

## New Energy and Renewable Energy Integrated Test Platform

### HBE-Green-Energy



- Test of New Energy(Fuel Cell) and Renewable Energy(photovoltaic, wind power)
- Test of Features for each energy source and Generating Technology
- Test of measuring and storing each Energy Source
- Test of various Applications operated by Renewable Energy
- Provides various test examples and sources

### Introduction

- Government has been prompting Short Core Task after establishing mid to long term Strategy in order to cultivate Renewable Energy Industry. Photovoltaic, Wind power and Fuel Cell industries are the main three fields which have large potential for growth in the aspect of employment effect, world market outlook, and competition condition.
- With HBE-Green-Energy, we can do various tests from basic test for Generation, Storage and Consumption of the three Renewable Energy to various applied tests. We can test technology requirement, generating method and element technology for each theme by dividing alternative energy called to Renewable Energy into New Energy and Renewable Energy.
- This catalogue for HBE-Green-Energy contains samples which uses renewable energy as power source for various applications, and the measuring equipment developed to understand features and compare generated amount of Renewable Energy.
- Also, this includes Charging Circuit of secondary cell in order to charge remained energy after consuming. HBE-Green-Energy provides effective test environment to all subjects which educate Green Energy technology emerging as New Growth Engine.

### Features

HBE-Green-Energy is based on [Green Energy Framework] which optimizes Energy Delivery System corresponding to the change of Energy Paradigm in Green Energy Strategy Road Map.

Energy Generation	Energy Consumption	Energy Management
<ul style="list-style-type: none"> <li>• Generation Measuring Test using Hand Generator</li> <li>• Energy Generation Test using Photovoltaic</li> <li>• Test for Generated Energy Change by Incidence Angle Load Characteristic Test</li> </ul>	<ul style="list-style-type: none"> <li>• MCU Operation Sample using Renewable Energy</li> <li>• Renewable Energy Charging Test</li> <li>• Application Sample using Renewable Energy</li> </ul>	<ul style="list-style-type: none"> <li>• Generation Monitoring using USN</li> <li>• USN Node Operation Test using</li> <li>• Renewable Energy</li> </ul>

## Green IT

### HBE-Green-Energy

HBE-Green-HomeNet

## Configuration and Names

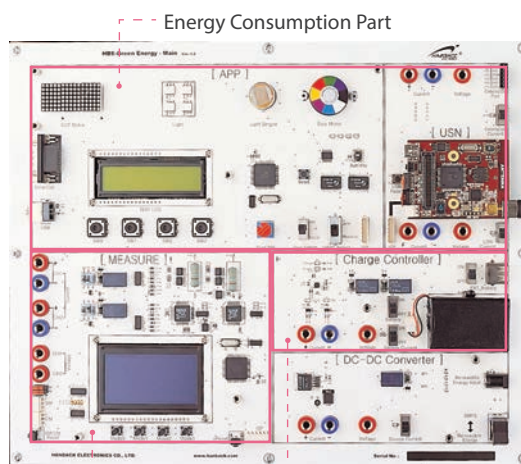
Energy Generation Part of HBE-Green-Energy is composed of Photovoltaic System, Wind Power Generation System and Hydrogen Fuel Cell, representative Renewable Energy fields. And we can do various tests for Energy Measurement, Storage and Consumption.



Photovoltaic System



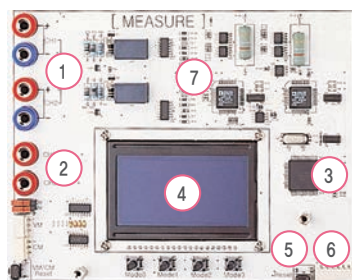
Wind Power Generation(Optional)



