

ANTI-THEFT SYSTEM FOR CATALYTIC CONVERTER

Team: Theft-Away

1. Ryan Budd (Mechanical Engineering)
2. Minh Le (Computer Engineering)
3. Nguyen Tang (Electrical Engineering)
4. Joey Giduscos (Electrical Engineering)

SOFTWARE/FIRMWARE DETAIL DESIGN

I. Software Architecture

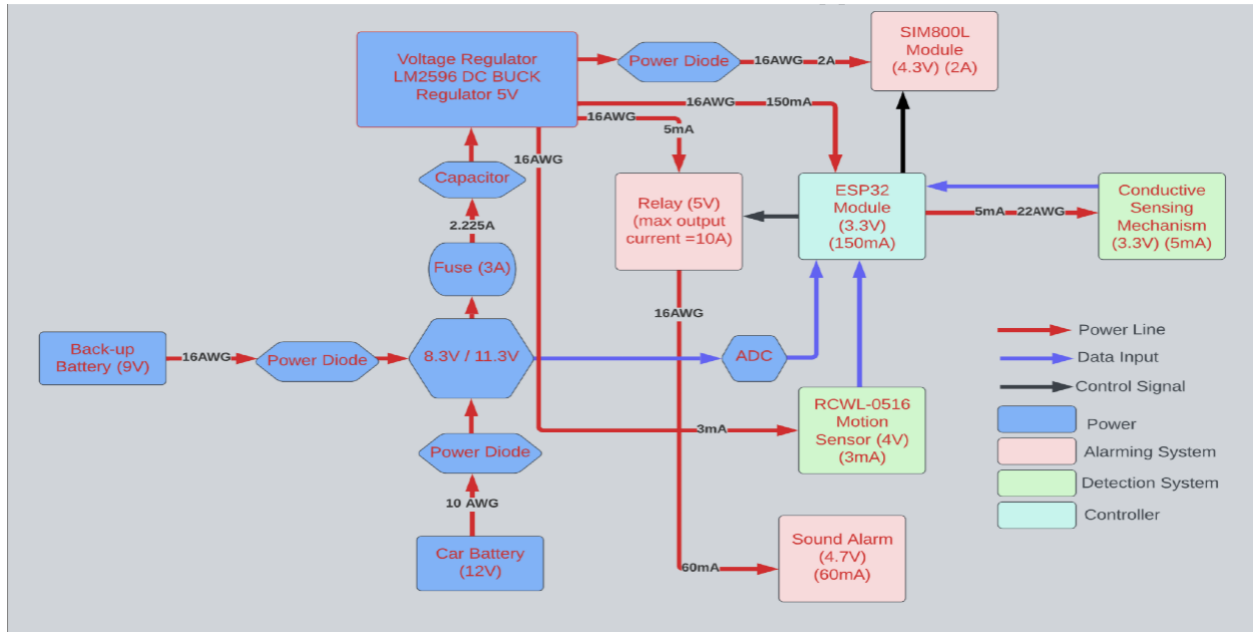


Figure 1. An overview of the system

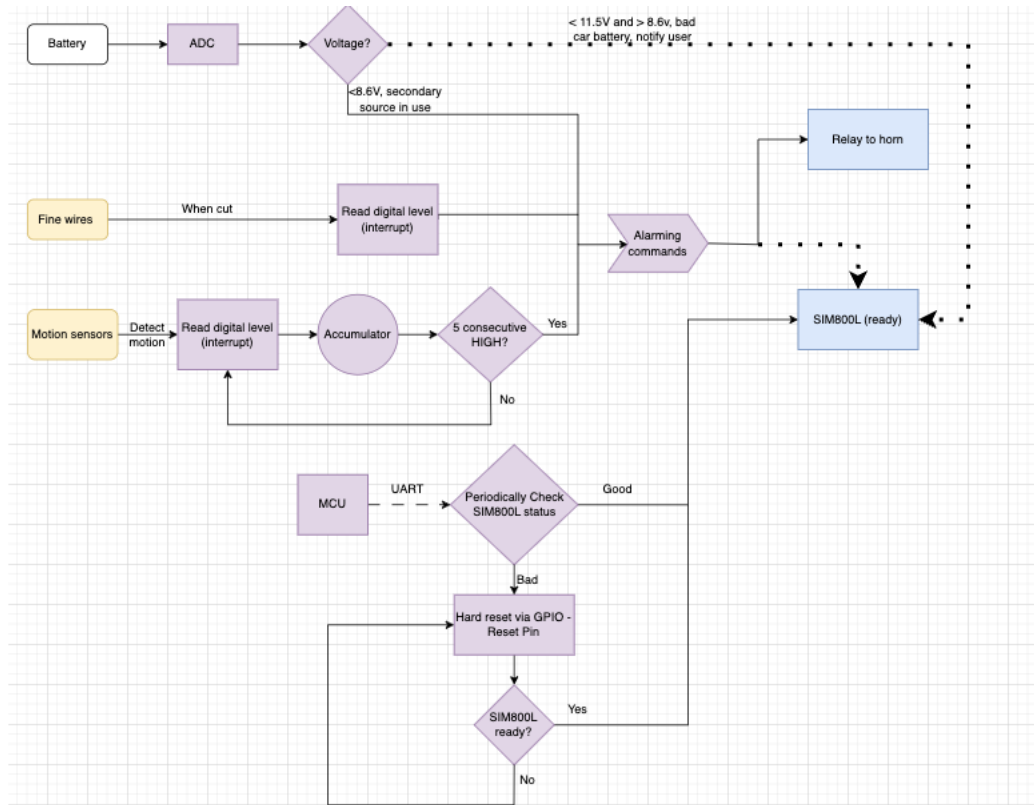


Figure 2. Software Architecture Diagram

At the top of the diagram, battery checking process is shown. After going through ADC, the microcontroller will check the voltage. If the voltage is in the warning zone of $<11.3V$ and $>8.3V$, it will notify the user via SIM800L that the battery needs to be replaced.

Next is the conductive sensing mechanism. A set of fine wires running across the converter connect between voltage source and pull-up input pins. When a wire is cut, the input switches from High to Low and the jump signal will be sent to the controller

Motion sensor also produces digital output signal. When there are 5 consecutive HIGH signals, the microcontroller will trigger the alarming system.

