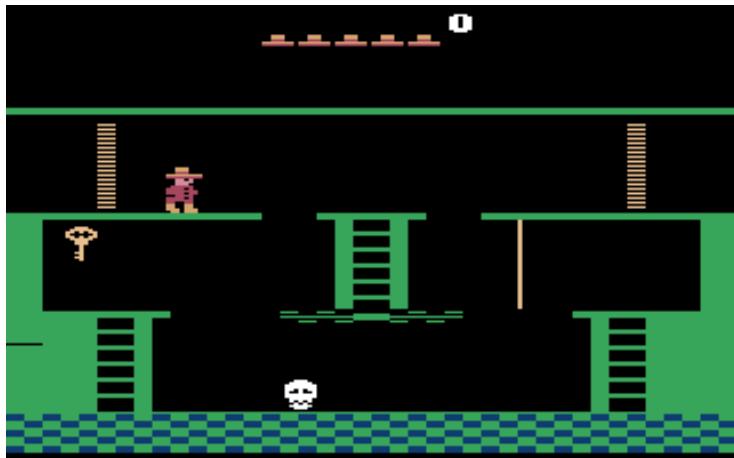
## ● Base Defender (missile command)

You have a base and you aim at incoming missiles, you shoot the missiles before landing on your base. No 3d in this game.



## ● Platformer (mario-like)

A hero walking on the ground, the hero can only move left-right and jump only, gravity is a real thing, you only stay on the ground as long as there is ground below you, if not, you just fall until you land on the nearest ground.



- **Open world games (quad directional games)**

The spirit can move up,down,left and right. There is a certain objective to complete.



**We greatly encourage uniqueness, creativity and innovation.**