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A New System Measurement of Green House Energy Monitored by the GPRS module

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Abstract

This document expresses a system design of transferring data over the network by using the GPRS module as the main device. The system receives data from green house energy after the storage of 3 kinds of alternative energy of Wind turbine, Solar cell and Bio gas that help find the efficacy of 3 energies that are used at home. Therefore, the researcher is able to find out the result immediately by sending a required SMS. Later, the system submits the result back to the source phone number.

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Keywords : SMS, Data Packet, Protocol, GPRS module

1. System overview

The current global warming is the problem that causes various changes in global climates such as flooding and drought. Most of them come from excessive energy usage which produces massive pollution and results in climate changes.

Moreover, green energy and renewable energy, such as solar energy, wind energy and natural gas has become reasonable choices for reducing or minimizing pollution. The environmental friendly energies are widely used. On the other hand, there is a limitation on using green energy because their price on process equipment is slightly high, and the result on environment issues is unclear. Therefore, this research will show the positive effect on using green energy to solve the understanding of those suspects and apply the process data more easily by transferring data through wireless connection to administrator for investigating the system.

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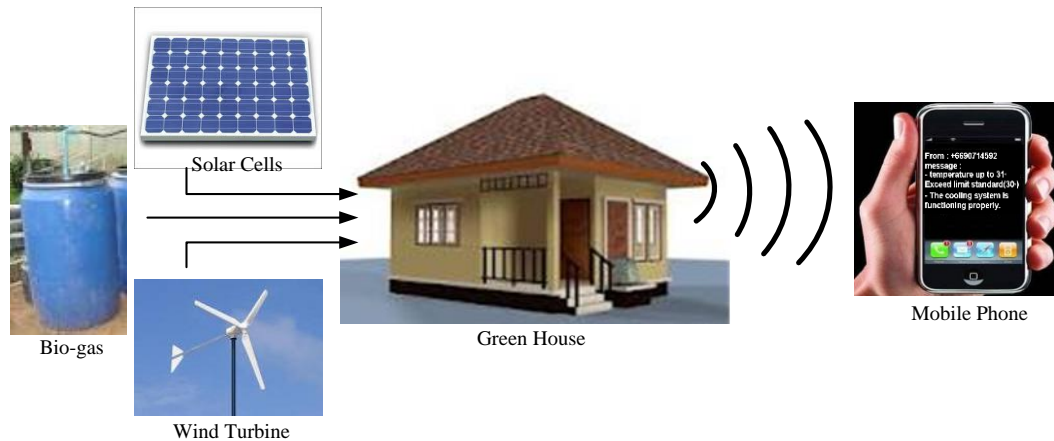


Fig. 1. System overview

2. GPRS module

SMS is a text based message on mobile network, created by Friedhelm Hillebrand, the researcher in communication and head of management committee of GSM association in additional service division. There are two reasons why the SMS is 160 characters long text message. First, from research information, most of the text in postcard has characters not exceeding 150. Second, from the sending message via telex, it still has characters equal to a postcard [4].



Fig. 2. SIM300CZ GSM module

In our research, we use SIM300CZ GSM module [3] to receive the SMS message via AT command protocol. AT command is a set of ASCII using to communicate the modem with PC. It was proposed by Hayes Communications in 1977. SIM300CZ has two SMS modes, PDU and text mode. PDU receive and display the status in binary code format, but text mode in ASCII with ease to translate and use. In order to receive message, Main control has to send “AT+CMGF=1” command to the module to enter the text mode. If there is a new message received, the module response by sending out the command such as +cmgs= “telephone number” with means there is a new message in memory which is “- Solar cell at 12 V. - Wind turbines at 10 V. - Bio-gas at 6 liters.”. Then send “AT+CMGS= “+66890714592”” command to the module to read message in memory as shown in fig 3.

```

at+cmgf=1
at+cmgs="+66890714592"
- Solar cell at 12 V.
- Wind turbines at 10 V.
- Bio-gas at 6 liters.
ctrl+z
at+cmgs
ok
    
```

