Control and data acquisition systems for high power laser

What is a control and data acquisition system?
A control and data acquisition system was implemented for the recently developed collinear laser spectroscopy setup. This system is dedicated to data recording, storage, processing, monitoring of the beam intensity and energy, and visualization of various spectra.

Are deterministic control loops necessary for laser countermeasure turret pointing?
Deterministic control loops are necessary for maintaining high accuracy in the pointing of the turret and aiming of the laser countermeasure system. Here,we report on the progress of a beam control system developed at the Institute of Technical Physics of DLR that meets these demands.

What is a control and DAQ system?
In summary,a control and DAQ system was implemented to realize multiple functions for a CLS-experiment,such as data collection,storage and processing,monitoring of the beam intensity and energy,and visualization of the HFS and TOF spectra.

What are the typical laser parameters?
The typical laser parameters are a pulse length of 8 ns and a pulse repetition rate of 1 kHz. The laser is distinguished by its beam quality of M² < 1.4. Beam parameters can be monitored continuously in a separated beam line using a sampled beam copy.

How does a high power laser system work?
High power laser systems,such as those at DLR,contain two collinear and collimated laser output options. The laser transmitter emits laser energyof 50 mJ at 1064nm or 25 mJ at 532 nm. The transmitted wavelength can be changed by a motorized mirror. Typical laser parameters include a pulse length of 8 ns and a pulse repetition rate of 1 kHz.

What is a sub-system in a laser beam control system?
In a laser beam control system,typical sub-systems include the target illumination laser,which functions as an ordinary flash lamp and provides the necessary photons to expose the camera focal plane array within sub-ms.

However, the space-borne lidar has high requirements on the stability and integration of the acquisition control system. In this paper, a new data acquisition and lidar control system (DALCS) was ...

A control system based on Tango Controls is implemented for both the laser and four experimental areas. ... having a highly dependable and customizable server infrastructure that enables data acquisition and control of the entire experiment can be of great benefit for daily experimental work. ... Control systems and data management for high ...

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An opportunity arises to share knowledge of improvements to control and data infrastructure currently being undertaken. We compare platforms and approaches to state-of-the-art control systems and data management at high-power laser facilities, and we illustrate these topics with case studies from our community.

2 Scott Feister et al. needed adjustments, new systems should enable automation of scans of experimental and laser parameters, rather than relying on repeated re-configuration through manual user

Key learnings: SCADA Definition: SCADA is defined as Supervisory Control and Data Acquisition, a system used for high-level process control and data management.; Components: A SCADA system includes Master Terminal Units (MTUs), Remote Terminal Units (RTUs), and communication networks for data transfer.; Functions: SCADA systems monitor ...

Figure 1 represents a Wi-Fi interface-based acquisition, analysis, and control system based on master-slave topology developed for the operation of flowing medium lasers. The acquisition and control system is divided into two main parts: master controller and slave unit. Slave unit is an acquisition, analysis, and control unit which performs all the monitoring, ...

A user-friendly data acquisition and control system (DACS) for a pulsed chemical oxygen -iodine laser (PCOIL) has been developed. It is implemented by an industrial control computer,a PLC, and a distributed input/output (I/O) module, as well as the valve and transmitter. The system is capable of handling 200 analogue/digital channels for performing various operations such as ...

The interaction of relativistically intense lasers with opaque targets represents a highly non-linear, multi-dimensional parameter space. This limits the utility of sequential 1D scanning of experimental parameters for the optimization of secondary radiation, although to-date this has been the accepted methodology due to low data acquisition rates.

In this paper, a new data acquisition and lidar control system (DALCS) was developed based on System-on-Chip Field-Programmable Gate Array (SoC FPGA) technology. It can be used in lidar systems with high repetition rate and photon-counting mode and has functions such as data storage, laser control, automatic collimation, wireless communication ...

Fast solid target delivery and plasma-ion detection systems have been designed and developed to be used in high intensity laser-matter interaction experiments. We report on recent progress in the development and testing of automated systems to refresh solid targets at a high repetition rate during high peak power laser operation (>1 Hz), along with ion diagnostics and corresponding ...

