# SpW Control Interface for IR Readout System

IDEAS has developed an ASIC, NIRCA MKII, which performs readouts for infrared sensors. Based on this ASIC, a development kit has been developed for provide customers the availability to evaluate the ASIC for their own purposes.

The firmware of the development kit was initially developed by a student during their master's thesis. The following is an excerpt from their thesis, an overview of the underlying firmware architecture.
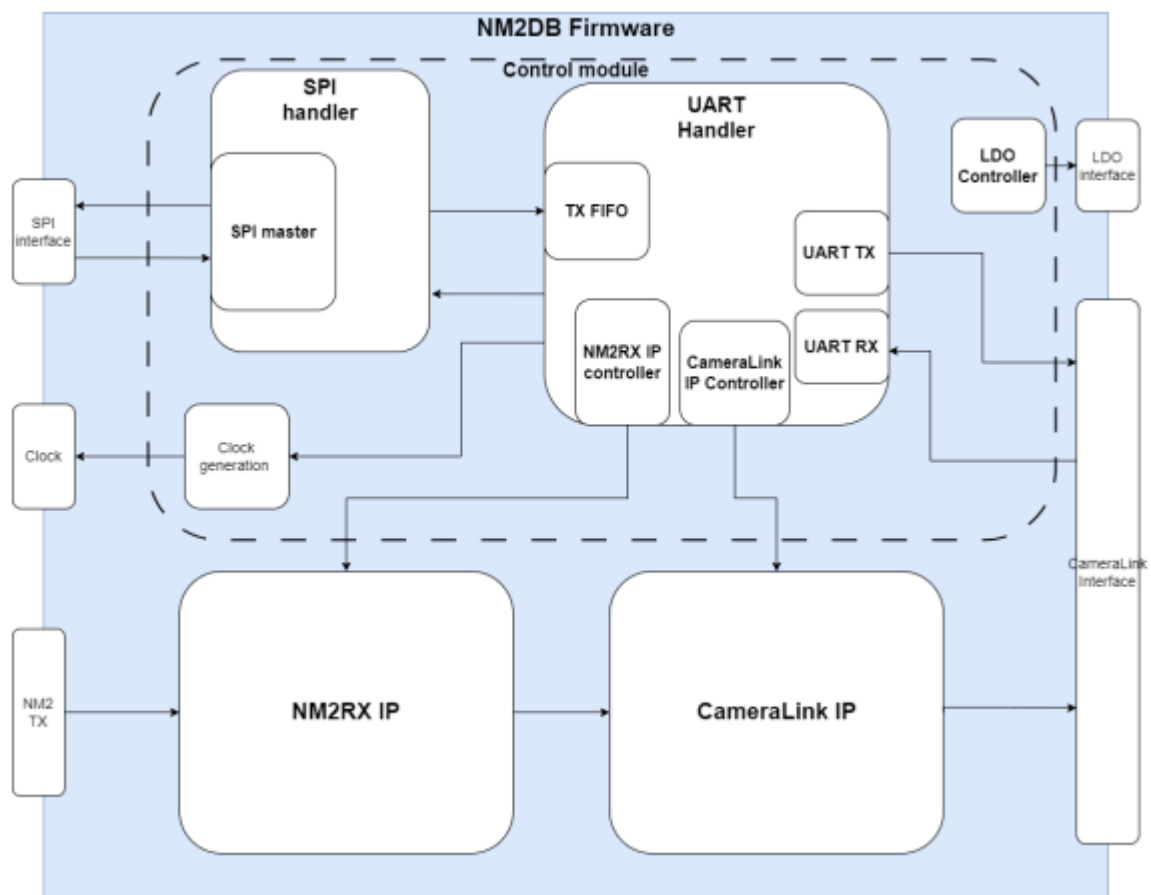
The main goal of this project is to replace the UART Handler, how it handles the connections to the other relevant modules and provides an external UART interface, with a SpaceWire based solution instead. The SpaceWire protocol implementation on the SpaceWire Handler done using the open-source SpaceWire Light, specifically the SpW Stream interface.

The external interface will facilitate the transfer of transmission of control, configuration and housekeeping signals to and from the Devkit. These signals are transferred over a SpaceWire "brick", an isolated implementation of SpaceWire. Meaning that the control, configuration and housekeeping signals will be sent over a SpW-to-SpW line.

The SpaceWire solution will be built upon an existing solution based on a UART solution. As such the project will be based on a fork of the existing project on available on GitHub. The project is built in Vivado and will need to fit into its existing dependencies and constraints. The design of the SpaceWire Handler will be done in VHDL. Additionally, a wrapper protocol for the SpaceWire packets needs to be selected and implemented.

Early on in the design and verification phase the SpaceWire Light IP will be used as a baseline for creating an understanding of its internal control and status signals, an expectation of its behaviour and lastly a simple simulation that verifies input and output stimuli for the interfaces. This simulation continuously built upon as the design for the handler takes form and finalizes.

Throughout the design process of then handler, synthetic simulation data and interfaces will be created based on datasheets for the relevant modules. Requiring the expansion of the simulation. Lastly perform tests and measurements on hardware once the complete design is implemented on hardware.

Furthermore, if the design, verification and implementation is complete, a total test readout, from sensor to properly received data on a computer, will be performed. This will require making the existing computer software solution compatible with the SpW solution.