CAMPBELL SCIENTIFIC UPDATE

Fourth Quarter 2009 Vol. 20, Issue 4

Introducing LoggerNet 4

A new major version of our datalogger support software

We're excited to announce the release of LoggerNet 4, a major upgrade to our main datalogger support software package. In addition to a redesigned user interface, we've added many functional changes to improve and expand the tools available for working with our dataloggers. Many of these improvements were recommended by you, our customers.

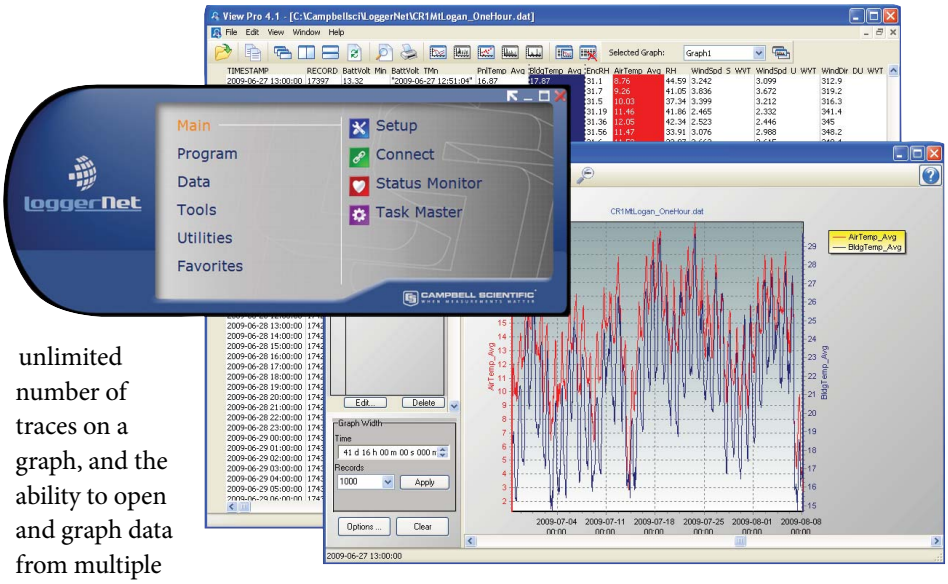
LoggerNet 4 retains the solid client/server architecture used by previous versions, with the server communicating with the datalogger network and simultaneously serving data to multiple client applications. These client applications provide a variety of useful tools, including:

- Network setup, configuration, monitoring, and backup
- Datalogger programming and data collection
- Real-time and historical data display

In addition to updating many of the existing LoggerNet clients, we've also added two new clients to the new version: Network Planner and View Pro.

The Network Planner is a tool that facilitates designing and configuring PakBus networks. The Network Planner allows you to add devices to a network, define communication links between devices, and set up activities such as scheduled data collection, callback, send/get variables, and one-way data transmissions. Once the network is designed, settings can be loaded directly into each PakBus device, or saved and loaded later using DevConfig.

View Pro is our new file viewer (replacing View) and features support for several new graph types (histogram, rainflow, and 2D/3D FFT), an unlimited number of traces on a graph, and the ability to open and graph data from multiple data files. A statistics feature on the graph displays the maximum, minimum, average, and standard deviation.



PC208W users, upgrade pricing ends December 31, 2009

Significant updates to existing LoggerNet clients include the following:

- The Toolbar has been redesigned to offer quick access to all LoggerNet clients, and now includes a Favorites view that allows easy access to those clients most important to you.
- With the Setup client, you can now schedule an automated datalogger network backup, schedule retrieval of images or other files from a datalogger, create custom notes for a station, and cut and paste single devices or a branch of the network to another location in the network map.
- The Task Master has a new After File Closed event trigger, which has built-in support for sending files via FTP and SFTP.
- A Table Monitor has been added within the Connect window so that a table can be easily selected, displaying all values from that table. The numerical and graphical displays are fully configurable and allow saving a configuration that can be reloaded for the original station or a different station.
- The Status Monitor now allows for the configuration of custom views (previously available only in LoggerNet Admin).
- The CRBasic Editor features new support for user-defined functions and the ability to encrypt files prior to sending them to the datalogger.
- DevConfig can be launched from within LoggerNet without conflicting with the LoggerNet server or other dataloggers in the network.