Energy Measurement Part

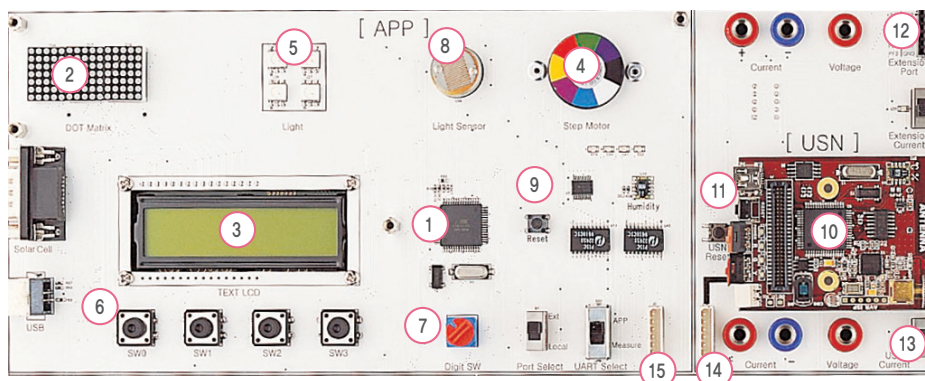
Energy Storage Part

### • Energy Measurement and Storage Part



1. Current Input Port
2. Voltage Input Port
3. MCU
4. Graphic LCD
5. Reset(Measurement Part)
6. ISP Port
7. JTAG Port
8. Voltage/Current Measurement Circuit
9. Lithium-ion Battery
10. USB Port

### • Energy Consumption Part

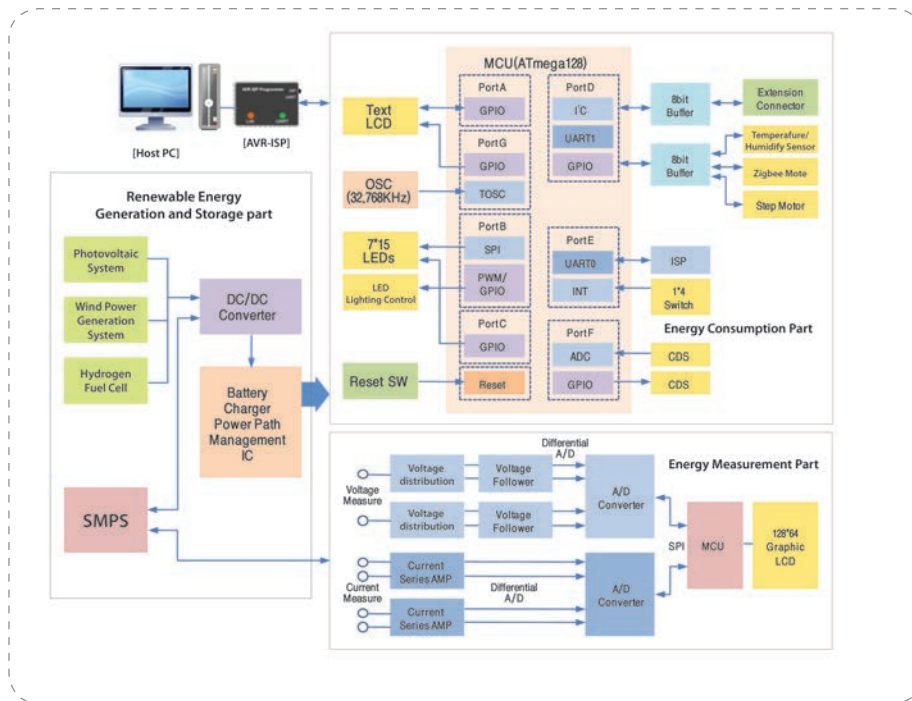


- |                    |                                       |   |
|--------------------|---------------------------------------|---|
| 1. MCU (ATmega128) | 7. Digit Switch                       | 13. Voltage/Current Output Port(ZigbeX) |
| 2. Dot Matrix LED  | 8. Light Sensor                       | 14. ISP Port (ZigbeX)                   |
| 3. Text LCD        | 9. Reset(Consumption)                 | 15. ISP Port (ZigbeX)                   |
| 4. Step Motor      | 10. USN Mote(ZigbeX)                  |   |
| 5. Mini LED Light  | 11. Reset (ZigbeX)                    |   |
| 6. Push Button     | 12. Voltage/Current Port(Consumption) |   |

