TEAM NUMBER

Light Work

Adetokunbo Aboloye, Serena Cho, and Yupeng Chua

A. James Clark School of Engineering

Problem Definition

Design a short range LiDAR sensor for high precision usages in autonomous robotics like drones or other small robots.

Design Calculations & Analysis

The parasitics for the SPAD are calculated from the layout using the design parameters from the Skywater 130 architecture. Additionally, the relative sizing of transistors in the AQAR are calculated to minimize delay as the SPAD builds up upon avalanche breakdown.

Final Design

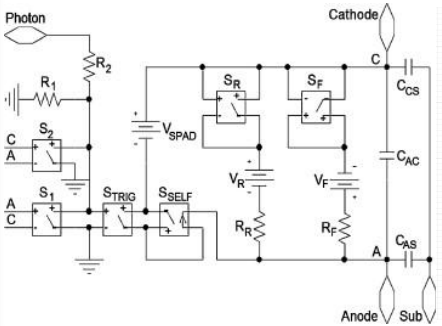

Figure 1
(Zappa et al.)

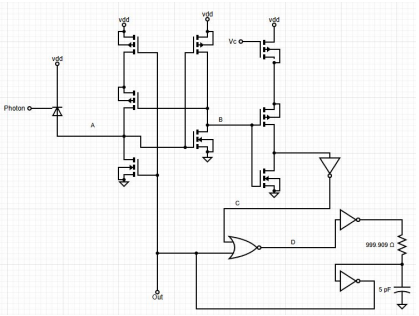

Figure 2

Figure 1 is a SPICE model used to represent the SPAD for testing and simulation.
Figure 2 is the Active Quench and Reset circuit used to enable proper functionality of the SPAD

Prototype & Test Results

Figure 3

Although the minimum possible dead time is far lower, for the sake of reliability we have our dead time at 1µs. The dead time can be adjusted by Vc

Light Work
LiDAR Sensor Array
Designed a short range LiDAR sensor for various purposes.

Light Detection and Ranging, LiDAR, is a method of determining range of an object using laser pulses and photon detectors. It involves a laser that emitted pulse that reflects back to a detector to find the time of flight to calculate the distance from the object and sensor.

LiDARs are commonly found in fully autonomous vehicles such as self driving vehicles and robotics for obstacle detection as well as drones for aerial mapping.

For our capstone project, we designed a LiDAR array capable of precision mapping to a range of about 25 meters for use in small robotics and drones using Cadence Virtuoso.