There are lots of other improvements, as well. Be sure to check the manual for the complete list.

LoggerNet 4 is the first LoggerNet version to include a 30-day trial, which is available for download from our

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Featured Application: Groundwater Monitoring

While groundwater makes up only around 30% of the Earth's fresh water, it is an important natural resource that affects the quality of streams and rivers and provides drinking water for much of the world's population. In a time when demand for water is growing in many areas, groundwater monitoring—of both quantity and quality—has become a necessity.

Typically, groundwater monitoring involves drilling a well to access the aquifer. Sensors are then lowered into the well to measure the level or quality of the water at that location. Short-term tests are used to characterize the effect of water pumping (removal) on surrounding wells (pump or aquifer test) or on the single well from which the water is removed (slug test). Long-term, continuous monitoring helps determine the effects of climate, development, and other factors on water quality and level.

Campbell Scientific dataloggers have often been used for pump and slug tests. Permanent monitoring installations for long-term well monitoring have also benefitted from our dataloggers' ability to operate on low power, communicate from remote locations, and provide reliable measurements in rugged environments.

In recent years, improvements in both hardware and software have made groundwater monitoring even easier. In the past, pump tests with multiple observation wells required hundreds of feet of cable, resulting in high material and labor costs. Today, wireless dataloggers eliminate cables, as well as provide synchronized measurements from all wells to a single base station. This improved networking between dataloggers also simplifies testing or monitoring projects that involve multiple sites over large areas. Additionally, real-time data retrieval and Internet technologies make it possible to post data directly to the Internet.

Our new CS450 Pressure Transducer represents another advancement that will benefit groundwater monitoring. By offering our own pressure transducer we are able to offer a high-quality instrument with shorter lead times for ordering and recalibration.

One example of how some of our newer products are benefitting groundwater applications involves the Sparta Aquifer in southern Arkansas and northern Louisiana. The Sparta Aquifer provides the majority of the water used for industrial and municipal purposes in Union County, Arkansas. Use of the aquifer began in the early 1920s and has increased over the years as development in the area increased. By the late 1990s, so much water had been removed from the aquifer that in some areas water level was down 360 ft. In addition, water quality in some areas had deteriorated.

To help water levels recover in the aquifer, an alternate water source was provided for some industrial needs, reducing water use from the aquifer. A monitoring program was also implemented by a group of stakeholder organizations to monitor the impact of this change on the aquifer. As part of this project, water level at 29 wells is being monitored continuously. At each observation well, a CR200 datalogger measures an SDI-12 pressure transducer and sends data to the base station via a cell modem. Data from all sites is accessible to the public on the Internet. Eight sites maintained by the USGS provide real-time data, and more real-time stations may be added in the future.

By the end of 2007, monitoring indicated that water levels in the aquifer are recovering, with one well reporting a 49-foot increase. More information about this project can be found at http://ar.water.usgs.gov/sparta_recovery/header.phtml. Real-time data for the project can be found here at http://waterdata.usgs.gov/ar/nwis/current/?type=gw.

We take pride in our products' ability to provide long-term, continuous monitoring year round, in any climate. Watch for more innovative products in the near future that will benefit groundwater monitoring and other applications. Please let us know if we can answer questions about your project.

Case Study: Fighting Fungus on Roses in Colombia

The cultivation and export of roses and other flowers is a huge business in Colombia. About 40 years ago, the American and Colombian governments began to encourage growing flowers as an agricultural export that could provide farmers a viable alternative to crops with greatly fluctuating prices, like bananas, coffee, and palm oil. Twenty years later, even more incentives were added to get farmers to move away from coca production.