# Green IT

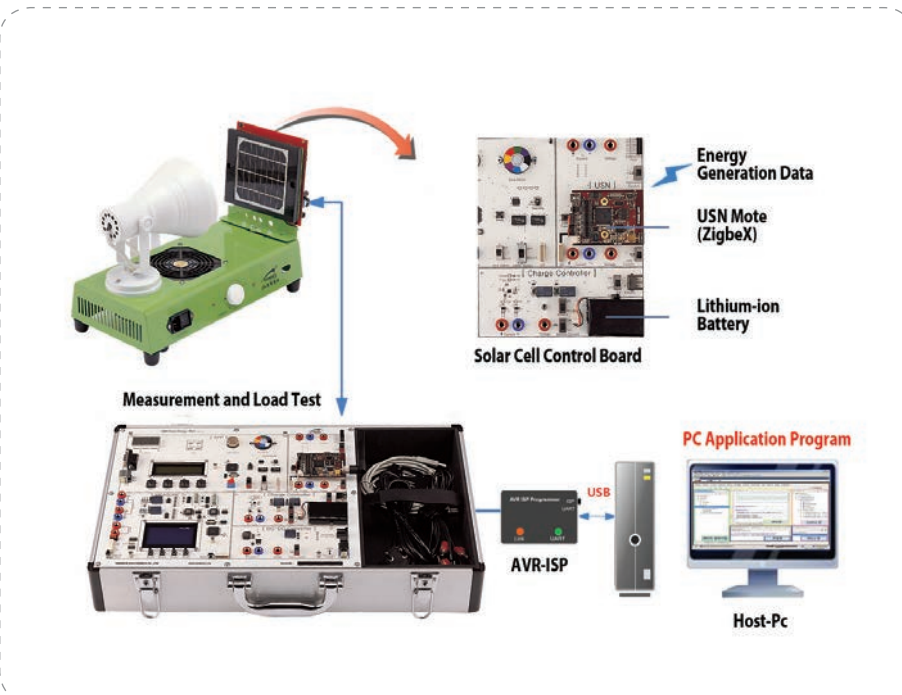
## >>HBE-Green-Energy

### Block Diagram



### Main Test Sample

- Photovoltaic System Test by Incidence Angle Control



## Hardware Specification

### • Energy Generation Part

Item	Description
Photovoltaic System	PV module : 9V/155mAh Motor : 3kg/cm, 0.19sec/60o Artificial Sun : 120W Halogen Lamp Brightness : Max 1200W
Wind Power Generation System (Option)	Fan CFM :330m <sup>3</sup> /h Input Power : 220VAC/ 60Hz Power consumption : 60W

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HBE-Green-HomeNet

### • Energy Measurement Part

Item	Description
Voltage Measurement	Range : 0V~50V Resolution : ADC 16bit, 2 Channel
Current Measurement	Range: 0~1A Resolution : ADC 16bit, 2 Channel

### • Energy Consumption Part

Item	Description
Application	MCU: ATmega128L Dot Matrix : 5*7 3EA 16*2 Line Text LCD 5V Step Motor 3 color's LED Mini Light Switch : Push Button 4EA, Digit Switch 1EA Sensor : CdS Sensor, Digital Temperature/ Humidity Sensor
USN Mote	MCU : ATmega128L, 128KB RAM, 4KB EEPROM RF : CC2420(2.4GHz, DSSS, 0dB, SPI) Sensor : Temperature/Humidity Sensor, CdS Sensor, Infrared Sensor, RTC OS : TinyOS 2.x, nanoOS

### • Energy Storage Part

Item	Description
Charger	Current Monitoring Circuit Embedded Displays On Charging and Charging Completed Provides Charging Terminal for only Lithium-ion and Mobile Phone
Rechargeable Battery	Lithium-ion 3.7V, 1770mAh