High repetition rate lidar is typically equipped with a low-energy, high repetition rate laser, and small aperture telescopes. Therefore, it is small, compact, low-cost, and can be networked for observation. However, its data

acquisition and control functions are generally not specially designed, and the data acquisition, storage, and control programs need to be ...

The computing system is dedicated to real-time control, data acquisition, analysis, and display. ... We present a data-acquisition system for a high-power pulsed Nd:glass laser oscillator ...

3.1.1 NIST Primary Standard for High Power Laser Measurements Scale: 10 cm Absorbing Cavity Calorimeter Case Temp Controlled Jacket Electrical Heater Temperature Sensor Reflector Figure 3.2 Schematic diagram of the cross-sectional view of ...

The data acquisition system collects and analyzes the flow data to monitor and control the flow rates. Acceleration and Vibration Data acquisition systems are also utilized to measure acceleration and vibration in different applications, including structural health monitoring, automotive testing, and aerospace industries.

Typically, wired data acquisition systems 15,21 have been mostly reported for operation of high power flowing medium laser systems on account of their reliability and proved track record. However ...

control systems and data management at high-power laser facilities, and we illustrate these topics with case studies from our community. Keywords: big data; community organization; control ...

Original manuscripts are sought to the special issue on "Future Control Systems and Machine Learning at High Power Laser Facilities" of High Power Laser Science and Engineering (HPL),. The scope of this special issue is to highlight the cutting-edge engineering, computational and experimental developments supporting the next generation of high power laser facilities and ...

results are presented to show that the new control algo rithm can improve the pointing performance of the system. 2. HIGH ENERGY LASER BEAM CONTROL TESTBED ... power laser to maintain a safe laboratory environment. The testbed is built by Boeing-SVS, and the picture of the testbed ... data acquisition system, and oscilloscope are used for ...

2.1 DAQ system. As shown in Fig. 1(a) (green shaded area), the collection and processing of the signals from the PMTs and MagneTOF detector are realized through a series of NIM modules, such as a fast timing amplifier (ORTEC FTA 820A) and constant-fraction discriminator (CAEN N605). The bias voltages for the PMTs and MagneTOF detector are provided by high-voltage ...

Supervisory Control and Data Acquisition (SCADA) is a computer system that processes and gathers data that exercises high-level operational controls over significant distances. SCADA systems were designed to solve communication issues, particularly data integrity and delay issues stemming from the various communication forms.

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A data logger captures and logs data based on the scan interval, and the data logging period. A data acquisition system can perform data logging efficiently with multiple input channel switch multiplexers, built-in signal conditioners, and control systems to help automate the capture of signals from sensors.

Best selection of high performance data acquisition and control systems for machine control, test automation, closed-loop PID or positioning. ... Combined laser and magnet control for MOT"s; When designing a data acquisition and control system there are a ...

This system includes a number of laser energy monitoring units at various stages of the laser chain, a data-acquisition unit and a control program to control its operation. Each unit in this ...

Setup of a Beam Control System for High Power Laser Systems at DLR Ivo Buske, Andreas Walther Deutsches Zentrum für Luft- und Raumfahrt, Pfaffenwaldring 38-40, 70569 Stuttgart, Germany, ... Synchronized data acquisition using the IEEE 1588 standard is available between the transmitter and receiver station. A time jitter of 120 ns RMS was proved.

The system is made up of an optical spectrum analyzer (OSA), oscilloscope (OSC), polarimeter (PAX), and the data acquisition automation through transmission control protocol/internet protocol (TCP ...

We compare platforms and approaches to state-of-the-art control systems and data management at high-power laser facilities, and we illustrate these topics with case studies from our...

This paper discusses interfacing of acquisition and control system (ACS) to the liquid aprotic laser subsystems with proper safety interlocking and remote operation (35 m through five, one feet ...

Due to their many advantages, such as high efficiency, small size, light weight, high reliability and direct modulation capability, semiconductor lasers have been widely used in many fields, such as material detection, environmental monitoring, component analysis and optical storage. 1,2 In a high-precision detection system, there are strict requirements for the ...