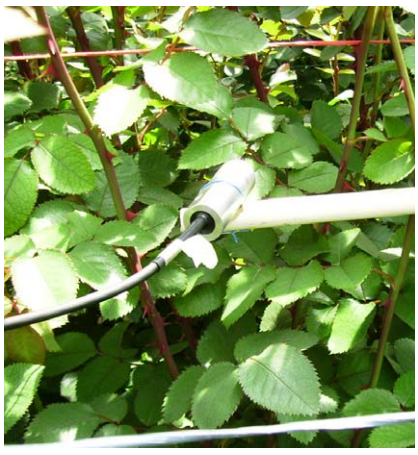
Now Colombia produces about 11 percent of the world's cut flowers, and holds over half of the American market. With industry growth has come scrutiny of the huge effect this industry has on Colombia's people and natural resources. Water consumption and pesticide use was hardly an issue in the early, unregulated stages of the industry. But with a modernized work force have come increased calls for safe working conditions and environmental stewardship.

As growers try to be more careful with the use of pesticides, they are putting a lot of effort into the study of diseases to learn ways to eradicate them with less danger to workers and watersheds. In one such effort, the Agro-Industrial Research Center at Jorge Tadeo Lozano University has begun a study of the variables in conditions that support *peronospora sparsa*, a fungus that causes downy mildew on roses.

To set up the study, researchers built two measurement stations to monitor the conditions in greenhouses where roses were growing. The stations, powered by solar panels, included several Decagon LWS Leaf Wetness Sensors and Apogee SI-111 Infrared Radiometers positioned at a variety of locations among the plants. These sensors were connected to Campbell CR1000 dataloggers via our AM16/32 multiplexers. The instruments, power supplies, and enclosures all came from Campbell Scientific and were configured by Durespo, Campbell's local sales representative in Colombia.

The focus of the study was on conditions that increase the fungus's growth. If those conditions can be better understood, growers can control them to curtail fungus growth. Then they can cut back their dependence on pesticides and reduce workers' exposure to dangerous chemicals.

As the measurement and analysis period continues, the university hopes to generate a model that will allow extrapolation of their findings to the extensive rose crops across Colombia's Bogota savannah.



Case Study: Bridge Disaster Recovery in Minnesota

On August 1, 2007, the I-35W St. Anthony Falls Bridge over the Mississippi River in Minneapolis, Minnesota, collapsed in the middle of rush hour. What followed was a tremendously cooperative effort to quickly and safely replace the bridge. The instruments and methods used show how instrumentation can be used to increase quality assurance, monitor construction loads, and show traffic and wind-load effects on long-term pier performance. Campbell Scientific's cutting-edge technology is at the core of this complex system.

This first part of a larger program involving the entire bridge pertained to only the Southbound Pier 2 columns and foundations. There, two types of strain gages and thermometers were installed to monitor three phases of the bridge and foundation system:

1. Internal concrete curing—measuring temperature of the foundation elements as it is poured and cures.

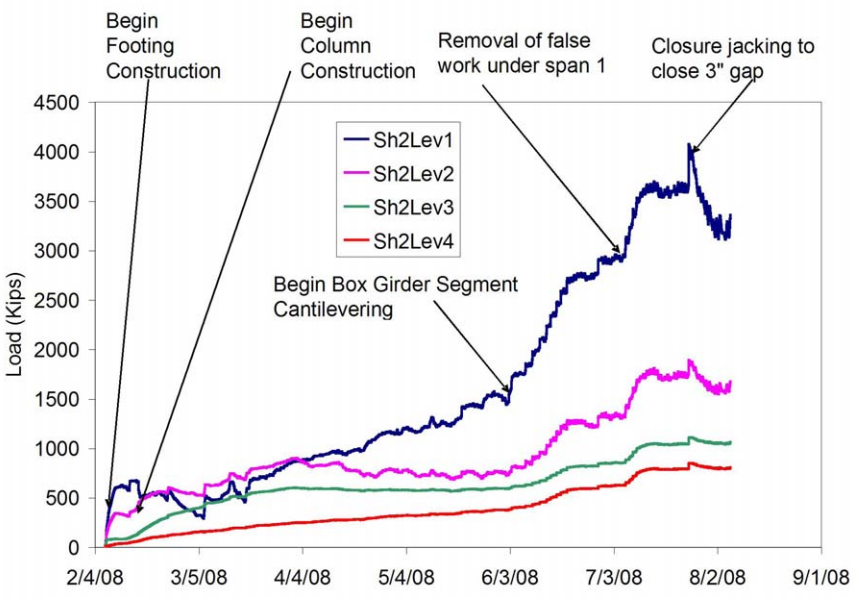
2. Construction loads—monitoring increasing stresses as bridge was built.

