

Introduction of Web monitoring program (ACE-WMP)

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The first value in the Geotechnical
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1. Purpose of build up web monitoring system

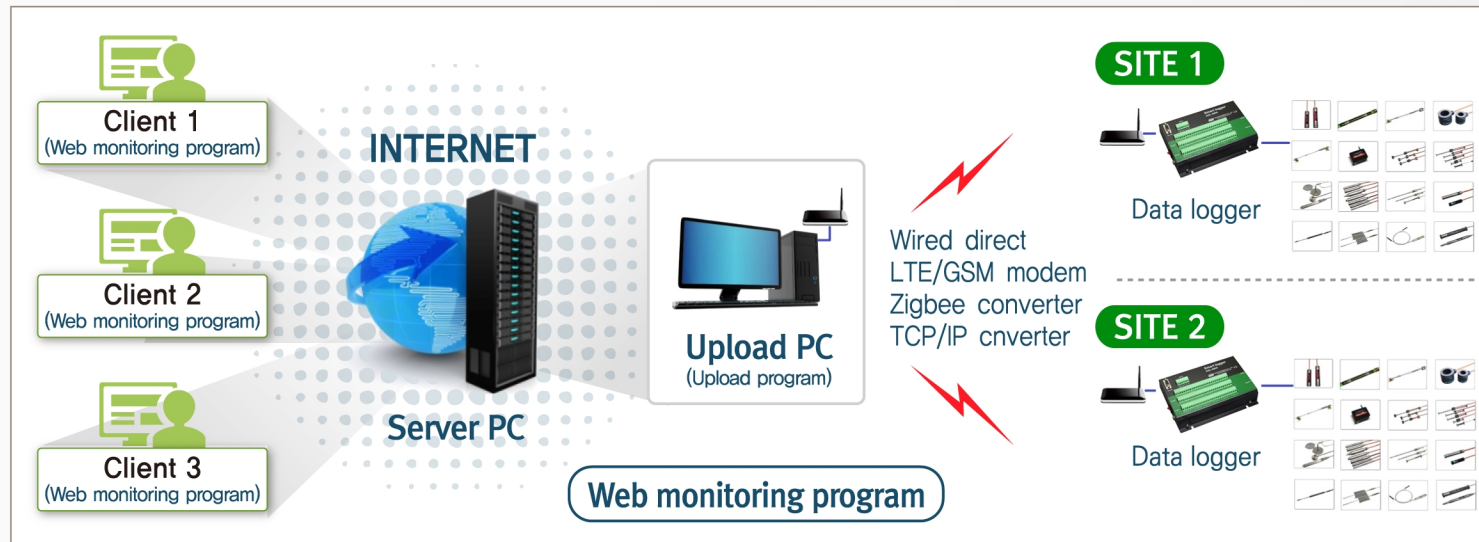
After installing various kinds of sensors (load, stress, strain, pressure, temperature, displacement, angle, etc.) installed in the field, automatic data acquisition system is built up and data is automatically measured and stored at fixed time intervals.

The data stored in the data logger is uploaded to the server PC through the upload program, and the web monitoring program based on the uploaded data can generate the graph displayed in engineering units, write and modify the report, and generate alarm and search real time measurement data.

It is aimed to monitor the construction progress, leaps of time, speed of process over time, and changes in real time to secure stability accordingly.

In addition, it is possible to monitor the collected data by connecting to the server PC anytime, anywhere using the web monitoring program.

