**Lab Report: Project 6 – Light Theremin**

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Lab 6 – Light Theremin

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**Abstract**The purpose of this lab was to build a simple theremin-style instrument using an Arduino Uno, a photoresistor, and a piezo buzzer. The project demonstrated how analog sensor input can control sound frequency output, allowing light intensity to modulate the pitch produced by the speaker. This project introduced concepts of analog input reading, mapping values, and tone generation through electrical signals.

**Materials**

* Arduino Uno Board
* Breadboard
* Photoresistor
* 10kΩ Resistor
* Piezo Buzzer
* Jumper Wires
* USB Cable
* Computer with Arduino IDE

**Procedure**

A screenshot of a computer

AI-generated content may be incorrect.*Circuit Diagram*

*Steps*

1. Connected the Arduino’s 5V and GND pins to the power and ground rails of the breadboard.
2. Connected one leg of the photoresistor to 5V and the other to an analog input pin (A0) and to a 10kΩ resistor to ground.
3. Connected the piezo buzzer to a digital output pin (8) and to ground.
4. Uploaded the Arduino sketch and tested the circuit.

**A screen shot of a computer program

AI-generated content may be incorrect.***Code*

**Discussion**

1. **Describe how the piezo device works as a speaker.**  
   A piezo device vibrates when an electrical signal is applied, creating sound waves. The frequency of the signal determines the pitch of the sound that is produced.
2. **Compare the analogWrite() and tone() functions.**  
   analogWrite() outputs a PWM signal to simulate an analog output, typically used for dimming LEDs or controlling motor speeds. tone() outputs a square wave at a specific frequency to produce sound through a piezo speaker.

**Troubleshooting**

1. **Issue:** Initially placed the photoresistor in the wrong orientation, causing unstable readings.  
   **Solution:** Double-checked the wiring and corrected the placement, ensuring one leg was properly tied to 5V and the other to both the analog input and pull-down resistor to ground.

**Conclusion**The Light Theremin behaved as expected. Waving a hand over the photoresistor controlled the pitch, although at first the control was not super smooth. This seemed to be due to poor lighting conditions. After using my phone flashlight to better control the light input to the sensor, the pitch transitions became much smoother and more consistent. No major code or wiring adjustments were needed beyond improving the environmental lighting. Overall, the project successfully demonstrated how sensor input can dynamically control sound generation in real time.