



کمیته ملی سد های بزرگ ایران

(کمیته تخصصی بازرسی فنی سد ها)

IRANIAN NATIONAL COMMITTEE ON LARGE DAMS (IRCOLD)
Committee on Dam Surveillance

Strong Motion Instrumentation of Dams

SEMEX | ENGCON

میکرون سنجش
micron sanjesh

کارگاه تخصصی - تکنولوژی-های نوین در ابزارگذاری و رفتارنگاری سد ها (۲۳- مهر)

WORKSHOP- Modern Technologies in Instrumentation & Monitoring of Dams (15-Oct)

SEMEX **ENGCON**


menHIR

Vibration and Strong Motion Instrumentation

www.semex-engcon.com



WORKSHOP- Modern Technologies in Instrumentation & Monitoring of Dams

About Us

SEMEX  ENGCON

- SEMEX-EngCon founded by two Ex-Syscom Managers
- Development of the versatile MENHIR platform.
- Strong background in vibration monitoring for civil engineering and seismic monitoring applications in safety critical environments.
- Provides instrumentations solutions, project management and installation services and support.
- Close cooperation with major companies to complement vibration and geotechnical instrumentation.

Instrumentation Solution

SEMEX **ENGCON**



- SEMEX-EngCon has developed MENHIR, the all-in-one solution platform for various vibration monitoring applications
- MENHIR provides a very intuitive means to analyze measurement data and generates tailored expert reports.
- MENHIR comes in a compact but robust form factor and can be configured for wired and wireless communication.