\* Specifications can be changed without notice

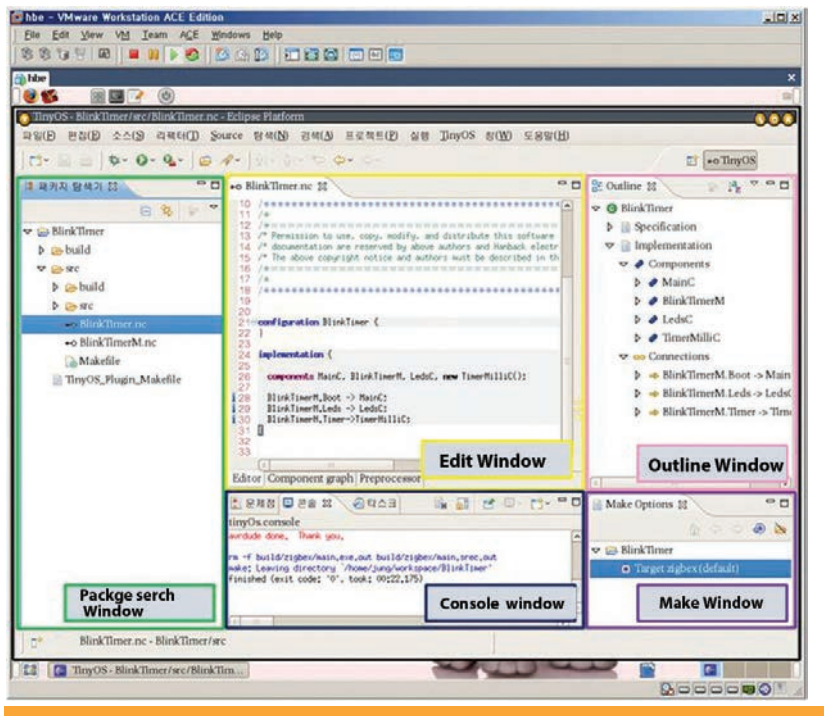
# Green IT

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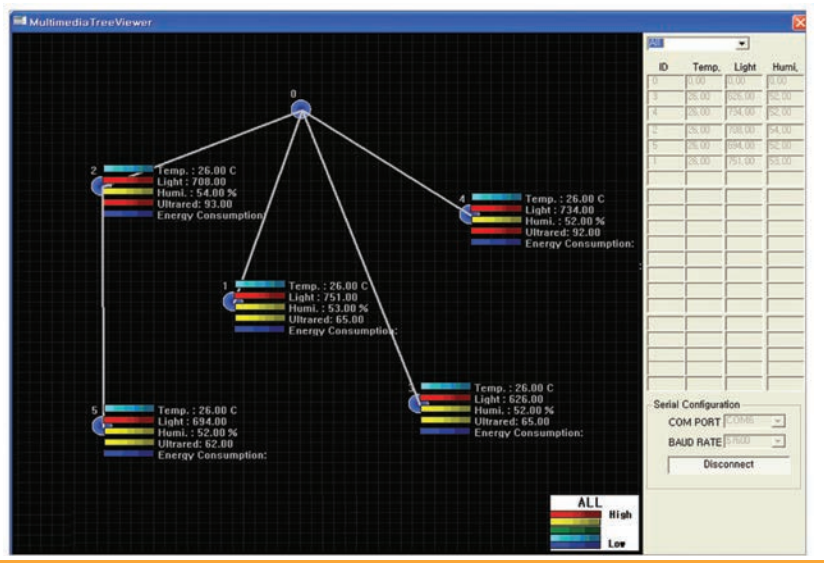
### HBE-Green-Energy Software

HBE-Green-Energy software is composed of Sensor Node Program and PC Application Program for Monitor.

#### • Sensor Node Program



#### • PC Application Program



## Content

### Contents of Education

#### With HBE-Green-Energy Renewable Energy Applications

1. New Renewable Energy?
2. AVR Microcontroller and Development Environment
3. Configuration and Use of Test Equipment
4. Generating Power with PV cell
5. Implementation of Thermo-Hygrometer using Alternative Energy
6. Implementation of Thermo-Hygrometer using Low Power Technology
7. Implementation of Lighting using CdS Sensor
8. Operation of Step Motor
9. Implementation of Guiding using CdS Sensor
10. Use of Generated Energy
11. Control of PV module
12. Operation of USN node with Alternative Energy
13. Generating Power with Wind Force
14. Generating Power with Fuel Cell

HBE-Green-Energy

HBE-Green-HomeNet

## Product Components



HBE-Green-Energy



User's Manual and  
Product CD



Photovoltaic System



Wind Power Generation  
System (Option)



HBE-AVR-ISP



AC Power Cable



USB Cable  
(A to B Type)



Power Connection  
Cable (Banana Jack)