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New digital low-level rf controls based on the red pitaya STEMLab for the tls linac system

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The Linac system at Taiwan Light Source (TLS) has been in operation for almost a quarter of a century and requires upgrades to improve its reliability. To achieve this, some components of the control system have been replaced with new digital low-level RF control units that use emerging technologies. A new unit is based on the open-source hardware platform which is named “Red Pitaya STEMLab” and offers a compact size and low power consumption. The unit features DAC blocks for downloading arbitrary waveforms with external trigger play and ADC blocks for waveform acquisition, enabling the development of real-time diagnostic toolkits. The new low-level RF control interface has been fully integrated into the existing EPICS software framework for system integration. The new digital low-level RF control system supports I/Q data with online amplitude and phase settings, and a waveform digitizer for inspecting low-level RF signals from the klystron modulator. Specific graphical applications have been designed and integrated into the existing operation interfaces. The system has been successfully achieved during routine operations. This paper describes the details of these efforts.

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Footnotes

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Yes

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