menhir Features

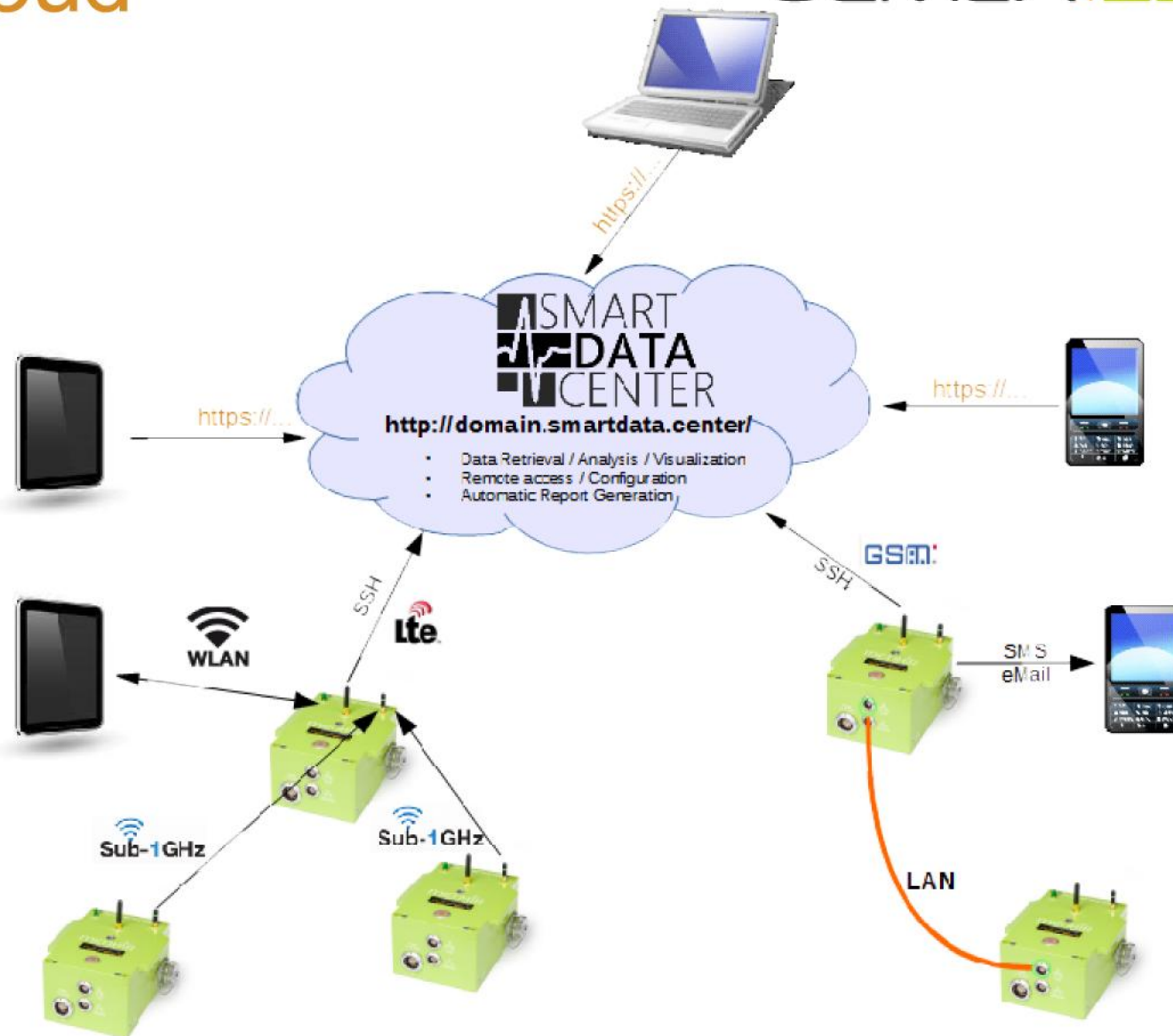
SEMEX ENGCON



- Embedded 3-channel velocity or acceleration sensor
- Sensor Bus (RS-485) for additional external sensors
- 24-bit Delta Sigma Converters, multiple sample rates
- Versatile Connectivity (Ethernet and Wireless) for Data communication and alarm notification
- Dual-SIM-Card option
- Power Output Relay
- Highly Secure SSH and SSL Internet Protocol
- Lossless Data Compression
- Built-in GPS, NTP and IEEE-1588 PTP
- Embedded Battery and Charger for autonomous operation
- Transient and EMI/RFI protection
- IP-67 rugged enclosure
- System Status LED and Display

Cloud

SEMEX ENGCON



SmartDataCenter



Smart Data Center Language ▾ Contact

Welcome markus! ▾



DEMO / Demo Quarry

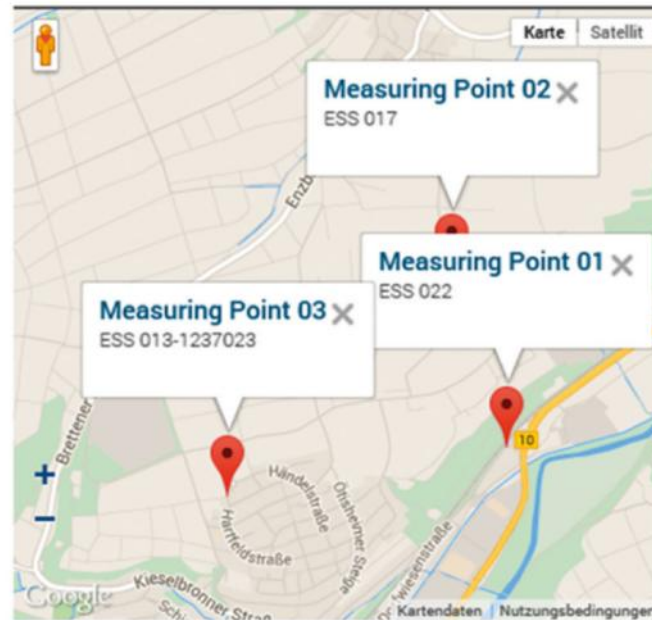
DEMO

Demo Quarry



- DASHBOARD
- DEVICES
- MEASURING POINTS
 - DEMO
 - Demo Quarry**
 - Measuring Point 01
 - Measuring Point 02
 - Measuring Point 03
- PROJECTS
- USER MANAGEMENT
- USER GROUPS
- FEEDBACK
- CHANGE LOG

GEO INFORMATION



MEASURING POINTS

		+
📍	Measuring Point 01	🗑️ ✎
Device	Device 022	
Last event	25/09/2014 07:06:31	
📍	Measuring Point 02	🗑️ ✎
Device	Device 017	
Last event	04/08/2014 14:58:26	
📍	Measuring Point 03	🗑️ ✎
Device	Device 013	
Last event	23/09/2014 10:24:33	

REPORT TEMPLATES

		+
📄	Report 09/14	🗑️ 📄 ✎

Connectivity



- MENHIR allows for flexible device/network connections:

Connectivity

LAN 10/100Base-TX (Copper), optionally 100Base-FX (Fiber). IEEE-1588 support

Sensor Bus Isolated RS-485 based External Bus for universal sensor connectivity

Power Relay Output Configurable Isolated Single-Pole Normally Open

Cellular GSM/GPRS/EDGE/UMTS/HSPA/HSPA+/CDMA/LTE with embedded and additional external SIM-Card slot

Wi-Fi/BT 2.4 GHz ISM band supports 802.11 b/g/n, Station, Access Point

Sub-1GHz Long range wireless communication up to 4 km (optionally 20 km) line of sight (LoS)

863-870 MHz: SRD band (Europe),

902-928 MHz: ISM band (North America),

779-787 MHz: WPN band (China),

915-930 MHz: (Japan)

GNSS GPS/GLONASS

Remote Access



Remote Access

- Interface** Onboard HTTP-Server with TLS/SSL internet security and WPA2 Wi-Fi security
Firewall friendly, highly secure SSH (HTTPS Reverse Tunnel), no need for VPN
- Command and Control** Password secured Web-UI for configuration and parameter settings access
- Data Retrieval** Fully supported by SmartDataCenter™ Cloud application for intuitive data management, analysis, visualization and automatic report generation
State-of-Health Information
- Data Format** ASCII, FLAC/Matroska, MiniSEED

SDC Event Table

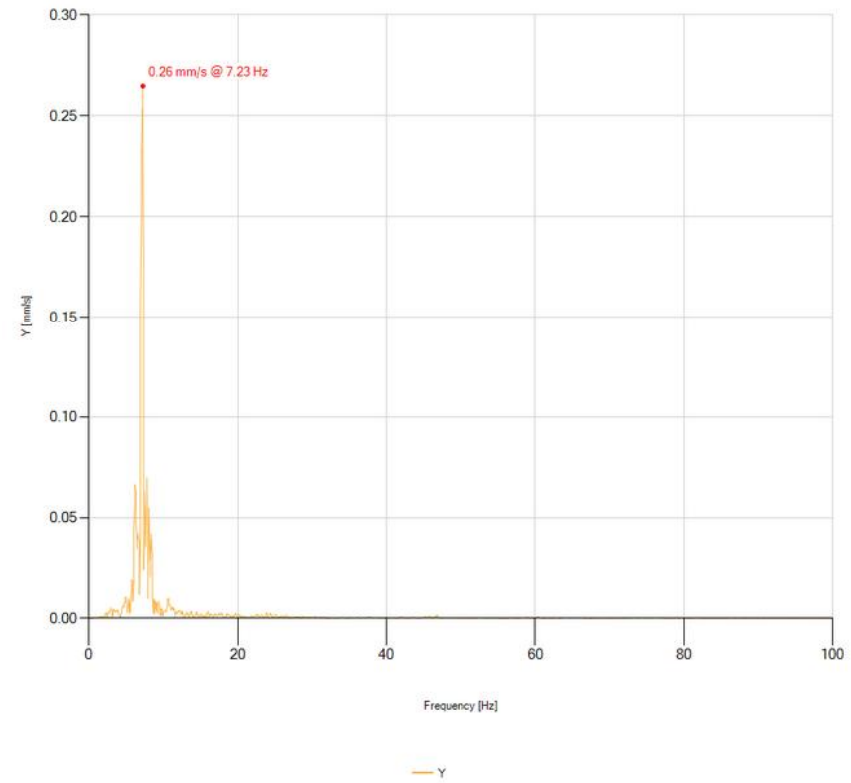
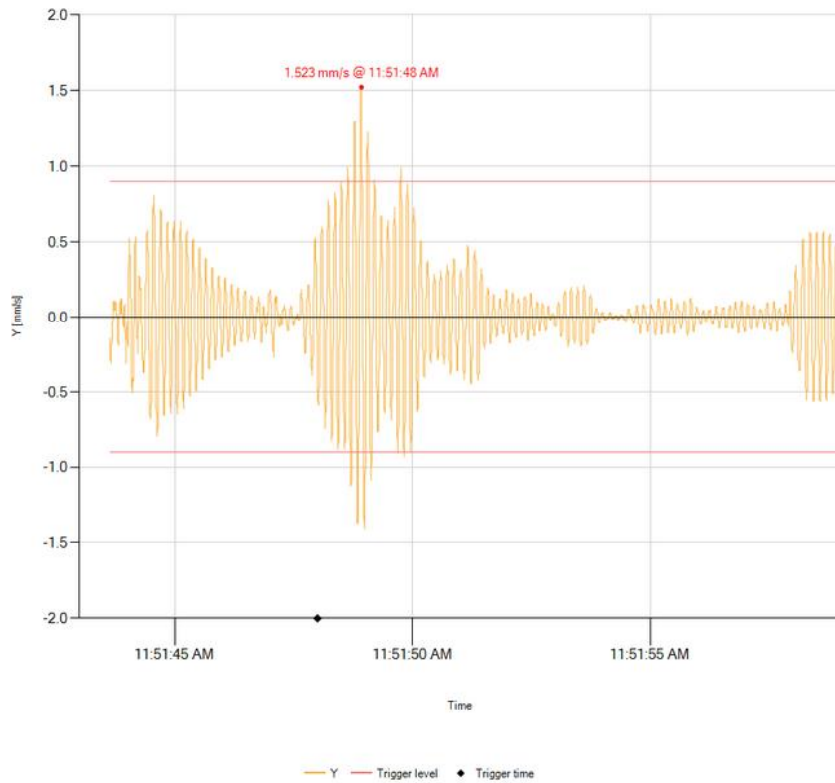