3. Long-term health—ongoing; comparing loads on bridge during use with baseline load tests. (See photo.)

Two separate data acquisition systems were used to measure the dozens of strain gages. The vibrating-wire gages were read with a Campbell Scientific AVW200 and recorded with a CR1000 datalogger. The resistive gages were measured with Campbell Scientific's CR9000X high-speed data acquisition system. Both systems were self-powered with solar panels and deep-cycle batteries, and each system uploaded data to a remote host server via cellular modem. This arrangement allowed the data acquisition systems to operate independently of on-site construction power and communications, and they did not interfere with day-to-day construction activities.

Key aspects to both data acquisition systems were remote data monitoring, program downloading, and reconfiguration as the data acquisition requirements increased and decreased.

This project well demonstrated the benefits of Campbell's AVW200 and the spectral-analysis method for reading vibrating-wire sensors. Not only did this project involve a large number of vibrating-wire sensors, but the setup was located 5 ft from a 1000-kW generator. Even with the large generator nearby, no data was lost due to noise, and no extra analysis was needed to determine if measurements had been compromised by noise. In fact, the raw data were posted automatically to a publicly available website every 15 minutes, without review or qualification.



This charts shows changes in the load on one of the shafts beneath the Pier 2 footing, along with major construction milestones.

Specialized Archer Field PCs

The Archer-PCON and Archer-OBS are two versions of Juniper Systems' Archer Field PC with specialized software. The Archer-PCON is for interfacing to general Campbell Scientific data acquisition systems, and the Archer-OBS is for interfacing to our OBS-3A Turbidity and Temperature Monitoring System.

The Archer Field PC is ultrarugged, meaning you can be sure your data is safe—even in extreme environments. With an IP67 rating, the Archer is completely sealed against dust and water. And it won't break down or fail in extreme temperatures—it is constructed to operate in temperatures as cold as -30°C or as hot as 50°C. The Archer has been designed to withstand multiple drops onto concrete from 5 ft. Couple these features with a battery life of up to 20 hours and a screen designed for readability in direct sunlight, and you've got a handheld data collection device that won't let you down.

Archer-PCON

The Archer-PCON includes Campbell Scientific's PConnectCE Datalogger Support Software and the hardware required to connect the Archer to a Campbell Scientific datalogger. It is compatible with most Campbell dataloggers. PConnectCE software supports simple on-site functions, such as:

- Collecting data
- Monitoring real-time data
- Graphing historical data
- Controlling datalogger ports and flags
- Transferring datalogger programs

Archer-OBS

The Archer-OBS comes with Campbell's new OBS-Mobile software—versatile, easy-to-use software that allows the OBS-3A to communicate with the Archer. OBS-Mobile supports most functions of the standard OBS software, such as:

- Running a manual survey or profile
- Setting up the OBS-3A for extended deployment
- Collecting data
- Displaying real-time measurements
- Graphing data
- Transferring data to an office PC

Tips and Tricks: Wonky CRBasic Alignment

wonky *adjective* **1:** turned or twisted toward one side **2:** lopsided or misaligned

Did you know that the margins in your CRBasic program are supposed to look nice and neat? You should be able to see groupings of output statements in DataTables, If/Then/Else statements, and other logic.

Copying and pasting in CRBasic can cause the margins to go wonky, making it harder to read the program's logic. Selecting Rebuild Indentation *(Ctrl+I)* on the Edit menu reworks those margins.

Before using Rebuild Indentation:

```
DataTable (Test2,1,-1)
  DataInterval (0,15,Sec,10)
  Minimum (1,batt_volt,FP2,0,False)
     Sample (1,PTemp,FP2)
     Average (1,PTemp,FP2,False)
DataTable (1,PTemp,FP2,False,False)
        Minimum  (1,PTemp,FP2,False,False)
EndTable
```

After:

```
DataTable (Test2,1,-1)
   DataInterval (0,15,Sec,10)
   Minimum (1,batt_volt,FP2,0,False)
   Sample (1,PTemp,FP2)
   Average (1,PTemp,FP2,False)
   Maximum (1,PTemp,FP2,False,False)
   Minimum  (1,PTemp,FP2,False,False)
EndTable
```

So, the next time your program looks discombobulated, use Ctrl+I before throwing in the towel. See this tip in action in the *CRBasic Features* tutorial from campbellsci.com/19_1_773.

