Introduction

Hardware

Software

General Knowledge

Testing

Overview:

We successfully designed and developed an Arduino-based accessory for a Ping Pong game. This Arduino keeps track of players scores and sets by pressing buttons that increase or decrease the score and displays this information on the LCD. The LED’s turn on to indicate whose turn it is to serve and flashes when there is a winner. This software is controlled by the Arduino IDE which sends commands via high and low voltage.

Hardware Overview:

To begin the game, an LED is turned on to indicate the player that is serving. At the hardware level, this is accomplished by using the Uno R3 Controller to send electricity from pins 4 and 7. The current flows through the jumper wires to the Breadboard positive side which gives power to the whole row. To prevent the LED from being burned from too much voltage, we need a 220 ohm, 1K ohm, or a 10K ohm resister to slow down the flow of electricity. The less the ohm, the brighter the LED. This resister is connected from the positive power source on the breadboard, to the positive longer leg of the LED (It doesn’t matter which side of the LED the resister is on). To have a circuit, a jumper wire goes from the negative shorter leg of the LED to the negative side on the breadboard which also has another jumper wire that connects to the ground on the Uno R3 Controller. (Explaining how it visually looks not why or how it works)

(how much volts do 4 and 7 and others give? Or is it just digital high and low?

After a player scores, they push the button to increase their score. This is accomplished by sending signals from pin 2, 3, 5 and 6 which sends a high voltage. This voltage runs through 2 legs of one side of the button and exits out the other two legs to the ground. But there are actually only two electrical connections inside the button. When the button is pressed, these two connections are connected to make electricity flow. The circuit from the power to the ground is not complete until the button is pressed. (explain code input\_pullup here?) does it matter which side of the button the power or ground is on?

After a button is pressed, this information is displayed on the LCD. The display has an LED backlight and can display two rows with up to 16 characters on each row. The pins of the LCD and their function:

VSS: connects to ground

VDD: connects to 5V power

VO: Adjusts contrast of the LCD

???? RS: A register select pin that controls where in the LCD’s memory you are writing data to. You can select either the data register, which holds what goes on the screen, or an instruction register, which is where the LCD’s controller looks for instructions on what to do next. HOW DOES LCD HAVE MEMORY? DATA IS STORED IN LCD NOT IN ARDUION?

R/W: A Read/Write pin that selects reading mode or writing mode  
E: An enabling pin that, when supplied with low-level energy, causes the LCD module to execute relevant instructions.  
D0-D7:Pins that read and write data WHERE, HOW, ETC. WHY ISN’  
A and K: Pins that control the LEDbacklight WHY IS K CONNECTED TO GROUND AND A GETS POWER? SO COMBINATION OF THEM CONTROLS BRIGHTNESS?

Explain software here?

To get electricity to flow, we need a circuit and materials that conduct electricity such as copper wire. Electricity wants to flow from a high voltage to a low voltage. (don’t understand concept of not getting shocked if only making contact with one point)

Voltage, current flow direction

Volt different from voltage?

Volt measure the strength of a power source. This Arduino outputs 5V, how much do the others output?

Amps measure how fast electricity is moving through a circuit.

Ohms measure how much resistance there is in a circuit to slow down the electricity. Resisters are used to reduce current flow, adjust signal levels, to divide voltages. How many ohms is our resister in our game, says 220ohms in the labs. Need to know resister decoding? Calculating resistance formula?

Need to know logic design? Combination logic, multiplexer, decoder, sequential logic?

Short circuit happens when a wire is connected from a positive to the negative side of a power supply. (What?) So current flow will only flow as much as the device consumes but this contradicts having too much voltage which will cause wires to melt, led to burn, etc

Open circuit is when the loop isn’t connected.

Watts are a measure of how much work is being done by a circuit. Watts = volts X amps

This is the Uno R3 Controller Board. It is

Uno R3 Controller Board

What it is

How it works

2 LED’s

What it is

How it works

jumper wires

LCD

2 10k ohm resisters

Breadboard

4 Buttons

Potentiometer

USB Cable

Software:

What it is

How it works

Explain each function

Electronics inside a modern computer are digital which operate with high or low voltage, same as 1 or 0

The Arduino IDE using C language to read and write using high and low voltage to the Arduino.

The hardware is designed to let electricity flow in a circuit. It begins from the 5V from the Arduino and using a wire? To plug into a positive on the breadboard to give power to that whole row. Then we use a wire

The software imports the LCD library to allow control of the LCD to print messages. The Arduino IDE has a void setup method that runes once to initialize the states such as pinMode(number on Arduino??, and option for input, output, or pullup??) and then a void loop function which runs continuously in a loop. This is like main method which we use to call other functions that manipulate the global variables and read and write. The digitalWrite function(number on Arduino called??, sets high or low voltage)

(need to know more about electricity, energy, battery?)

Testing Demo

Cases to show. Focus only on what assignment says, nothing extra.