PROJECT

- **Objective:**

Go through all phases of a project of an embedded system.

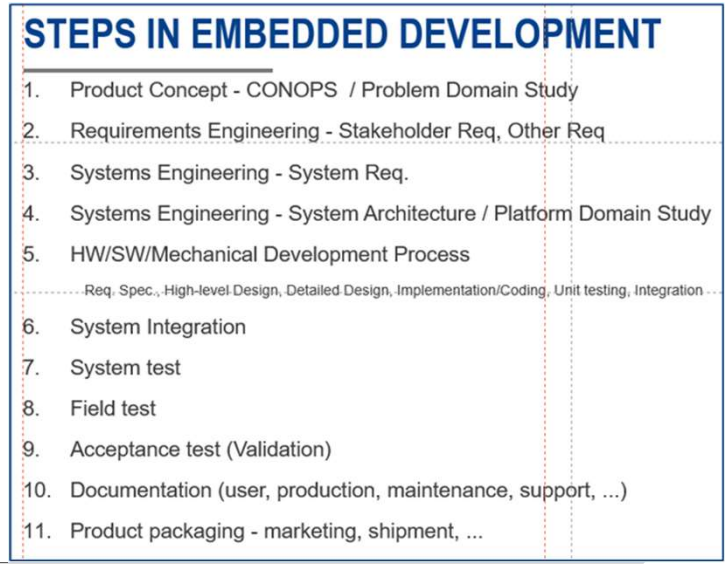
Option 1: develop a vintage game, such as Pacman.

Option 2: develop a closed control loop (sense-process-actuate) such as the control of an elevator. Requires either a plant simulator or an actual physical model.

PROJECT

Activities:

1. Select a simple graphical game, such as Pac Man or Space Invaders, that can be played with the LCD, touch and push-buttons available on the S7G2
2. Perform the Development steps of an Embedded System (19-31h)
3. Deliverables
   a) CONOPS + Specification (4-6h)
   b) Platform domain study docs (2-4h)
   c) Design docs (3-6h)
   d) source files + executable (10-15h)



PROJECT - TEMPLATES

Templates for documents:

a) CONOPS+Specification

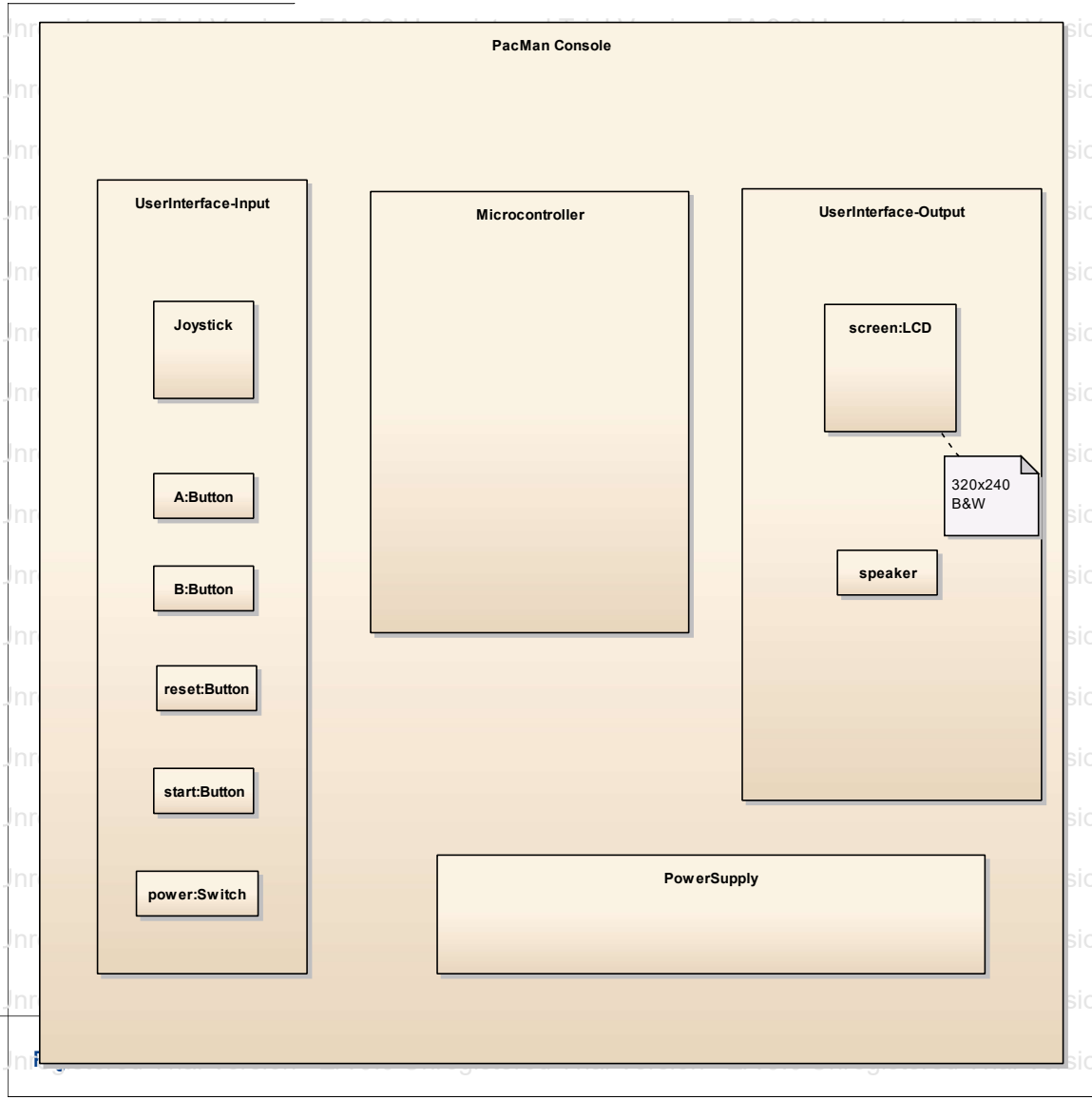
b) Platform domain study docs

c) Design docs

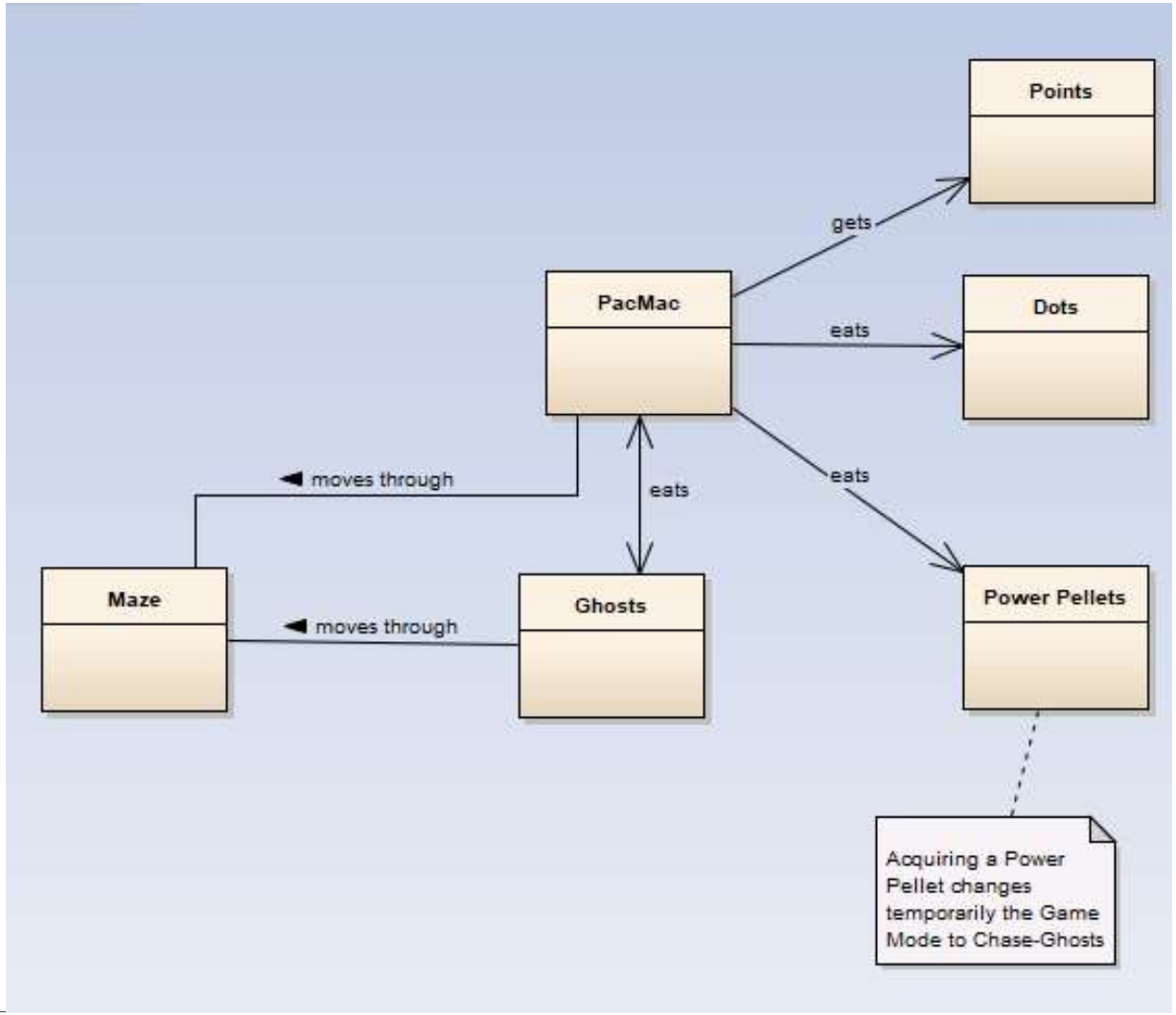
CONOPS

1. Introduction
2. System Description