Wonkily,

Tip

From the Perspective of the Customer: The Value of Feedback

One day my young son came home from his third grade class and sat down to work on his homework. "Math—yuck," he said. "It's too hard. I can't do it right and I don't want to know this stuff."

Two things immediately crossed my mind. First, where did his parents go wrong (that's an article for a different industry), and second, he obviously did not see the value in what he was doing, nor was he receiving the appropriate feedback to motivate the desire to improve.

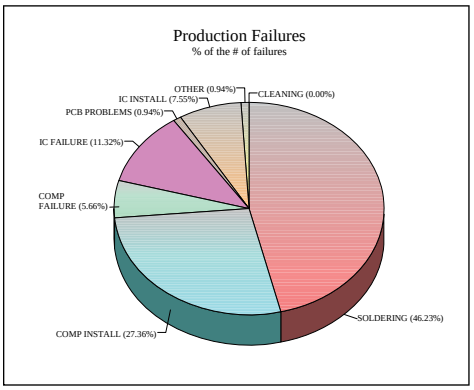
I quickly responded and asked him to get me three apples from the fruit basket. After holding them up, I asked him to put one back. "How many apples do I have now?" I asked. "Two," he said. "See you can do math," I replied. His perspective changed and so did his attitude as he began to recognize all the math around him.

For the next few years we focused on how simple math is used everywhere. I'll never forget the pride he showed when he calculated the amount of concrete we would need in order to pour a new driveway. Over time, meaningful feedback was given and its value perceived, while his desire and motivation to improve increased.

Where is this going? Simple feedback creates focused perspective and value for the recipient.

In manufacturing, we look at all kinds of data, such as solder defects, process control limits, failure rates, and product performance over temperature. This information provides feedback on the performance of specific processes. Depending on the trend of the data over time, we generate a perceived value for a process. According to the data, we may leave well enough alone, or we may allocate resources to improve its outcome.

In every process where performance is measured and properly reported, performance will improve and the perceived value of that feedback accelerates the improvement.



A variety of manufacturing data is used as feedback for improving production processes.

In Campbell Scientific's Manufacturing department there are well-trained and seasoned employees who take an incredible amount of pride in their work. In addition, with good feedback they can perform with increased perspective and value.

A few months ago, during one of our random out-of-box quality audits, one of our application engineers discovered a mechanical interference on the battery base of a datalogger. Though the error was not functionally debilitating, the feedback was taken and an analysis made. Inventory was inspected, uncovering more of the same issue. Root-cause analysis took the investigation

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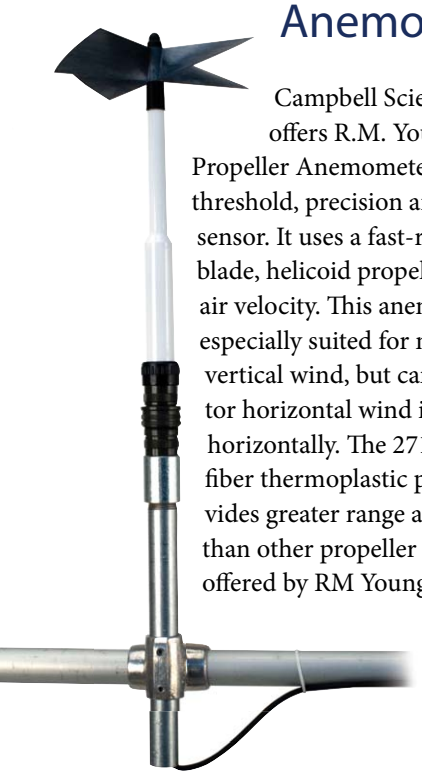
RM Young Propeller Anemometer



Campbell Scientific now offers R.M. Young's 27106T Propeller Anemometer—a low-threshold, precision air-velocity sensor. It uses a fast-response, four-blade, helicoid propeller to measure air velocity. This anemometer is especially suited for monitoring vertical wind, but can also monitor horizontal wind if mounted horizontally. The 27106T's carbon-fiber thermoplastic propeller provides greater range and durability than other propeller anemometers offered by RM Young.

