Reactive LED Matrix Air Hockey

<first name> <last name>
IF you want to remain anonymous during Phase I, don't put your name

CS 122A Fall 2019
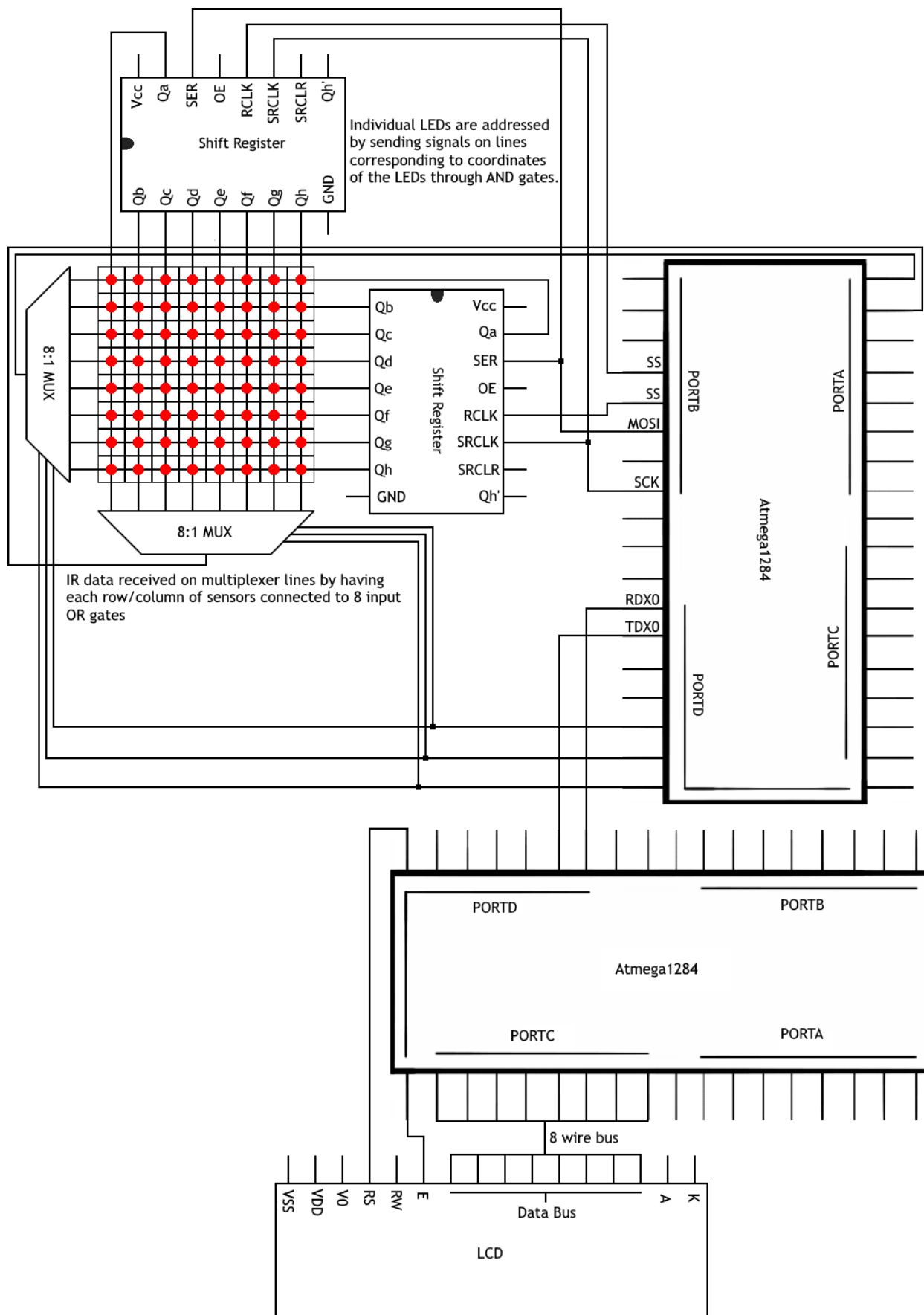
Phase I

Introduction

This project could be deployed in an amusement room or on a desk. It uses infrared proximity detectors for input to move a virtual ball/puck on a 8x8 LED matrix. It's virtual air hockey on a LED matrix with infrared input.
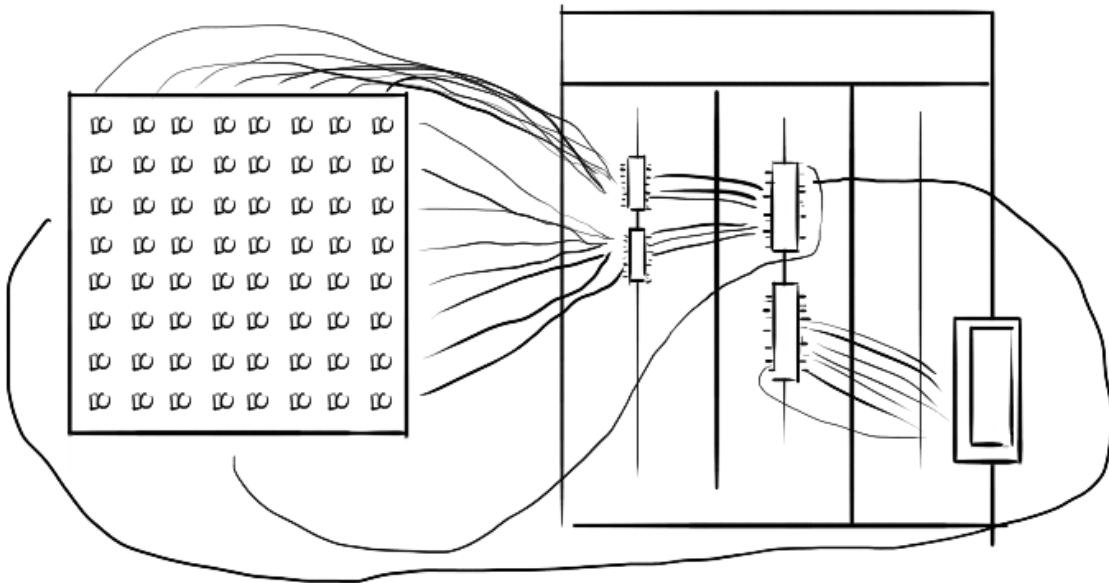
Components (Pin-out)

- **Inputs**
  - 64x Infrared Proximity Sensors
- **Outputs**
  - 64x LEDs
  - LCD score display
- **Internal components**
  - 2x Shift registers
  - 64x 2 input AND gates
  - 16x 8 input OR gates
  - 2x 8:1 multiplexers
- **Microcontrollers/Processors**
  - 2x Atmega1284

Shift Register

Vcc Qa SER OE RCLK SRCLK SRCLR Qh'

Qb Qc Qd Qe Qf Qg Qh GND

Individual LEDs are addressed
by sending signals on lines
corresponding to coordinates
of the LEDs through AND gates.

8:1 MUX

8:1 MUX

Shift Register

Qb — Vcc
Qc — Qa
Qd — SER
Qe — OE
Qf — RCLK
Qg — SRCLK
Qh — SRCLR
GND — Qh'

IR data received on multiplexer lines by having
each row/column of sensors connected to 8 input
OR gates

Atmega1284

PORTB
PORTA
PORTD
PORTC

SS
SS
MOSI
SCK
RDX0
TDX0

Atmega1284

PORTD
PORTB
PORTC
PORTA

8 wire bus

Data Bus

VSS VDD V0 RS RW E   A K

LCD

Phase II

Milestones

For each milestone, you will need to list what it is that you will complete (see prompts below) and the date that you plan on completing it along with the date you plan on demoing it in the lab. **Important:** When you demo in the lab, you will need to have your milestone description from this proposal open to show your TA. IF your milestone changes, you will need to have a second paragraph describing the change and why you made it.

Milestone I

This should be a specific point in your project that you will be able to demonstrate some minimum functionality. Typically you will want to demo a V1 of your project, i.e. basic functionality. This demo does not need to be perfectly functioning but should be functioning well enough for the TA to be able to give feedback on your pace, and the direction you have been going. Alternatively, you can specify that your milestone I will be demonstrating fully functioning *drivers* for several of your hardware components.
