Assignment 6: Garage Security System

Rajdeep Gill 7934493

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1 Security System Desgin

To design a successful security system, we need to consider the following requirements and constraints:

- System should work in an industrial/residential environment
- Powered by 120V AC
- Ability to arm and disarm via a coded switch, or a keyed system
- Monitor two doors

With these requirements, a simple flow chart can be created to outline the system's operation. This flow chart is shown in Figure 1.

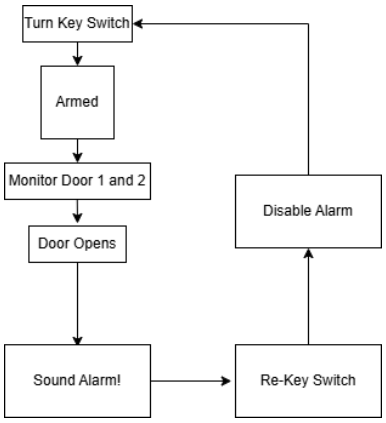

Figure 1: Flow chart for the security system

The system is armed by turning the key switch to the on position. This will arm the system and begin monitoring the two doors. If either door is opened, the alarm will sound and can be silenced by using the key to turn the switch to the off position.

The ladder logic for this system is shown in Figure 2. It mimics what was described above. The two normally closed switches, when open will allow power to flow to the alarm, sounding it if the key switch is in the on position.

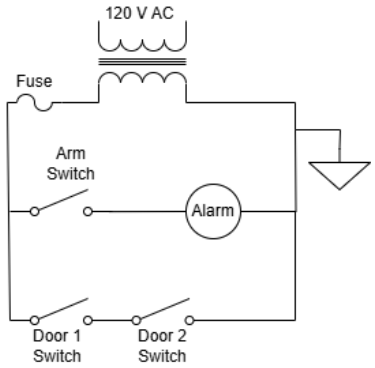

Figure 2: Ladder logic for the security system

Further iterating on this design, we can use the inplace coded switch to arm and disarm the system instead of a keyed switch. A timer can also be added to the system to allow for a delay between the door being opened and the alarm sounding. This is shown in Figure 3.

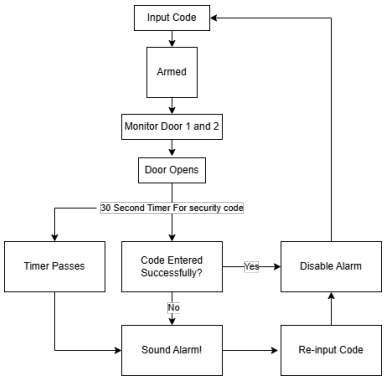

Figure 3: Flow chart for the security system with coded switch and timer

A programmable logic controller (PLC) can be used to implement this system. The PLC will take in inputs from the coded switch and the two door switches. The PLC will then output to the alarm based on the states of the inputs and a timer. This would ensure a more rugged and reliable system than a relay-based system.