Alpine Wind Monitor—Ice Resistant

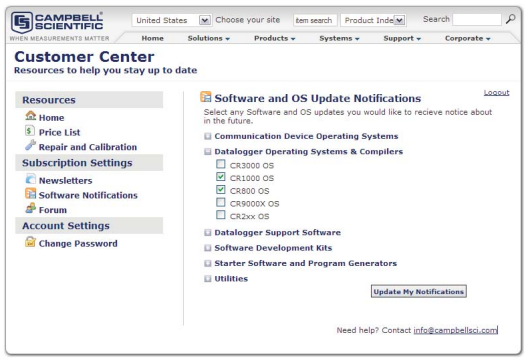
R.M. Young's 05103-45 Alpine Wind Monitor is for customers who need an ice-resistant wind speed and direction sensor. This rugged instrument, available now from Campbell Scientific, is designed to make accurate measurements in harsh, alpine conditions. Design features include a black exterior—for better melt off—covered with an ice-resistant coating. The 05103-45 also has a smaller propeller diameter than the other wind monitor models, which minimizes vibration at high wind speeds.

Not Registered for the Customer Center?

If you haven't taken the opportunity to register for our online Customer Center, we encourage you to do so. New this year, the Customer Center provides services that you may find useful, including:

- Access to our U.S. price list
- Notifications of datalogger OS and software updates
- Newsletter subscriptions
- Address-change forms
- Access to our user forum
- … and more

Other resources will be added in the future. Customer Center accounts are available to current customers. If you would like to register for an account, please visit our registration page at www.campbellsci.com/register.



The Value of Feedback continued from page 7

through the assembly process to a welding fixture that needed some small adjustments and some go/no-go gauges that were slightly out of tolerance. The feedback was delivered and the fixtures and gauges were modified. Everyone involved in this event improved in their roles. Perspective and value were increased and product quality was restored. Without feedback, the situation would have remained the same or continued to deteriorate.

A great source of feedback for Campbell Scientific is our customers. As a customer, you have the ear of your application engineer. Your perspective is important to our direction. Is it a new product you are looking for? Maybe your expectations were not achieved after you received your purchase. You might have an idea on how to improve your experience. Your application engineer is your advocate, and will send your feedback where it will do the most good. Customer feedback is reported and reviewed in regular quality meetings where action is taken to address concerns.

Campbell Scientific has been successfully making measurement instruments for many years. As technologies evolve and the need to make new and unique measurements continues, your feedback to us will help assure that our products will continue to meet your measurement needs.

Loggernet 4 continued from page 2

website free of charge. This is a fully functional version of the software that runs for 30 days. We invite you to download the trial and explore the new features.*

Upgrade pricing for LoggerNet 4 is available to anyone who owns PC400 or a prior version of LoggerNet. We will also honor upgrade pricing for PC208W until December 31, 2009.

We hope that this new version of LoggerNet improves your datalogging experience. Please drop us a line if you have feedback for us. You can find our feedback form on our website at www.campbellsci.com/feedback.

* If you are already running an earlier copy of LoggerNet, we suggest you install the trial on a different computer so you don't interfere with your operational system. Files used in LoggerNet 4 may be not fully backward compatible with previous versions.

Calendar

October

04-07	Geothermal Energy Expo	Reno, NV
18-21	GSA 2009	Portland, OR
26-29	Oceans 2009 MTS/IEEE	Biloxi, MS
27-29	Automotive Testing	Novi, MI
27-29	Solar Power International	Anaheim, CA
28-30	NALMS	Hartford, CT

November

1-5	ASA 2009 Annual Meeting	Pittsburgh, PA
1-5	CERF 2009	Portland, OR
9-12	45th AWRA Conference	Seattle, WA

December

2-4	Irrigation Show 2009	San Antonio, TX
9-11	Colorado River Water Users	Las Vegas, NV
10-13	Ground Water Expo	New Orleans, LA
14-18	AGU	San Francisco, CA

Visit our web site for training class schedules and additional listings.

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