Project 4
Digital Logic
Fake Auto Security System

One can build a very simple LED Flasher circuit that makes it appear that you have a security system in your car when, in fact, all you have is a flashing LED. One of the simplest ways to build such a circuit is to use a 555 timer running in astable mode. The circuit we built as the transmitter in Project 2 (without the audio input) will work if we choose values for the resistors and capacitor such that the frequency is lowered to less than 1 Hz. In this project we want to build such a flasher circuit using either a version of the 555 timer circuit or logic gates. In either case, we will need resistors and capacitors. We will also add some enhancements in order to make the circuit even more convincing as a security system.

Step One – Design and build a simple LED Flasher circuit that operates at a frequency of less than 1 Hz. This circuit should be capable of running off of batteries, but you can test it using a power supply if you wish. The LED must flash less than 20% of the time. That is, it should flash on for a short time and then be off for most of the cycle time.

Suggested circuits can be found at a large number of websites (search for LED Flasher), in the Radio Shack books and elsewhere. These circuits do not necessarily use the TTL devices we have in our parts kits. Thus, the values for resistors and capacitors might have to be changed to make them work properly with the devices we have.   A combination of PSpice simulation and trial and error should get you to useful values. A 555 timer circuit is the most straight-forward way of accomplishing the task of having an LED on for a short time in each cycle of about 1 second in duration.

Step Two – Add a counter circuit that can count at least 10 flashes of the LED.

We have just built such a counter in Experiment 11.

Step Three – Add an enhancement circuit to the basic flasher that performs some task every N (N > 10) flashes.   Possibilities include generating an audible sound of some kind, turning some other device on or off using a relay, etc. An LED should also light up when the enhanced circuit is in operation.

To have a device turn on only during a particular pulse from the flasher, you will need to build some kind of a gated circuit. There are examples of such devices in the Radio Shack books. Remember that it is necessary for the counter to trigger a completely separate circuit. It is not enough for the counter to just turn on another LED.

Pre-Project Report (10 Points)
Describe what you are planning to build. You do not need to build anything for this report. You only need to find circuits that you think can be modified for your purposes. Include a block diagram of your design and a specific circuit diagram for each block.

Describe what the circuit will do when it is working properly. That is, state the operating goals for your design. These are the goals you will use when you demonstrate that your design works.

It is very important that your operating goals are quite specific. They need to be stated clearly enough that it will not be difficult to know if they are being met.

Final Project Report (10 Points)
Describe what you actually built. Provide complete circuit diagrams.
Restate the operating goals for your design, since they will likely have changed from your original plan. Provide a place for an instructor or TA to sign indicating that your goals have been achieved.

If your original operating goals are not adequate to test the success of your final design, you will have to restate them in a manner that can make it clear that your design is indeed working. Remember that you get to define your goals.

Discuss the changes you made in your original circuits so that they now work as you had hoped they would.

Explain how your circuit works.

Demonstrate that your circuit works to an instructor or a TA. You must demonstrate that your circuit achieves your design goals. Have your list of goals signed and include this page in your report.

Witnessed by _____ on _____