

Design and Implementation of automatic Security Monitoring System

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Abstract— Many security systems are used in buildings where doors are to be monitored e.g. in prison. The condition of doors that is if the door is closed or open is monitored continuously in the analog form while data is transmitted in digital form to the monitor panel for data processing and alerting. Hence, the circuit implemented is the application of mixed signal. To design this circuit, an astable multivibrator is used to generate a square wave. A MOD-16 counter has 16 states in its count sequence and used for counting operation. A 16x1 Multiplexer is used for data monitoring operation and after transmission of data, 1x16 Demultiplexer is used for data processing. This design reduces the amount of wiring. It transfers the door data to the alert system using only single wire.

Keywords – mixed signal, security system, OPAMP, counter, Multiplexer, Demultiplexer

I. CIRCUIT DETAILS

An astable multivibrator is an Op-Ampbased comparator which is used for comparing analog voltage level with another reference voltage V_{REF} and generates a square wave using RC constant circuit. This output is fed to a MOD-16 counter. It has 16 states and counts from '0000' to '1111'. After reaching '1111' state it reset to '0000' state. The output of the MOD-16 counter is given as input to the 4 select lines of the multiplexer as well as to demultiplexer. 16x1 Multiplexer is a combinational circuit which has 16 data input lines with 4 select lines and 1 output line while 1x16 demultiplexer has 1 data input line with 4 select lines and 16 output lines. In this circuit, LEDs are used for alert system.

Case Scenario: Let us assume that door 3 is open (High) and all other doors are closed (Low). Data at door 3 will transmit to output of the MUX when the counter becomes 0011. With the same select line connected to DEMUX, it will transfer that data to LED3 at the same counter value. Since the DEMUX has an active low output, it will invert the data value and LED3 will be turned ON while the others are OFF. That means alert is passed that door 3 is open. When the counter value is other than 0011, the LOW signal will pass from the MUX to the DEMUX, this data will be inverted at the output of the DEMUX and fed to the LEDs which results in turning off the LEDs. That means door 3 is closed.

II. CIRCUIT DIAGRAM

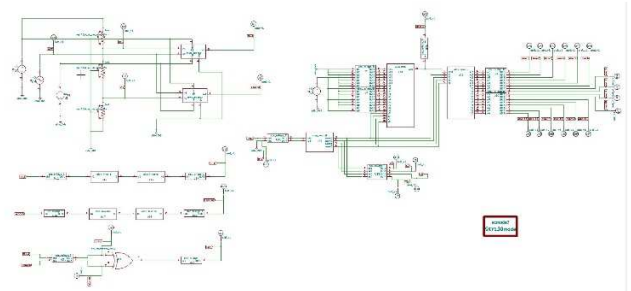


Figure 1. Circuit Diagram

III. CIRCUIT WAVEFORMS

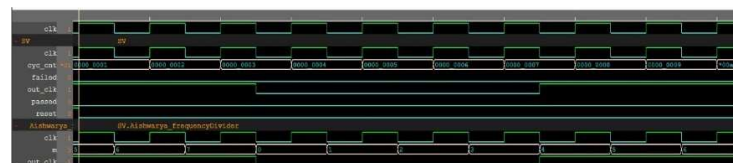


Figure 2. Frequency Divider ckt waveforms



Figure 3. Alert system output. Door numbers 4,8,12,16 are open. All others are closed.

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