

Development of a High-Precision Time Delay Measurement System using a Time-to-Digital Converter

Introduction

A time delay measurement is an essential task in various fields, including telecommunications, navigation, and remote sensing. In this project, we aim to develop a high-precision time delay measurement system based on the TDC7201 time-to-digital converter. Among other things, this time-to-digital converter can be used to measure flight time (ToF) in Lidar systems. The proposed system will be capable of measuring the time difference and delay of signals with high accuracy and precision.

Objectives

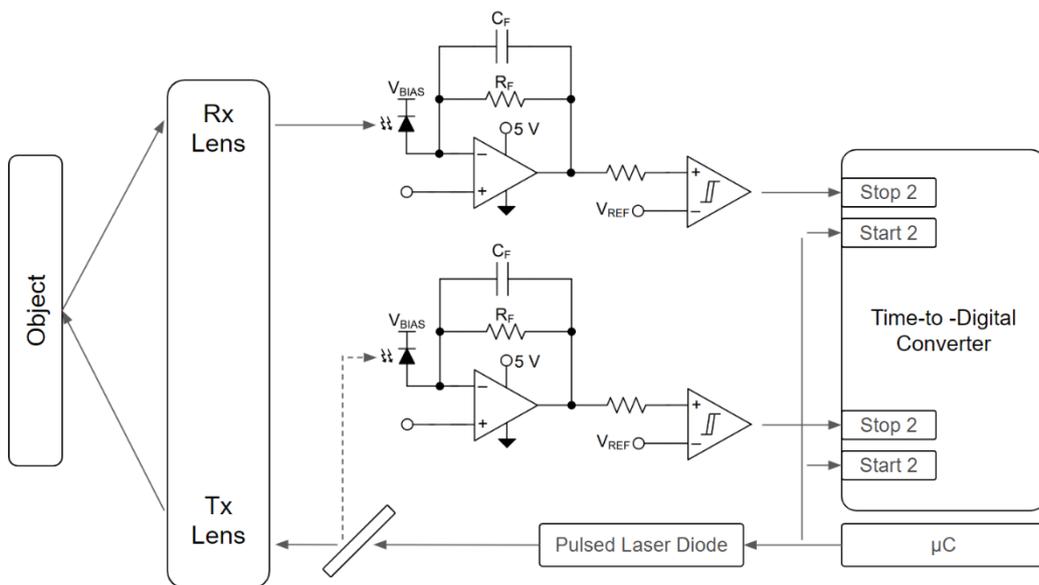
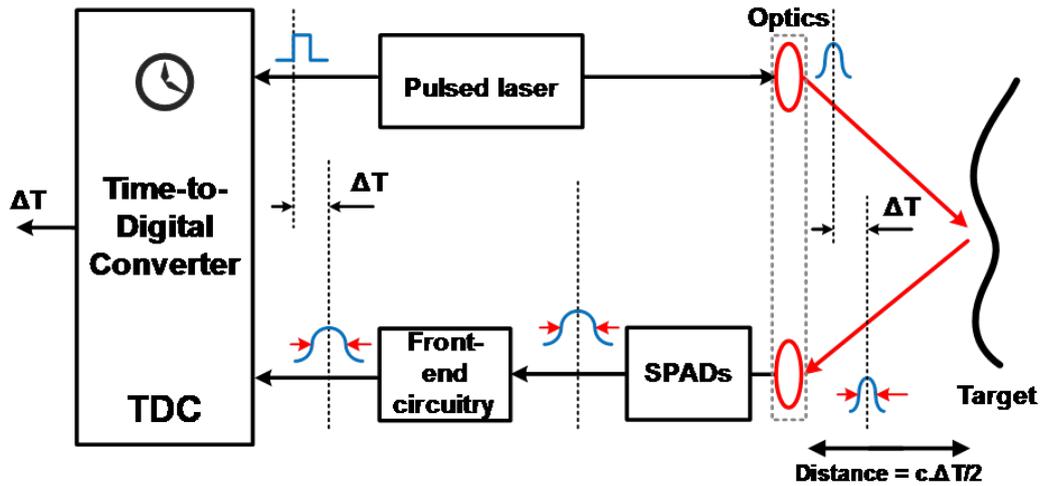
The main objectives of this project are as follows:

1. Design and develop a PCB with the time converter (TDC7201) for measuring time delay accurately and precisely and a microcontroller as communication interface.
2. Develop software on the microcontroller to interface with the time-to-digital converter and a computer via ethernet.
3. Develop python software on a computer to interface with this microcontroller. The software will eventually capture, visualise and log the data of the time-to-digital converter.
4. Integrate the previous developed subparts to create a complete time delay measurement system.
5. Propose options to calibrate this time measurement system.

Expected Results

The proposed time delay measurement system will be capable of measuring the time difference and delay of signals with high accuracy and precision. The system will measure the delay of a digital buffer (74LVC1G126) and a half bridge power stage (MDC901 & GaN HEMT's). The software developed for this project will fit in our in house Python tool to automate our characterization setups.

THESIS PROPOSAL



MinDCet

MinDCet is a High-Voltage, Power and Mixed-Signal IC design company, supporting our clients from concept to production-tested ASICs by cost-effectively accelerating time-to-market. This thesis proposal arose from the need for accurate delay measurements in characterization setups and an ongoing ic design project to design a laser diode driver used in lidar systems. The developed delay measurement system will be used in our lab as a tool. We plan to use an adapted version of the tool to build an demonstrator with our own designed lidar laser driver IC.