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PCB Design Using Altium Suite

Introduction:

The Altium Designer allows for the easy creation of printed circuit board (PCB) designs. The software contains libraries including most components that could be found on a board. The component designed in Altium is an analog electronic lock. The system is two circuits, a key and a keyhole. The key is a CMOS inverter-based tone generator circuit, and the keyhole is a tone-decoder circuit that can detect frequencies between 0.01 Hz and 500 kHz. If the frequency detected is the frequency determined by the RC circuitry, then the relay will be activated, which connects to the electronic locking device. The tone is generated by pressing switch S1, and the circuit is reset by pressing S3. The goal of the design is to create a schematic for the circuit, and generate a PCB design for it.

Design:

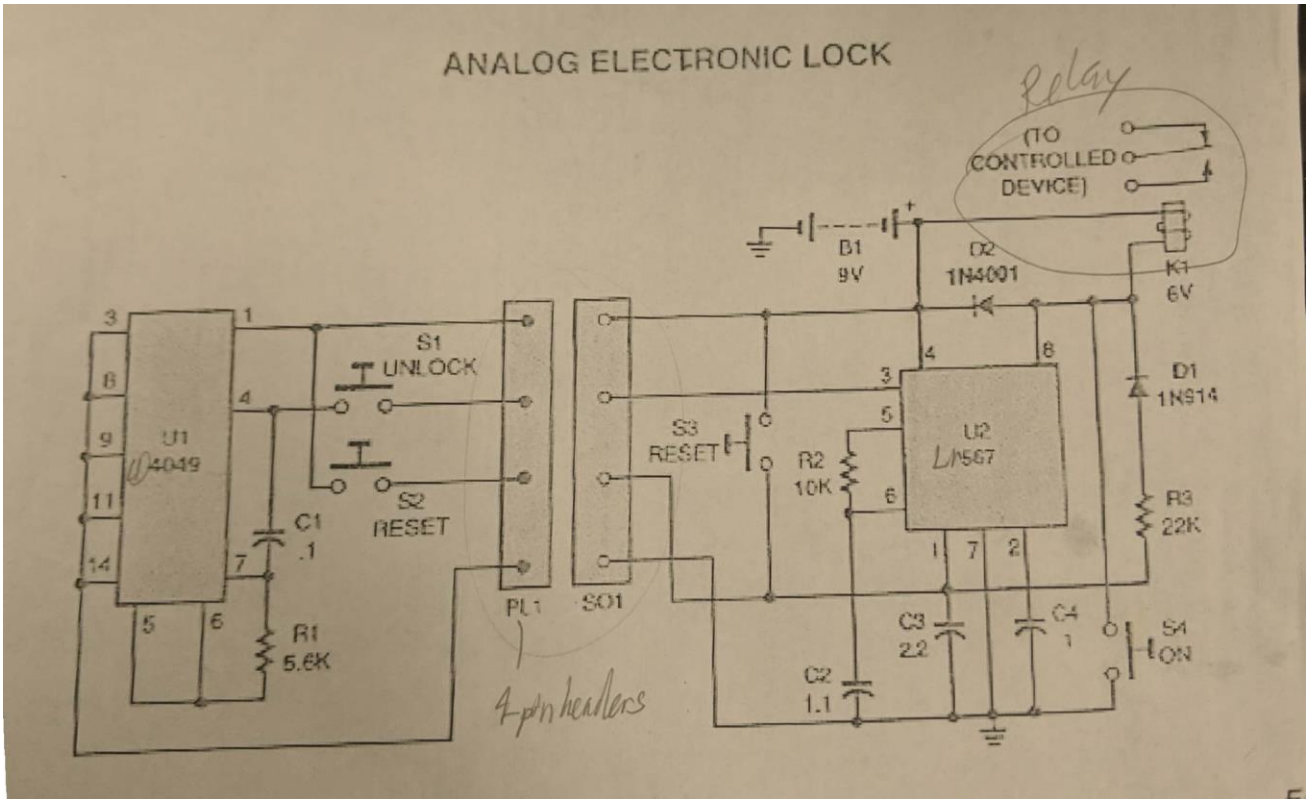