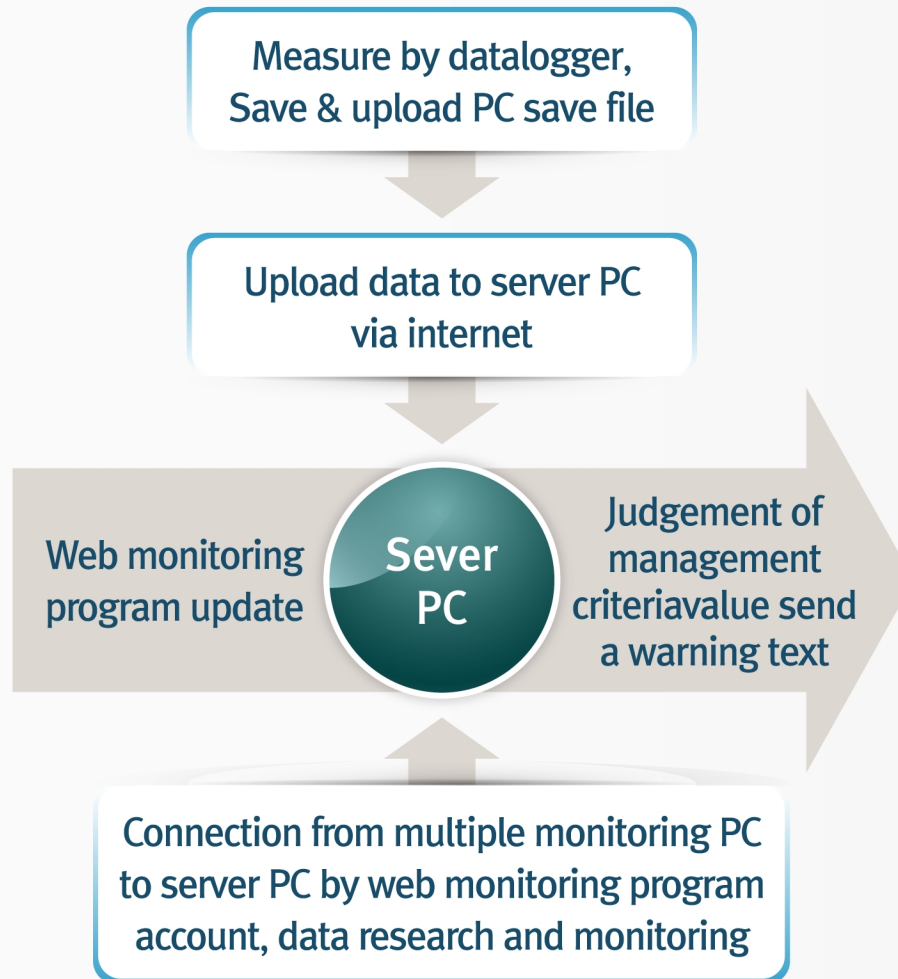
2. Proposal of construction measurement system



The data measured and stored by the data logger is transferred to the upload PC and the data is uploaded to the server PC by the upload program.

Transactions between Upload PC and Data logger are RS-232, RS-485 wired, wireless using LTE / GSM external module, short-distance wireless using Zigbee module and TCP / IP module using internet.

3. Web monitoring program flow chart



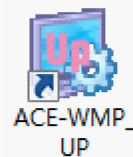
The data transferred to the upload PC is uploaded to the server PC through the native upload program and automatically processed and stored.

Data can be monitored at anytime and anywhere by connecting to the server computer through the Internet network and monitoring the change of the instrument.

Automatically sends SMS text messages to the administrator, so users can prevent the risks.

4. ACE-WMP_UP _ Server Upload Program

ACE-WMP_UP Server upload program is a program that uploads the data files collected in the data logger to the server PC via the Internet. ACE-WMP_UP continuously uploads data according to the setting schedule.



It is connected and uploaded with the fixed IP of the setting server PC.

The upload program can set the upload time differently according to the construction site and searches the linked data file according to the set schedule and uploads the newly added data to the server PC in real time.

The screenshot displays the ACE-WMP software interface. The title bar indicates the user is 'acedmin' and the time is '2017-07-22 09:30:57'. The main window is divided into two sections: 'Upload Loggers' and 'Upload Status Info.'.

Upload Loggers

No.	St...	Logger	On Status	Start Time	Next Time	Time Count	Upload Interval	Upload Start Time
01	<input checked="" type="checkbox"/>	sanchuck	▲ On Schedule		17/07/22 10:28:15	0Day 00:59:10	0Day 01:00:00	0Day 01:00:00
02	<input checked="" type="checkbox"/>	logger1	▲ On Schedule		17/07/22 10:28:15	0Day 00:59:10	0Day 01:00:00	0Day 01:00:00
03	<input checked="" type="checkbox"/>	logger2	▲ On Schedule		17/07/22 10:28:15	0Day 00:59:10	0Day 01:00:00	0Day 01:00:00

Buttons: Add, Modify, Delete, Stop Schedule

Upload Status Info.

No.	Time	Contents	Remarks
1025	2017-07-22 05:28:16	Sanchuck : Upload completed but have not newly datas.	
1026	2017-07-22 05:28:16	Logger1 : Upload completed but have not newly datas.	
1027	2017-07-22 06:28:15	Logger2 : ▲ Data uploading ...	
1028	2017-07-22 06:28:15	Sanchuck : ◆ Upload completed	

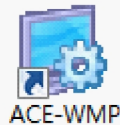
Buttons: SMS Set., Clear

5. ACE-WMP _ Web Monitoring Program

Users can access the data uploaded on the server PC by using the ACE-WMP web monitoring program, connect the monitoring data from the monitoring PC via the network, check the measured data, check the graph and print. The user's connection is connected to the server PC through the setting account (ID, Password).



