

Power measurements for the Railroad Crossing System

1. LCD Display

- For the display characters:

$$V = 4.76 \text{ V}$$

$$I = 0.14 \text{ mA}$$

$$P_{1,display} = V * I = 4.76 * 0.14 = 0.666 \text{ mW}$$

- For the backlight:

$$V = 5.01 \text{ V}$$

$$I = 21.2 \text{ mA}$$

$$P_{1,backlight} = V * I = 5.01 * 21.2 = 106.2 \text{ mW}$$

- Total power dissipation:

$$P_1 = P_{1,display} + P_{1,backlight} = 0.666 + 106.2 = 106.9 \text{ mW}$$

2. Ultrasonic Sensors (x2)

- For a single sensor:

$$V = 5.01 \text{ V}$$

$$I = 2.22 \text{ mA}$$

$$P_{2,single} = V * I = 5.01 * 2.22 = 11.1 \text{ mW}$$

- For two sensors:

$$P_{2,total} = 2 * P_{2,single} = 2 * 11.1 = 22.2 \text{ mW}$$

3. Speaker

$$V = 0.258 \text{ V}$$

$$I = 34.4 \text{ mA}$$

$$P_3 = V * I = 0.258 * 34.4 = 8.88 \text{ mW}$$

4. Servo Motor

$$V = 4.69 \text{ V}$$

$$I = 0.217 \text{ A}$$

$$P_4 = V * I = 4.69 * 0.217 = 1.02 \text{ W}$$

5. RGB LED Common Cathode

$$V = 0.616 \text{ V}$$

$$I = 5.79 \text{ mA}$$

$$P_5 = V * I = 5.79 * 0.616 = 3.57 \text{ mW}$$

Total Peak Power Dissipation:

$$P_{total} = 106.9 + 22.2 + 8.88 + 1020 + 3.57 = 1160 \text{ mW} = 1.16 \text{ W}$$