3. User Interface
4. Stakeholder Requirements
5. Operational Scenarios

SYSTEM DESCRIPTION -
PRELIMINARY PHYSICAL STRUCTURE



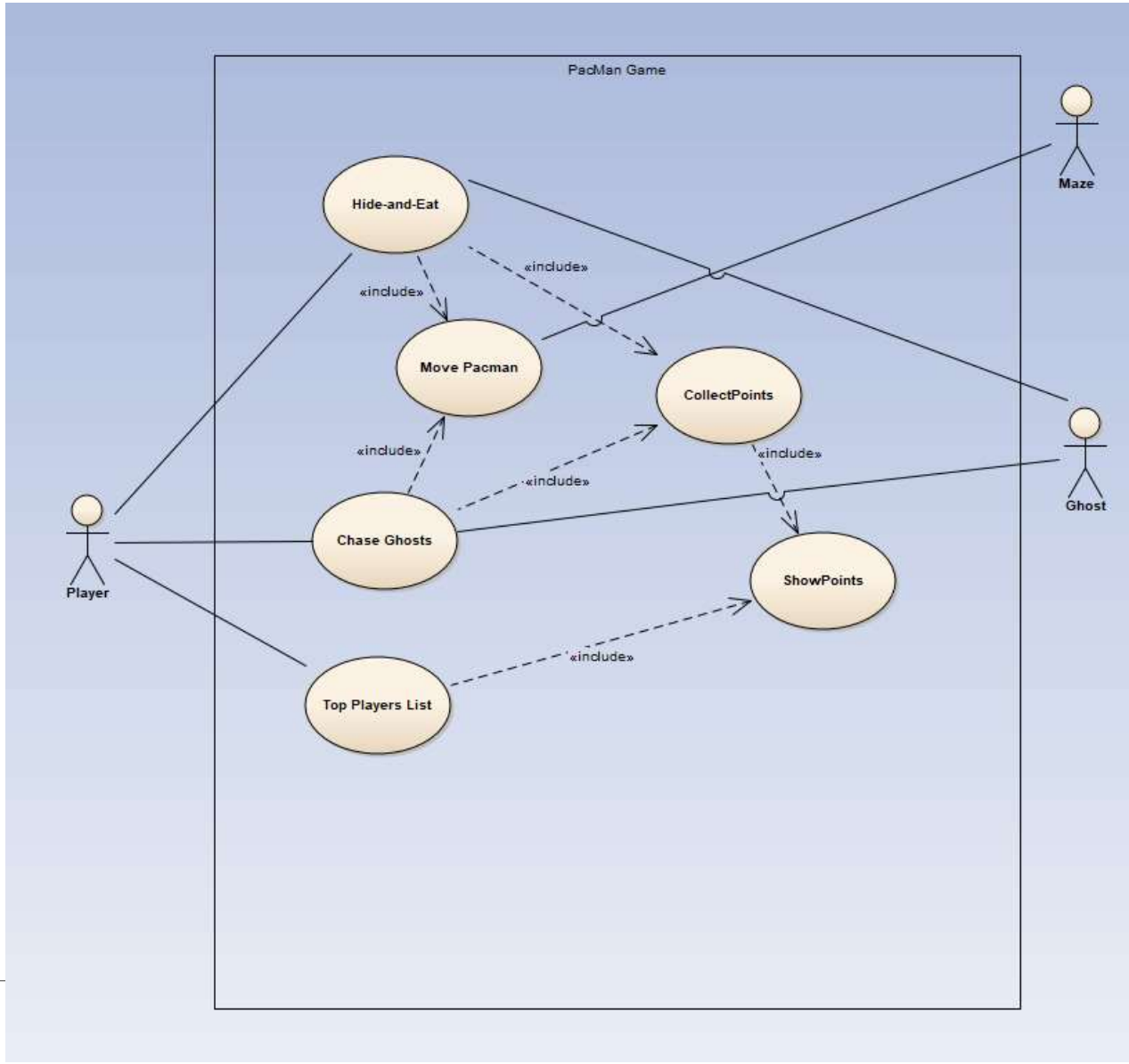
SYSTEM DESCRIPTION - GAME LOGIC



