

Spacely

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Spacely is a Python-based test automation framework developed at Fermilab, designed to accelerate the functional testing and characterization of ASICs. Spacely interfaces to both industry-standard NI PXI modular test hardware and open-source Caribou hardware, and it introduces an abstraction layer for controlling multiple peripheral instruments, which include oscilloscopes, function generators, and arbitrary waveform generators. It also comes equipped with its own set of standard bitfiles for specific NI PXI FPGAs, enabling the generation of high-speed arbitrary digital waveforms directly from Python, eliminating the need for customized FPGA firmware.

Spacely provides a suite of software utilities which simplify the test flow, such as directly converting waveform dumps from RTL simulations of an ASIC into a format which can be used to test the physical hardware. Spacely's software architecture is inherently modular, such that support for new ASICs and test configurations can be added by writing a few short configuration files. For instance, SPROCKET/XROCKET series pixel detector ASICs have had their functionality verified and characterized using it at Fermilab, which greatly decreased the time spent on running tests and allowed some chips to be brought up in less than one day.

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