- Solder LED matrix to board
- Solder infrared sensors to board
- Connect AND gates to LED matrix
- Connect OR gates to infrared sensors
- Aiming for Nov. 20

Milestone II

What is your second target milestone, or your V2 of your project? This should be adding on additional components onto your basic project. Alternatively, you can specify that your milestone II will be demonstrating fully functioning *drivers* for several of your hardware components.
- LED matrix drivers working
- IR sensor drivers working
- Collision detection working
- Ball physics working
- Score output working
- Aiming for Dec. 4

Testing and Verification

What is your plan to test your invention? **How** will you test each "version" in your project? **When** will you start testing each stage. Specifically **what** do you plan to do to test each stage? What hardware and software will you test and how? Additionally, list a character type for alpha vs.

beta testers of your project, i.e. lab mates as alpha testers, friends in the frisbee club as beta testers.

I will be testing each component as I develop them by substituting each part with a LED array to display the relevant data that is being manipulated. Hardware construction will be tested in the first stage. Drivers will be tested in the second stage. Lab mates will work as alpha testers. Beta testers will be anyone that I can get to mess around with the board.

Form Factor

This is the non-engineering portion of the proposal/project. **IF** you were to make a case for your project, embed it in the environment, or "deploy" it in some fashion. What would that look like? Would you need to shrink the form factor down before deployment? Could you 3D print a case? Could you build one from wood?
NOTE: This is not required for this course, but the presentation is still important, and it is something to think about doing before you take a project into an interview.

This project could be attached to the bottom of a table with a transparent surface. The project would be encased in a material that matches the look of the table. A case could be 3d printed if it didn't need to withstand any impact or stresses. A wood case would also work for a wooden table.