CS/EE 120B Custom Laboratory Project Proposal

Pick that Lock!

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Introduction

The “Pick that Lock!” game is a distance and hearing based game where the player must approach a sensor using their hand which acts as the lock. The closer the player approaches the correct distance to the “lock” with their hand, a buzzer will begin to output noise until the correct distance is reached. Upon holding that distance, the buzzer will then begin to output beeps, with the number of beeps being the number they must press on the remote control. Pressing the correct number denotes a successfully picked lock, the user gains a score which is displayed, and the next lock begins.The aim of the game is to pick as many locks until either the user fails to pick a lock, or they pick all the locks.

Hardware Components

Elegoo UNO R3 Controller
LCD1602 Module

IR Receiver Module
Remote Control

Ultrasonic Sensor

Passive Buzzer

Button to perform a total reset

LEDs to display which level the user is on.

Resistors as necessary

Microcontroller Pins:

5V pin is used to power the breadboard
GND pin acts as the ground for the breadboard

Digital PWM pin 13 is used for the IR Receiver Module

Digital PWM pin 12 is used for Ultrasonic Sensor Trigger
Digital PWM pin 11 is used for Ultrasonic Sensor Echo

Digital PWM pin 10 is used for the Passive Buzzer

Digital PWM pin 9 is used for the LCD1602 display RS pin
Digital PWM pin 8 is used for the LCD1602 display E pin
Digital PWM pin 7 is used for the LCD1602 display read/write pin
Digital PWM pin 6 is used for the LCD1602 display D1 pin
Digital PWM pin 5 is used for the LCD1602 display D2 pin
Digital PWM pin 4 is used for the LCD1602 display D3 pin
3.3V pin is used for the LCD1602 display A pin

Basic Functionality

The baseline version of “Pick That Lock!” would have the player press buttons to change the current distance of a given lock. One button will be used to denote getting closer to the lock, while a second will denote the player moving away from the lock.

When the user has the correct distance, an LED will blink a number of times equal to which number button they must press. These would be 2 other buttons the player must press to confirm the lock. .

Upon pressing the correct button, their score will be incremented on the display and they will proceed to the next lock. Upon pressing the wrong button, all LEDs will turn off, the LCD will display a “You Lost” message, alongside their score. At any time the user may press a 5th reset button to reset the game to the first lock.

When they have picked the final lock, all LEDS will turn on and the LCD will show that the player wins.

Complexities

Remote control

For user interaction and control for the game. Particularly to reset the current score number of lockpicks successfully picked on the LCD1602. They can also use it to change the current level.

Ultrasonic sensor

Used for lockpicking within the game. When the user is actively lockpicking, an LED will light up on the board denoting the user may attempt to lock. The user must then place their hand next to the sensor, with the distance apart being the correct key. They must hold their hand in that position for a few seconds.

Buzzer

Gives the audio cue when the user gets closer and closer to the correct distance for the ultrasonic sensor when lockpicking. When the user successfully lockpicks the lock, a “victory” buzz will play for a few seconds.