Fig. 3. New message reading status

3. Firmware function

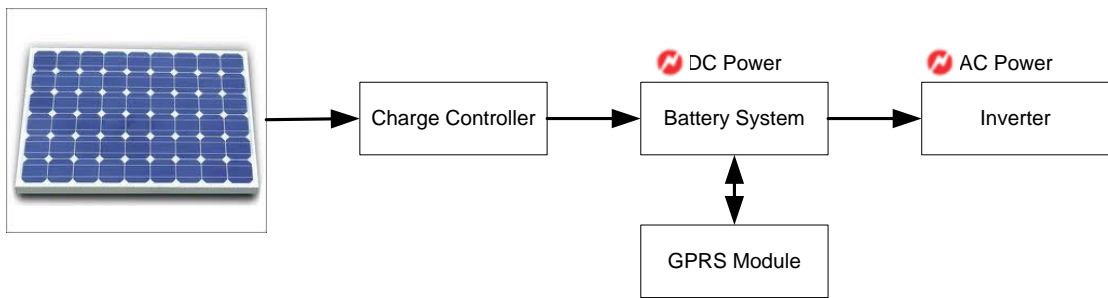


Fig. 4. The process of the Solar cells system

Fig. 4 shows block diagram on the process of the solar cells system. The capacity of each solar cell is 40W. With 8 solar cells, the total energy produced will be 320W. The energy will be collected into the cell and the DC to AC converter will convert energy from cells to household electric appliances. In addition, the data transfer system is connected to the battery system to send the data usage via mobile cell phone.

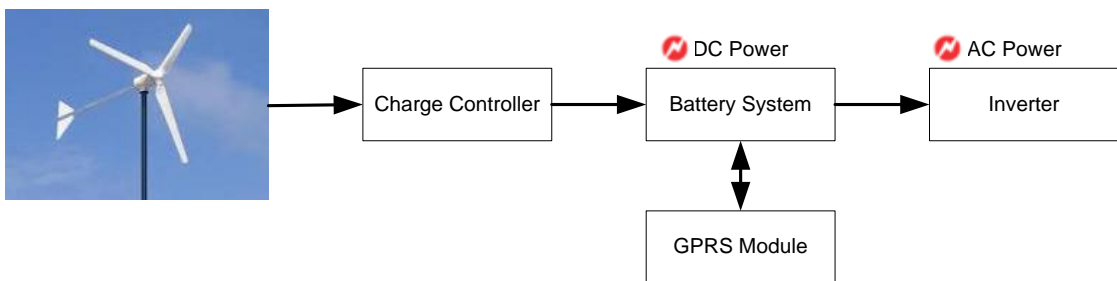


Fig. 5. The process of the Wind Turbine system

Fig. 5 shows the block diagram on the process of the wind turbine system. The maximum capacity of this system is 200W which is absorbed to energy storage. The DC to AC converter will convert energy from cells to household electric appliance. In addition, the data transfer system is connected to the battery system to send the data usage via mobile cell phone.

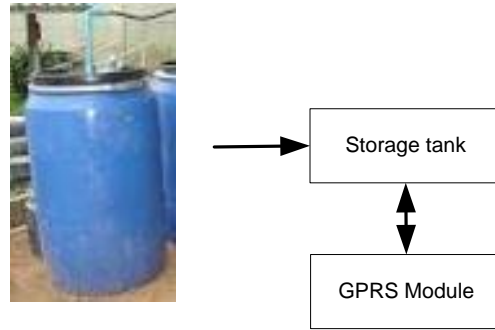


Fig. 6. The process of the Bio-gas system

Fig. 6 shows the block diagram of the process of the bio-gas system. The capacity of the bio-gas storage is 8 litres. The formation of bio-gas depends on raw materials during fermentation such as dung and garbage. The gas obtained from fermentation will be used as liquid gas in household usage. In addition, the system will measure the pressure inside the storage and send data via mobile cell phone.