Figure 1: Analog Electronic Lock Diagram

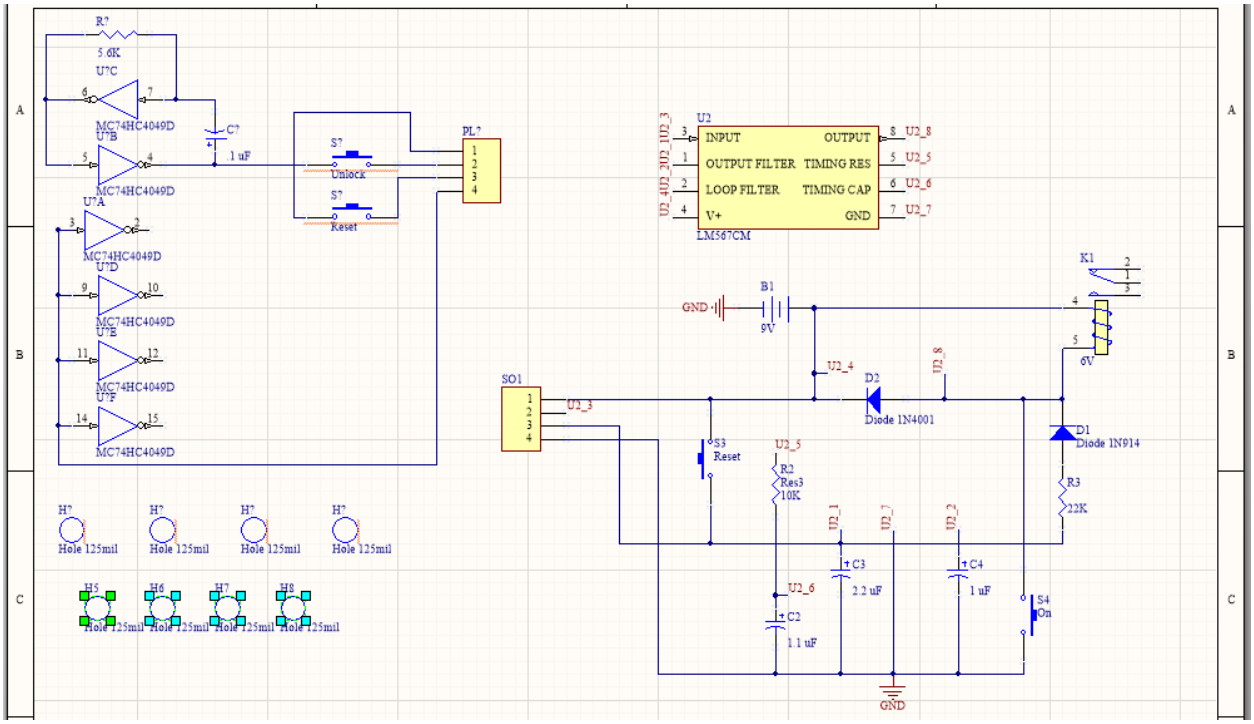

Figure 2: Altium Schematic Drawing

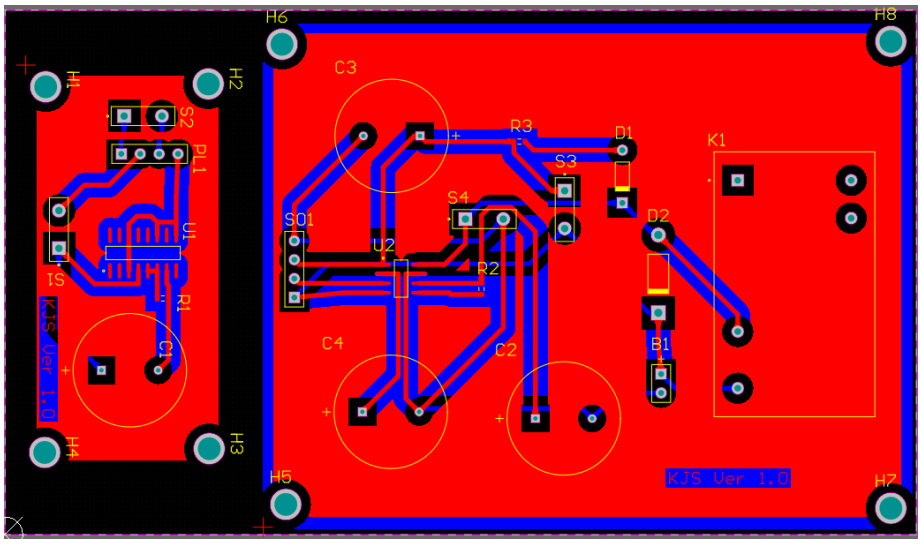

Figure 3: PCB Layout Drawing in 1:1 Format

Conclusion:

The overall PCB design is approximately 4.76” x 2.78”. The design process is relatively simple; the entire design is in two pieces, as was instructed by the TAs. The left side of the design is the key, and has a 4-pin header, denoted by PL1. The right side is the keyhole, and contains another 4-pin header, denoted by SO1. The key board is meant to be inserted into the keyhole board through the usage of the 4-pin headers. The capacitor footprints were chosen such that larger electrolytic capacitors could be used for the desired matching frequency, if necessary. The traces are all at least 50 mils wide, and all have teardrops to provide structure for the connections. The design is simple to construct both in Altium and physically.