

CS 241 Lab 10

(Relay and Pulse Width Modulation)

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1 Answers to Questions

- **Assignment 0:**
 - *Does the coil turn on with a logic 1, or logic 0?*
 - Turns on with a logic 1.
 - *Do you hear the relay click, and does it click when it's on (level triggered) or changing states (edge triggered)? Which states are loudest?*
 - We hear the relay clicking, and it clicks when it's on, or in a level triggered state. The 'ticking on' state is louder than the 'ticking off' state.
- **Assignment 1:**
 - *Which relay terminals did you use?*
 - +5v to COM and then Coil to NO and NO to NC.
 - *How do you turn the relay on?*

- Initially set the relay pin to the high position and made contact with it to the coil terminal.
- *If the relay is on, and you unplug and replugin the Arduino, does the relay stay on? Why or why not?*
- No, because the Arduino is the power source.
- *How do you turn the relay off?*
- We take the data cable off from NO.
- **Assignment 2:**
- *For what period (pulseIn) is the coil line high? (microseconds)*
- 24 microseconds per period (average).
- *For what period (pulseIn) is the coil line low? (microseconds)*
- 376 microseconds per period (average).
- *What is the frequency of the relay's whine? (Cycles/second, or Hz)
What does this indicate about when a circuit can use a relay?*
- 24 microseconds [per ON value] \rightarrow 376 microseconds [per LOW]. 1 cycle per every 400 microseconds. 400 cycles/second or 400 Hz.
- *What proportion of the time is the coil line high? (Percent on time)*
- 6 percent of the time on high $\rightarrow 376 + 24 = 400$ total; $24/400 = 6\%$.
- *Do you see much shorter / longer periods in the data occasionally? How often? What might these represent?*
- Every once in a while – might represent a lapse when the Arduino is taking time to record an average and print the respective statements. Happens when the program lapses on the printed value.

2 Appendix

2.1 Source Code

```
1 // Benjamin Stream & Solomon Himelbloom
2 // Assignment 2
3
4
5 // Change RELAY_PIN to your data input.
6 const int RELAY_PIN = 2;
7 unsigned long duration;
8 void setup() {
9   Serial.begin(9600);
10   pinMode(RELAY_PIN, INPUT);
11 }
12 }
13
14 void loop() {
15   for(int i = 0; i >= 0; i++){
16     duration += pulseIn(RELAY_PIN, HIGH);
17     Serial.println(duration/i);
18   }
19 }
20 }
```