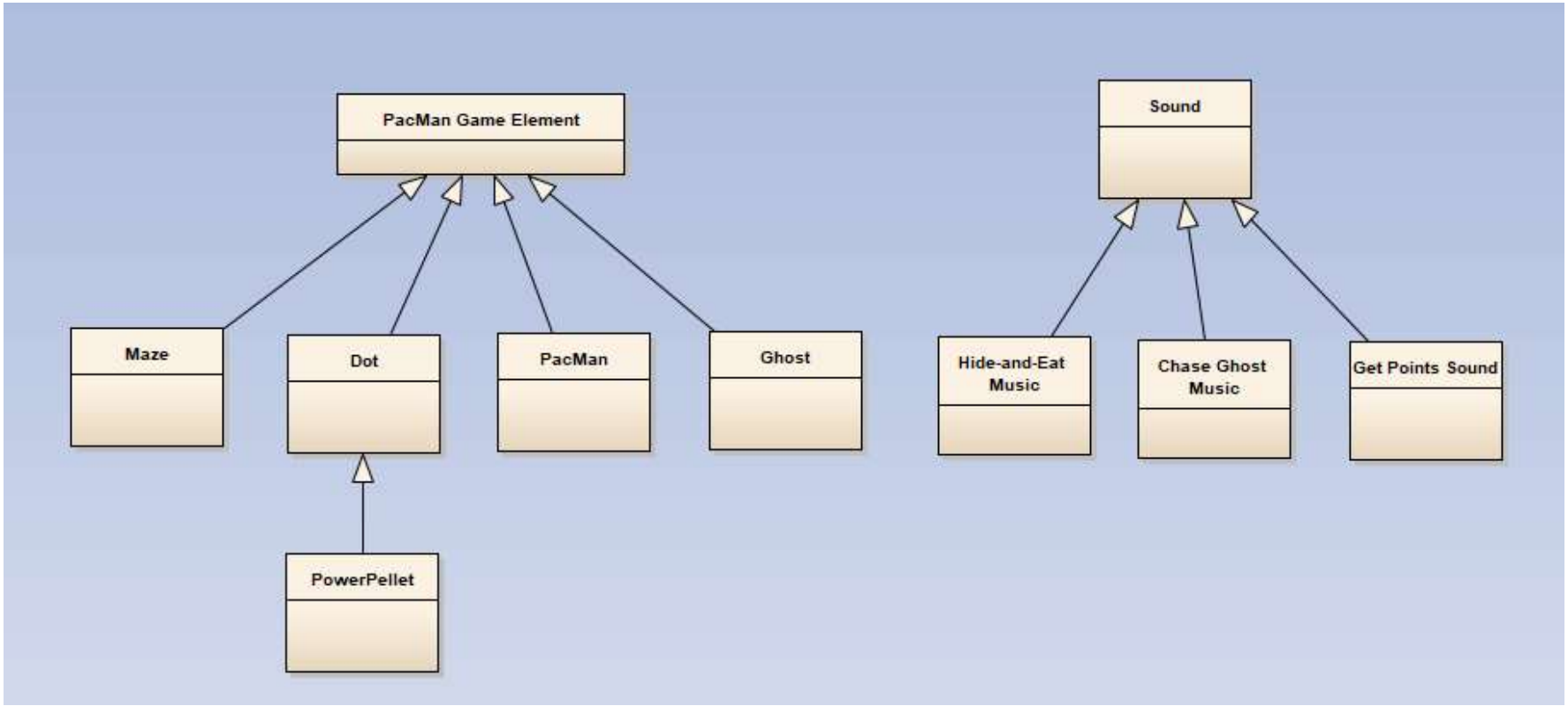
PROBLEM DOMAIN

1. Theory of Arcade Games
   i. Action games
   ii. Responsiveness
2. Modes
3. Rules
4. Best Players

PROBLEM DOMAIN - USE CASES DIAGRAM



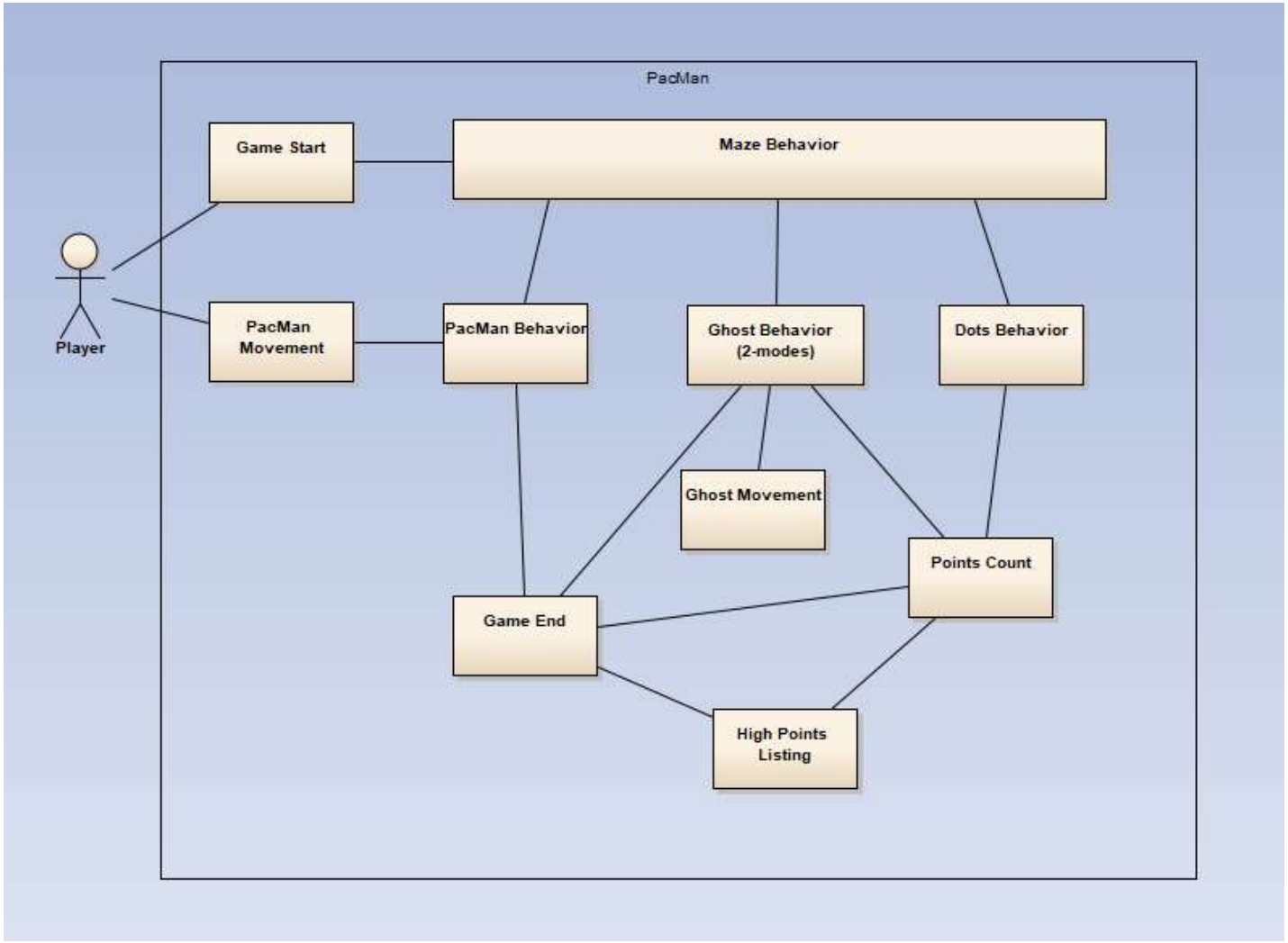
PROBLEM DOMAIN - GAME ELEMENTS



SPECIFICATION

1. Introduction
2. System Structure
3. Functional Architecture
4. Functional Specification
5. Non-Functional Specification
6. Restrictions

