

## Description

The Black Diamond (BD) data acquisition system and AlgoCentral provide a complete data monitoring solution. The solution saves time and money by automatically acquiring and analyzing big data from sensors.

The BD system collects data from sensors with high resolution and minimal noise. Leveraging Field Programmable Gate Array (FPGA) technology, the BD deterministically collects and processes data synchronously. The resulting data is archived and streamed over the network to the cloud.

AlgoCentral is a cloud service that executes algorithms to process data, graph results, automate tasks, and send notifications when critical events occur. Data is continuously processed to ensure reports are always up to date.



## Applications

- Real-time structural monitoring
- Risk monitoring and failure analysis
- Machine to machine communication
- Manufacturing process control
- Oil and gas exploration / mining research
- Continuous monitoring
- Sensing: pressure (fluid), temperature, strain, power (current and voltage)
- Inputs from other analog and digital sensors

## Key Benefits

### BD Device:

- Records data from up to 20 precisely synchronized channels
- Collects data from a wide range of sensors
- Operates without a fan in a sealed, ruggedized enclosure for use in cleanrooms and outdoors
- Runs from DC, AC, battery, or solar power
- FPGA hardware and software customizable to fit your specific needs
- GPS disciplined oscillator

### Online AlgoCentral:

- Provides real time access to data from your laptop, tablet, and smart phone
- Runs customized algorithms to automatically compute and chart results
- Notifies you about pre-defined events via SMS and email alerts
- Archives sensor data securely in the cloud
- Automates generation of reports
- Easy to use interfaces dramatically reduce time to set up and analyze key results

## Black Diamond Specifications

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Input range	Any analog device scaled within range of $\pm 5$ VDC
ADC resolution	24 bit
Analog input channels	8-20
Local storage	SD media with SDHC compatible 32 or 64GB cards
Data output	Streaming to browser, AlgoCentral, and AlgoLive
Data retrieval	Retrieval from browser and network API
Available sensors	Acceleration, tilt, mass flow, optical, piezo, temperature, torque, acoustic, chemical, electric current, electric potential, magnetic, radio, moisture, humidity, fluid velocity, position, angle, displacement, distance, speed, optical, pressure, force, density, fluid level, proximity
Additional I/O controls	GPIO, digital and analog outputs
Input impedance	1M $\Omega$
Power	12V DC, 120/240V AC, battery, POE, solar charging capable
Communication	Ethernet, compatible with standard router to support WiFi, 3G/4G
Connection interfaces	RJ-45
Time accuracy	GPS disciplined oscillator
Weatherization	Water resistant mobile option, Polypropylene copolymer
Heterogeneous computation	Field Programmable Gate Array (FPGA) + CPU
Local user interface	Client browsing on laptop, tablet, or smart phone

## Online AlgoCentral Features

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Cloud interface	Secure access worldwide
Project dashboard	Real-time live data views
Data intake API	AMQP, MQTT, RESTful API
Security	Secure client access
Data visualization	Advanced charting capabilities
Data processing	Preprocessing, post processing, and real-time processing
Data analytics	Data mining analyses, anomaly detection, predictive analytics
Storage	Archival storage and backup
Process alarms	User configurable upper and lower control limits
Customizable algorithms	Octave