EVENT TABLE

Trigger time	Duration s	Vector ...	Measured values v(t)			KBf			Amplitude Spectrum						Comment
		Peak	Peak			Peak			Peak						
		mm/s	X mm/s	Y mm/s	Z mm/s	X	Y	Z	X Hz	Y Hz	Z Hz	X mm/s	Y mm/s	Z mm/s	
10/7/2015, 1:19:04 PM	15.0	3.026	1.647	-3.003	0.245	0.718	1.119	0.096	2.1	5.3	2.1	0.115	0.181	0.019	
10/7/2015, 1:10:39 PM	15.0	3.708	-0.781	3.673	0.506	0.336	1.031	0.218	1.6	1.7	1.6	0.132	0.692	0.022	
10/7/2015, 12:13:05 PM	16.4	32.209	-19.505	-25.614	-4.522	6.281	8.304	1.457	5.4	6.3	6.3	0.314	0.953	0.047	
10/7/2015, 11:59:24 AM	24.3	29.753	-19.298	29.478	29.527	5.791	11.453	7.004	4.6	6.6	14.2	0.531	0.714	0.163	
10/7/2015, 11:29:20 AM	17.3	15.869	-8.898	-12.796	4.962	3.584	5.211	1.886	1.7	6.3	16.4	0.822	0.763	0.126	
10/7/2015, 11:05:26 AM	16.4	13.493	-11.596	-8.654	1.422	3.668	3.616	0.527	1.7	6.3	1.7	0.853	0.736	0.133	
10/7/2015, 10:57:57 AM	15.8	10.009	7.892	6.841	-1.502	3.063	2.429	0.562	1.8	6.3	1.8	0.549	0.402	0.086	
10/7/2015, 10:57:44 AM	15.1	2.672	-2.548	1.992	0.385	1.150	0.780	0.169	1.8	2.0	1.8	0.234	0.217	0.031	
10/7/2015, 10:50:01 AM	15.4	6.773	-6.689	-2.289	0.601	2.296	0.960	0.219	1.8	6.3	1.8	0.286	0.252	0.045	
10/7/2015, 10:49:08 AM	39.4	19.635	12.127	-13.619	-18.586	4.201	5.080	6.753	4.3	4.9	5.1	0.688	0.605	0.292	

1 - 10 of 98 records

SDC Data Visualization



Data Processing



Data Processing

- Conditioning** FIR, IIR filter pool, Time- and Frequency Analysis
- Precision Timing** GPS/NTP/IEEE-1588 disciplined VCXO master clock (< 0.1 ppm)
- Dynamic Range** > 130 dB @ 400 sps
- Trigger** Selectable Band passed Threshold, STA/LTA, with Dynamic Adjustment Option
Independently selected for each channel from 0.01% to 100% of full scale
- Trigger Voting Logic** Selectable AND/OR combinations among channels, Common Trigger in Master/Slave Network Topologies
- Alarm** User configurable multiple Alarm options (SMS/email notification)
- Pre-event Recording** 1 – 100 s in 1 s steps
- Post-Event Recording** 1 – 1000 s in 1 s steps
- Non-Volatile Memory** Dual internal SDHC slots:
Data: Industrial grade SD-Card (standard 4 GByte), other capacities upon request
System: Industrial grade SD-Card (standard 4 GByte)
- File-System** LINUX EXT4, Highly Efficient Lossless Data Compression

