Bibartan Jha

Andrew Brown

Darius Zinolabedini

Bilal Quraishi

**1. Overview**

**1.1. Objectives**

We are doing this project for the purpose of learning how to use PCB artist and expand our understanding of UART. Furthermore, through this project, we hope to further explore how to interface the TM4C with different I/O devices such as switches, the speaker, and the LCD screen.

**1.2. Roles and Responsibilities**

We will divide responsibilities equally throughout the course of the project. Since Andrew and Bilal are both near campus, they can focus on UART communication. The clients are air hockey enthusiasts who want a TM4C-based experience of playing air hockey.

**1.3. Interactions with Existing Systems**

Two different TM4Cs will communicate with each other via UART.

**2. Function Description**

**2.1. Functionality**

The system will allow two users from two separate TM4Cs to play air hockey. The user will use slide potentiometers to move their paddles across the screen. The users can also use buttons to control different aspects of the game such as sound volume, background colors, speed of puck, and colors of paddles/puck. The game will be displayed on both users’ lab board LCD screens, and the lab board speaker will be used for any sound effects in the game.

**2.2. Performance**

There are some qualitative measures we will use to determine the performance of the system. First, our software modules must be easy to understand and well-organized. Second, there should be no time delay between an input from the user (from the slide potentiometer or the buttons) and the outputs of the system (on LCD or speaker). Third, the displays on both TM4C LCDs should be exactly the same throughout the game and there should be no time delay in the communication between the two TM4Cs.

**2.3. Usability**

These will be the interfaces in our project:

* Graphics Interface – for outputting to LCD
* Switches Interface – for receiving inputs from lab board switches, TM4C switches, and other switches we connect to TM4C
* Sound Interface (DAC) – for outputting sounds for game
* Slide Potentiometer Interface – for taking inputs from each player’s slide potentiometer (used to control paddles)
* Timer Interface – used to animate the moving puck
* UART Interface – for communicating between 2 players’ TM4C

**3. Deliverables**

**3.1. Reports**

The reports for Labs 7 and 11 will be written.

**3.2. Outcomes: Simply copy/paste the Lab 7 and Lab 11 deliverables.**

1. Requirement Document
2. Hardware Design
   1. SCH PCB files
   2. Printout of PCB Layout Top and Bottom taped to cardboard
3. Software Design
4. Measurement Data
   1. Current Estimation
   2. Cost Estimation
5. Analysis and Discussion
   1. YouTube video