1 Run a web monitoring program



3 Viewing the data

In the left sensor list, the position is displayed in the order of [Field / Section / Sensor Name]. Double-click the sensor that you want to check in the list to check the data and graph.

The screenshot displays the ACE-WMP software interface. On the left, a tree view shows the sensor list for 'KANGNAM4 [F-2]'. The list is organized by field and section. A red dashed circle highlights the sensor 'Water Level [ST-07]' under the 'Ok+627 [G-6]' field. A red arrow points from this sensor to a magnified view on the right, which shows the full sensor details for 'Water Level [ST-07]'. The magnified view includes the sensor name, field, section, and a list of related sensors.

The central camera view shows a construction site with an excavator and various sensors. A red dashed circle highlights the 'Water Level [ST-07]' sensor in the field.

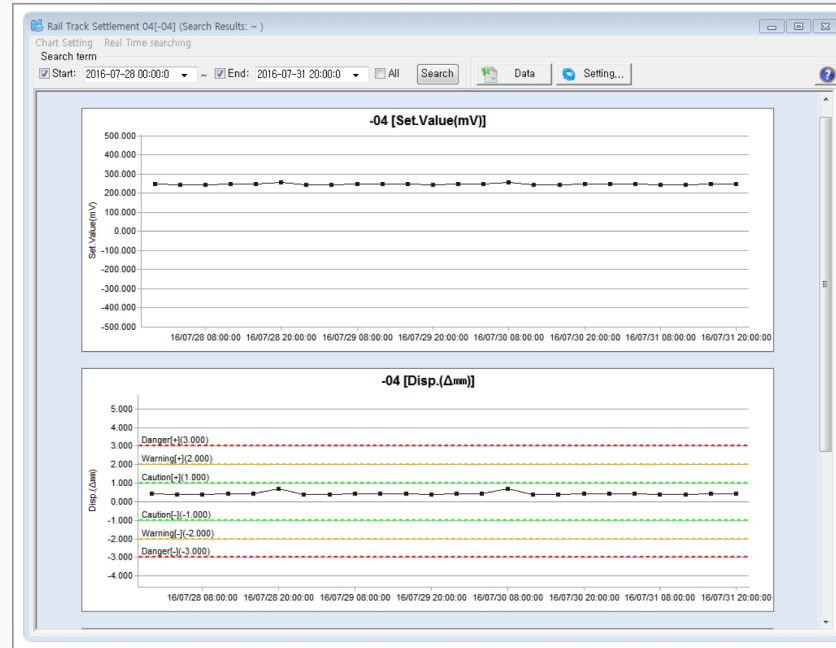
The data table on the right shows the following columns: [LEGEND]Man..., [STATE]Item, and Current. The table is currently empty.

The magnified view of the sensor details includes the following information:

- Water Level [ST-07]
- Ok+627 [G-6]
- LEFT [S-8]
- Vertical Inclinator [G-7]
- VW Load Cell [2]
- VW Load Cell [4]
- Water Level [ST-07]
- RIGHT [S-7]
- Vertical Inclinator [G-6]
- VW Load Cell [2]
- VW Load Cell [4]
- Water Level [ST-07]



Viewing the graph



Viewing the data

The figure shows a data table from the monitoring software interface. The table has five columns: Date, Temp.(°C), Set.Value(mV), Disp.(Δmm), and Remarks. The data is recorded every 4 hours from July 28, 2016, to July 31, 2016. The temperature is consistently 0°C. The Set Value (mV) fluctuates slightly around 248-258 mV. The Displacement (Δmm) fluctuates around 0.45 mm, with a notable spike to 0.686 mm on July 28, 20:00:00 and July 29, 00:00:00.

Date	Temp.(°C)	Set.Value(mV)	Disp.(Δmm)	Remarks
2016-07-28 00:00:00	0	248	0.45	
2016-07-28 04:00:00	0	246	0.402	
2016-07-28 08:00:00	0	246	0.402	
2016-07-28 12:00:00	0	248	0.45	
2016-07-28 16:00:00	0	248	0.45	
2016-07-28 20:00:00	0	258	0.686	
2016-07-29 00:00:00	0	246	0.402	
2016-07-29 04:00:00	0	246	0.402	
2016-07-29 08:00:00	0	248	0.45	
2016-07-29 12:00:00	0	248	0.45	
2016-07-29 16:00:00	0	248	0.45	
2016-07-29 20:00:00	0	246	0.402	
2016-07-30 00:00:00	0	248	0.45	
2016-07-30 04:00:00	0	248	0.45	
2016-07-30 08:00:00	0	258	0.686	
2016-07-30 12:00:00	0	246	0.402	
2016-07-30 16:00:00	0	246	0.402	
2016-07-30 20:00:00	0	248	0.45	
2016-07-31 00:00:00	0	248	0.45	
2016-07-31 04:00:00	0	248	0.45	
2016-07-31 08:00:00	0	246	0.402	
2016-07-31 12:00:00	0	246	0.402	
2016-07-31 16:00:00	0	248	0.45	
2016-07-31 20:00:00	0	248	0.45	

4 Data print

After selecting the sensor from the list, click the right mouse button and a popup will be created and the data and graph will be printed by selecting the "Print Detailed Measurement Reports" option.