When the conductive sensing mechanism or the motion sensor senses a theft, the microcontroller instructs the GSM module to send text message and sends a High signal to open the relay.

The starting sequence of GSM module is shown at the bottom loop. The microcontroller will periodically check for the status of GSM module. In case the module stop working, the microcontroller will instruct a restart sequence until the status is good again.

II. Software Routine

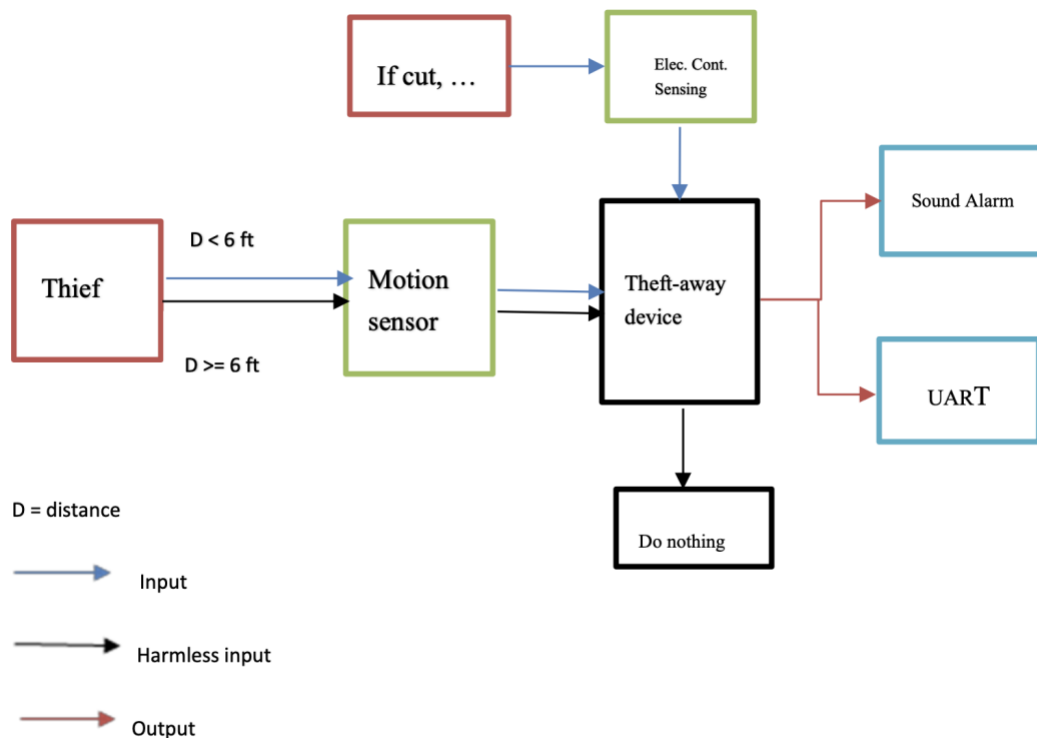


Figure 3. Software Routine

That there are two types of input: the harmless one (black arrow) and the one that will trigger the alarm system (blue arrow). The motion sensor has a broad range of 12 feet. However, our device will be programmed so that it will only trigger with threat that locates within a of distance less than 6 feet. If the motion sensor is bypassed and the fine wires are cut as a result of attempting to cut the converter, the device will trigger the alarm system.