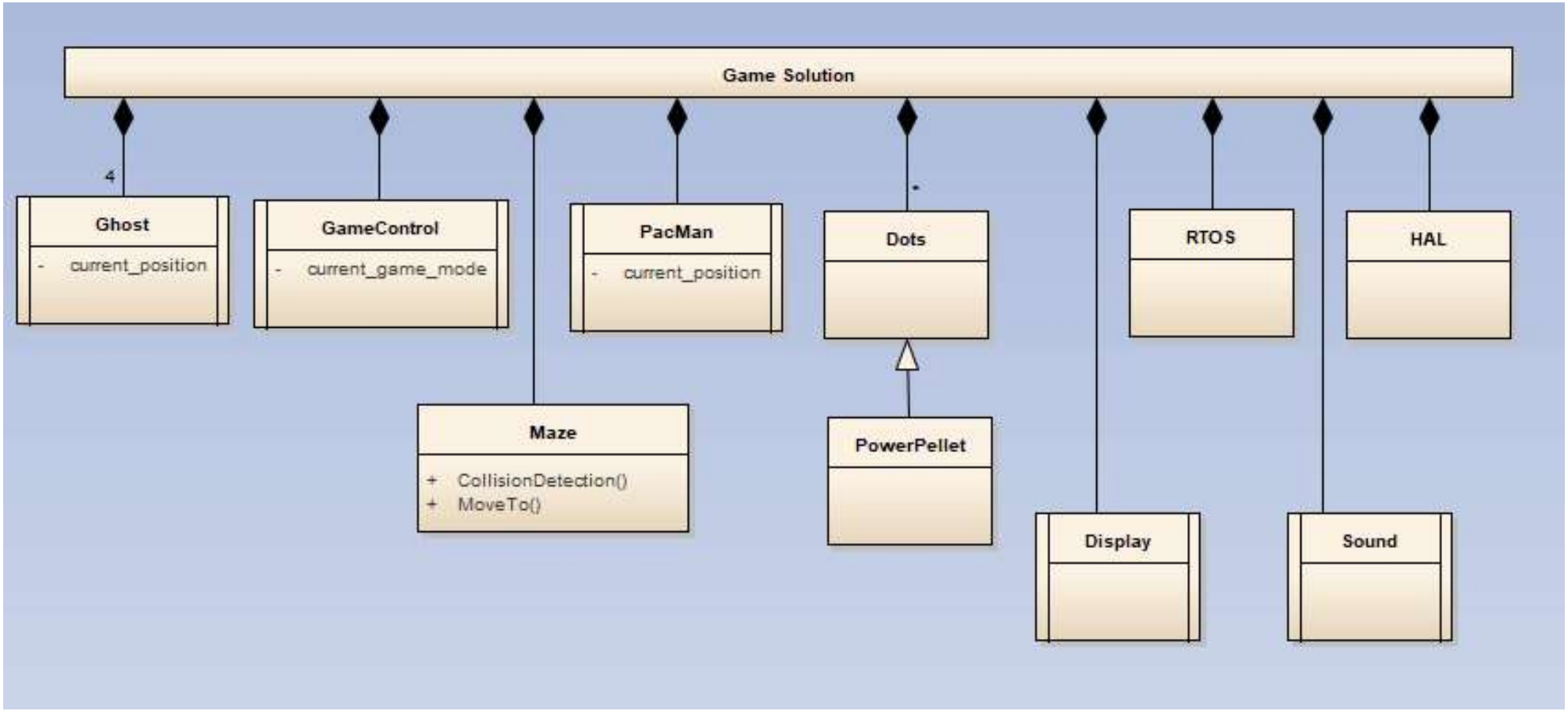
FUNCTIONAL ARCHITECTURE



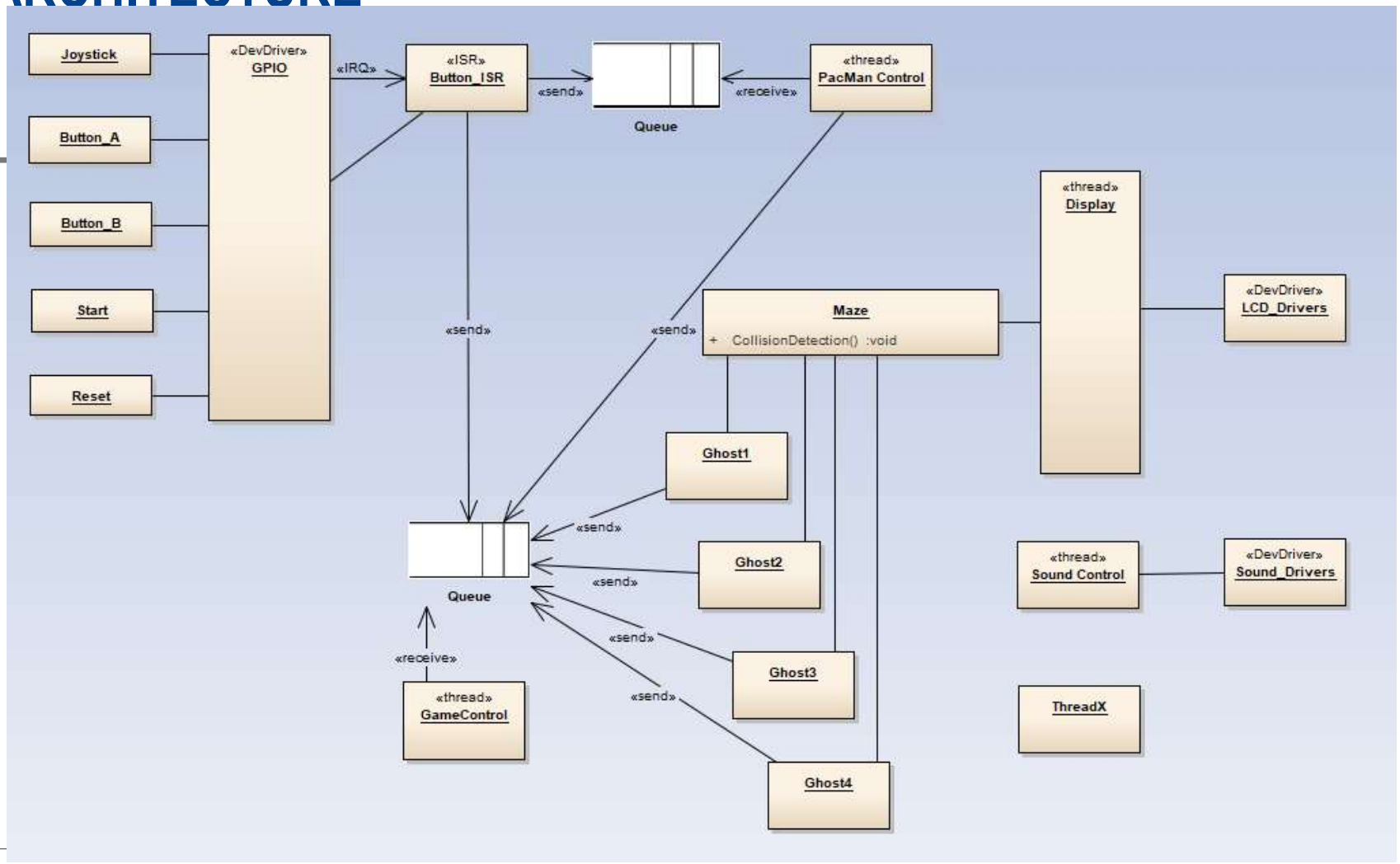
DESIGN DOCUMENT

1. Introduction
2. Functional Architecture
3. Physical Architecture
4. User Interface Design
5. Mapping of Physical Architecture to Functional Architecture
6. Detailed Design

