Term Paper Topics

Review the literature for state–of–the–art performance in high–speed detectors for optical communication.

Analyze the various noise contributions to a LIDAR (coherent or incoherent at your choice) at different wavelengths to determine how the SNR will depend on wavelength for day and night operation.

Using circuit–modelling software, develop a model for a semiconductor detector, and determine the performance in viewing a pulsed light source. Consider in particular a strong pulse followed by a weaker one.

Review the literature for state–of–the–art thermal imaging systems. Consider either those with the best performance, or those with low cost, such as the room–temperature bolometer arrays.

Examine the advantages and pitfalls of differential detection (balanced mixing) considering noise, high ambient light levels, and realistic variations in detector characteristics.

For the detector and application of your choice, design and analyze a bias circuit, paying attention to power transfer, noise, frequency response, DC level, and any other issues you think are important.

Contrast predetection and postdetection gain with regard to noise. Discuss quantitative examples, using data from literature or from vendors' online catalogs.

Investigate the optogalvanic effect in lasers and consider using it for detection in laser radar.

Consider power transfer in photovoltaic detectors. Specifically, investigate the efficiency of conversion from optical to electrical power.

Investigate the matters of dark–signal subtraction and linearization in image processing programs using data from CCD arrays.