Sensor Options

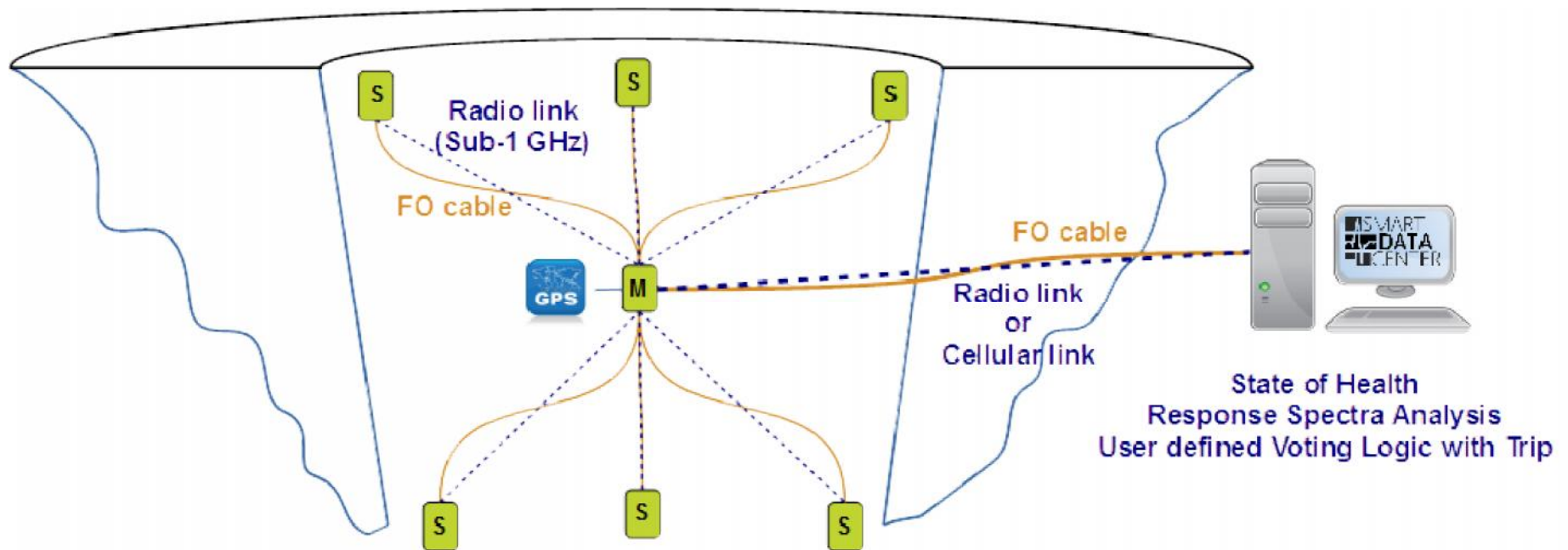


	Geophone	Seismometer	MEMS	FBA
Application	Civil Engineering	Seismology	Strong Motion	Free Field
Frequency range	1 – 400 Hz	0.1 – 50 Hz	0 – 80 Hz	0 – 80 Hz
Dynamic Range	140 dB	140 dB	100-110 dB	> 120 dB
Maintenance	Regular Re-calibration	Regular Re-calibration	Life time factory calibration!	Regular Re-calibration
Attachment	Embedded/ External	Embedded/ External	Embedded/ External	External

All Sensors are automatically checked by an embedded state of health analysis (impulse response, calibration compliance, ...).

Other ranges available on request

Dam Setup



Power Source:
AC (110/230V)
DC (9..36V)
Solar Panel

Flexible Connectivity:
Ethernet: Copper or Fiber
Sub-1 GHz: 2km or 20km LoS
Cellular
GPS/IEEE1588/NTP Time Sync

Conclusion



- MENHIR is a modern, state-of-the-art solution for flexible dam instrumentation.
- Remote instrument and data access with full state-of-health information from any place.
- Versatile notification options keep you informed any time at any place.
- Reduces maintenance to a minimum.
- All kind of velocity/acceleration sensors may be used to tailor to your specific requirements.
- With the flexible interfaces, additional geotechnical sensors may be easily added.



SEMEX-EngCon

Your reliable Partner for
seismic and vibration monitoring

با تشکر از توجه شما



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