

EE 478 Capstone Final Report
RFID Interaction Suite

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1 ABSTRACT

2 INTRODUCTION

These are some example of how to cite and use bullet points A reference to Table 1 and one to the Design Specification, Section 3.

- Overall summary description of the module - 2-3 paragraphs maximum (explanation of use cases goes here)
 - Specification of the public interface to the module
 - * Inputs
 - * Outputs
 - * Side effects
 - Psuedo English description of algorithms, functions, or procedures
 - Timing constraints
 - Error handling

3 DESIGN SPECIFICATION

3.0.1 Design Overview

This system is a RFID-based gaming system. A user is able to play alone against a computer, or can play with other users owning a system using a multiplayer connection feature. Additionally, users can create their own customized cards using a third built-in function of the device.

3.1 Design Requirements

3.1.1 Environmental Requirements

The device must operate in an indoor/outdoor environment with relative humidity consistent with desert and tropical environments. It must be durable enough to withstand various types of users, especially small children. The unit is to be portable and battery operated.

3.1.2 System Input and Output Requirements

The system must be capable of accepting several different types of signals and inputs:

- Standard frequencies used for close-range or Near-Field Communication Radio Frequency Identification (RFID) devices
- Standard frequencies used for commercial wireless communication standards such as wifi networks
- User input from a keypad to navigate menus, enter commands, and provide other alphanumeric information

- When in multiplayer mode, communication and commands from other players must be accepted and responded to.

The system must be capable of providing the following outputs:

- Display information about the current game state through an LCD screen
- Provide status information of individual cards placed on the game board
- Send commands to other systems when in multiplayer mode
- Send wireless signals to program RFID-enabled cards

3.1.3 User Interface

The system must also have the following buttons, switches or interface devices:

- 16-button keypad with alphanumeric character labels
- Reset button that when pressed causes a soft reset of the system
- Power button that turns the system on and off
- An LCD screen viewable from several angles. The screen must be viewable indoors and in overcast conditions

An example User interface is shown in Figure 1.

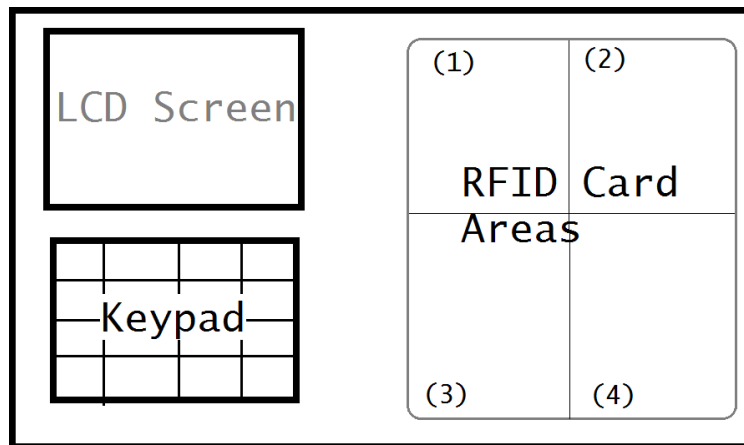


Figure 1: An example front panel layout for the system

3.1.4 Functional Requirement

The system must support the following modes of operation:

Single Player: Allows the user to select from, and play, single player games. Upon entering Single Player mode, the system prompts the user to select a game to play from those stored in memory. Selecting a valid game loads the game from memory and begins game execution.

Multiplayer: Allows the user to select and play multiplayer games. Upon entering Multiplayer mode, the system activates wireless communication and attempts to connect to other users in Multiplayer mode. Once a connection is established, the users select a multiplayer game on both systems and gameplay begins.

Build Card: Allows the user to create custom cards for a game. The data stored will vary based on game requirements. All cards must contain unique card serial numbers or identifying ID numbers, and a code that specifies which games the card is valid for.

3.2 Identified Use Cases

3.3 Detailed Specifications

3.4 Functional Decomposition

4 HARDWARE IMPLEMENTATION

4.1 Top Level Design

4.2 Low Level Design

5 SOFTWARE IMPLEMENTATION

5.1 Top Level Design

5.2 Low Level Design

6 PRESENTATION, DISCUSSION, AND ANALYSIS OF THE RESULTS

6.1 Results

6.2 Discussion of Results

6.3 Analysis of Any Errors

6.4 Analysis of Implementation Issues and Workarounds

7 TEST PLAN

7.1 Test Specification

7.2 Test Cases

8 SUMMARY AND CONCLUSION

8.1 Final Summary

8.2 Project Conclusions

A BREAKDOWN OF LAB PERSON-HOURS (ESTIMATED)

Person	Design Hrs	Code Hrs	Test/Debug Hrs	Documentation Hrs
Patrick	x	x	x	x
Alyanna	x	x	x	x
Ryan	x	x	x	x

By initializing/signing above, I attest that I did in fact work the estimated number of hours stated. I also attest, under penalty of shame, that the work produced during the lab and contained herein is actually my own (as far as I know to be true). If special considerations or dispensations are due others or myself, I have indicated them below.

B BILL OF MATERIALS

Table 1 lists the bill of materials for the construction of one system.

Bill of Materials			
Item	Unit Cost	Quantity	Total Cost
TI HI-Plus RFID Tags	0.91	20	18.20
DLP-RFID2 RFID Reader/Writer	50	3	150
Xbee S1 Wireless Chips	30	2	60
PLA Makerbot Filament	48	1	48
GAL22V10D	3.5	4	14
PICKit 3	45	2	90
CY7C128A SRAM	4	2	8
3.3 Volt Linear Regulator	3.22	2	6.44
Lever Switch, micro SPDT, momentary	2.5	6	15
16-key Numeric Keypad	7.5	2	15
128x169 Color LCD	17	2	34
PIC18F46K22 Microcontrollers	7.7	4	30.8
RGB LED, Common Cathode	4	8	12
(EXTRA)			
(EXTRA)			
(EXTRA)			
Total Cost			

Table 1