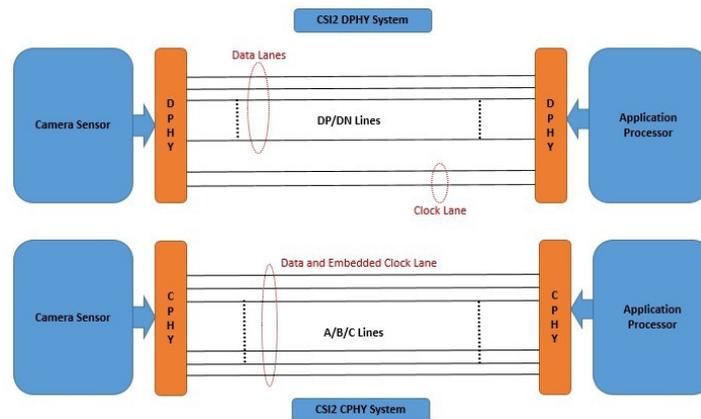Topic for Diploma Thesis:

Design of a MIPI CSI-2 D-PHY Transmitter System

Background

Modern day mobile electronic devices rely heavily on robust communication protocols between their components. The Mobile Industry Processor Interface (MIPI) Alliance has walked a long way to standardize communication protocols to help interface various electronic components within mobile hardware. One such standard protocol is the MIPI Camera Serial Interface, which is designed for, and widely used, to interface an Image Sensor with an Image Processor.

Many receiver implementations are currently available for use either as IP cores for FPGAs and Microcontrollers, or as stand-alone physical interfaces included as part of a mobile image processor, such as the Snapdragon, Cortex, Helio, amongst others. However, MIPI CSI transmission systems are usually reserved and implemented by electronics device manufacturers and companies operating in the field of image sensor design. As such, the knowledge and materials on MIPI CSI transmitter implementations is not wide spread, nor well defined, and is subject to the creativity of engineers within the companies designing these interfaces.

Thesis Description

This Master Thesis aims at exploring the development a MIPI CSI-2 D-PHY transmitter on an FPGA and testing it with existing mobile imaging processors or available FPGA IP cores. Photolitics has various image sensor designs which could at a later stage in this thesis act as an input source to test the functionality of the transmitter. The thesis can be developed into multiple directions according to the preferences and competence of the applicant, including:

- Exploration of the mechanics of MIPI CSI and other serial interfaces

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- Design and test of a fully functional MIPI CSI-2 D-PHY system on an FPGA
- Silicon implementation of MIPI logic control circuitry driven by the design exploration steps

The main goals of this thesis are to explore and understand the concepts behind high-speed serial interfaces for communication with image sensor chips. Gaining practical experience within the field of Digital Design for FPGAs, and learning the mechanics of various data communication protocols on a hardware level.

Qualifications

We seek students with background in digital electronics and sensor interfaces, and design for FPGA. Skills in VLSI and DSP processor design are also advantageous, and you need to be a good self-motivated learner to manage the complexity of this task.

Extent and duration

Typically 1 student should manage to complete the thesis within a timeline of 6 to 8 months.

Location

Photolitics OOD, Ruse, Bulgaria

Additional information on the thesis topic can be obtained by Deyan Levski at
deyan.levski@photolitics.com

About Photolitics

Photolitics is a custom image sensor design house, specializing in industrial machine vision CMOS image sensor development, miniature medical endoscopic camera modules and mixed-signal ASIC design. We are a group of world-class IC design professionals with multi-decade experience in photonic IC design, CMOS image sensors and analog mixed-mode integrated circuits. Through our wide network of connections we distinguish ourselves as a small IC design house, with exciting opportunities for growth and professional development.

To find out more about us, visit our website: http://photolitics.com