SOLUTION DESIGN - CLASS DIAGRAM



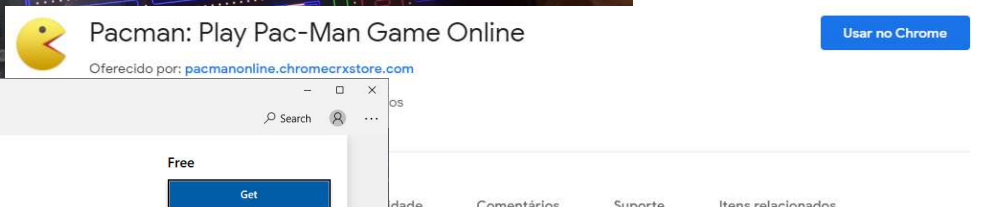
PHYSICAL ARCHITECTURE

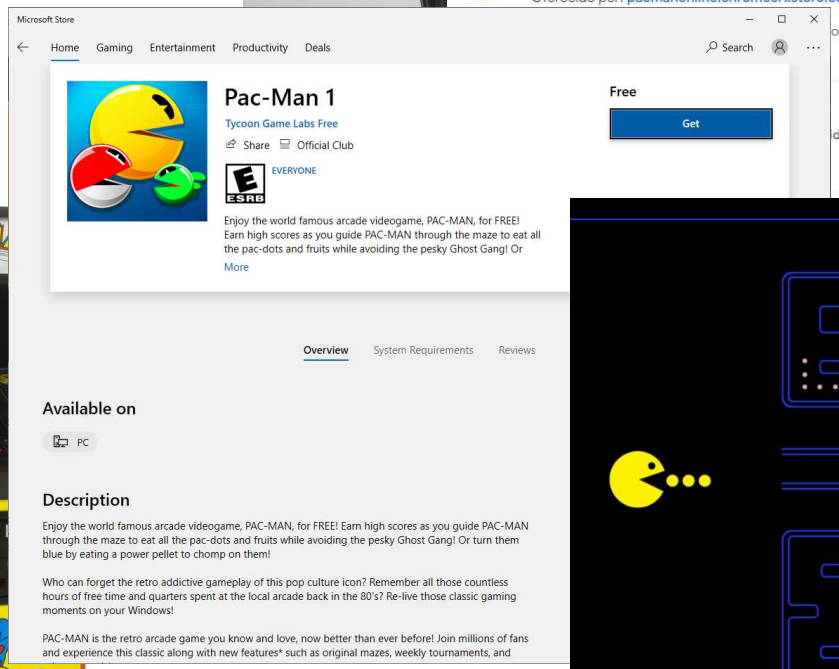


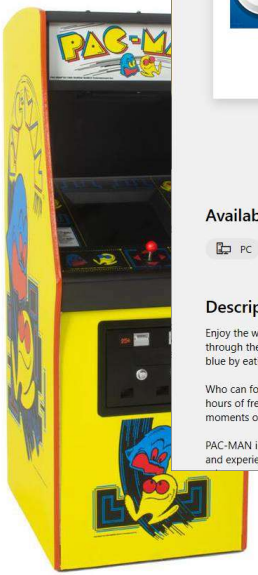
MAPPING

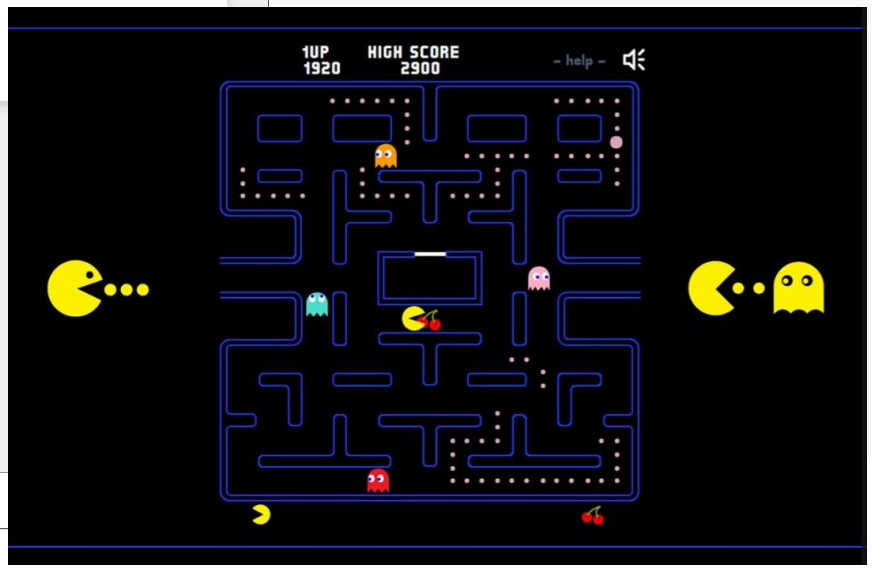
Implementation Modules: -> / Functionalities:	GPIO	Button_ISR	PacMan Ctrl	Maze	Ghost 1	Ghost 2	Ghost 3	Ghost 4	Game Control	Display	LCD Driver	Sound Ctrl	Sound_Drv	ThreadX
GameStart	x	x		x					x					
PacMan Mvm	x	x		x										
Maze Behavior				x	x	x	x	x	x	x	x			
PacMan Bhv				x										
Ghost Behavior				x	x	x	x	x						
Ghost Mvm				x	x	x	x	x						
Dots Behavior				x					x					
Points Count									x					
Game End	x	x							x					
High Points	x	x							x					
Play Sounds									x			x	x	
Change Game Mode									x					

PRODUCT EVOLUTION









COMPARING IMPLEMENTATIONS

Changes:

- user input
- display resolution
- processing platform: PC, cloud, microcontroller

Same:

- visualization of graphical elements
- game rules