Rail Track Settlement Data Sheet

Site : Site

General Information Date : 2016/7/28~2016/7/31

Sensor	Rail Track Settlement	Term	All Pt.
Manase No.		C.T [CAUTION]	No Criteria
Station	Station 1	[WARNING]	No Criteria
Section	Section 1	[DANGER]	No Criteria
Install Date	2016/08/26		
Sensor Type	Rail Track/Settlement	Max.	0.5429(mm) [16/07/30 08:00:00]
Logger Name	CR1000_mjs3	& Min.	-0.4984(mm) [16/07/28 20:00:00]
Channel	m] 1	Min.	

Chart

Rail Track Accum. Disp. []

DATA Date : 2016/7/28~2016/7/31

Date	16/07/28 20:00:00	16/07/29 00:00:00	16/07/29 04:00:00	16/07/29 08:00:00	16/07/29 12:00:00	16/07/29 16:00:00	16/07/29 20:00:00
[P01]-1.20	0	0.1184	0.0711	-0.0474	0.1184	0.1184	0.1184
[P02]-2.40	-0.4984	-0.38	-0.3799	-0.4983	-0.38	-0.38	-0.38
[P03]-3.60	-0.3322	-0.2138	-0.2137	-0.3796	-0.2618	-0.2138	-0.2613
[P04]-4.80	0.3541	0.1885	0.1886	0.0701	0.1884	0.2369	0.141
[P06]-6.00	0.4721	0.2694	0.2695	0.1881	0.2692	0.3067	0.2691

5 Setting the management criteria

Select a sensor from the list, right-click and select "Modify Info" from the pop-up that is created, and set the management criteria from the [Chart] option on the top tab.

It is possible to set the management criteria value in three steps of [Caution], [Warning], and [Danger], so that alarms and texts can be sent when uploading.

The screenshot displays the 'Modify Info' dialog for 'Rail Track Settlement 04' in the ACE-WMP software. The dialog is divided into several sections:

- Sensor List:** A tree view on the left shows the hierarchy: Station 1 [S1] > Section 1 [SC-1] > Rail Track Settlement [G-1] > Rail Track Settlement 01 [01-1] (selected).
- Context Menu:** A right-click menu is open over the selected sensor, with 'Modify Info.' highlighted.
- Chart Settings:** The 'Chart' tab is active. It shows a table for 'View Data Criteria Value' with columns for sensor type, chart type, and various criteria values. The 'Disp. (Δmm)' sensor is selected, and its chart type is set to 'Auto'. The table shows the following values:

OPT	Chart	Auto	Min	Max	Sp...	[Cauti...]	[Cauti...]	[warni...]	[warni...]	[dang...]	[dang...]	SMS
<input checked="" type="checkbox"/>	Temp.(°C)	<input type="radio"/>	-1000.00	1000.00	0	-	-	-	-	-	-	<input type="radio"/>
<input checked="" type="checkbox"/>	Set.Value(mV)	<input checked="" type="radio"/>	-500.00	500.00	0	-	-	-	-	-	-	<input type="radio"/>
<input checked="" type="checkbox"/>	Disp. (Δmm)	<input type="radio"/>	-1000.00	1000.00	0	-1.00	1.00	-2.00	2.00	-3.00	3.00	<input type="radio"/>
- Chart name/range Setting:** The chart name is 'Disp. (Δmm)'. The 'Auto Range Min.' is set to -1000 and 'Max.' to 1000. The 'Auto grid' is set to 0.
- Criteria Value Setting:** This section allows setting three levels of criteria values with corresponding colors:
 - [Caution] Criteria Value: Lower 1 (-1, green), Upper 1 (1, green)
 - [Warning] Criteria Value: Lower 2 (-2, orange), Upper 2 (2, orange)
 - [Danger] Criteria Value: Lower 3 (-3, red), Upper 3 (3, red)
- SMS send alarm:** The 'SMS send alarm' checkbox is checked, and the 'alarm' type is set to 'X'. The 'Criteria Value' is set to blue.

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