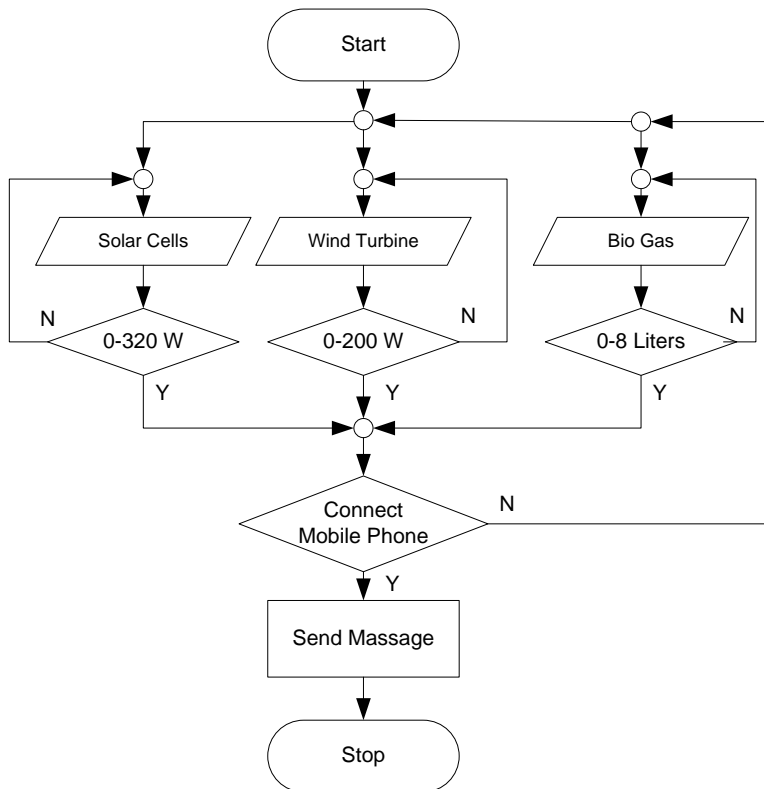


Fig. 7. Flow chart over all process

AT-COMMAND is a standard program with the capability to operate with communication devices such as Modem or DTE Equipment (Data Terminal Equipment) to respond, setup or command such equipment to operate as required. For communicating with a mobile phone, the communication will use the program called GSM AT COMMAND

Samples of BASIC AT COMMAND

- AT to examine the availability of equipment, if available, the device will answer back with "OK"
- ATDT phone number to call to destination number
- ATH hang up
- ATA answer the call

AT COMMAND related to SMS sending and receiving

There are several types of AT COMMAND programs used with mobile phones including mobile phone model reading, battery checking, signal examination. However, we will mention only the command related to SMS sending and receiving only.

- 1) Message Format (AT+CMGF) is the command to determine the form of displayed message by

AT+CMGF = 1 or displaying message in the form of TEXT

AT+CMCF = 0 or displaying message in the form of PDU CODE

- 2) List Message (AT+CMGL) is the command to display message in several status with displaying all messages. The command is as follows:

AT+CMGL=0 or displaying received message without reading ("REC UNREAD")

AT+CMGL=1 or displaying received message and already read ("REC READ")

AT+CMGL=2 or displaying stored message without sending ("STO UNSENT")

AT+CMGL=3 or displaying stored and sent message ("STO SENT")

AT+CMGL=4 or displaying all messages ("ALL")

Remarks: In the event of determining Message Format to be PDU CODE, the status will be selected by using 0-4. On the other hand, in the event of determining Message Format to be TEXT, the status will be selected by using the text in the later parenthesis.

- 3) Read Message(AT+CMGR) is the command to read the specific message by determining the location of such stored data

- 4) Send Message (AT+CMGS= "XX") is the command for sending message which "XX" is Octet number of 16 except the first Octet that is "00".

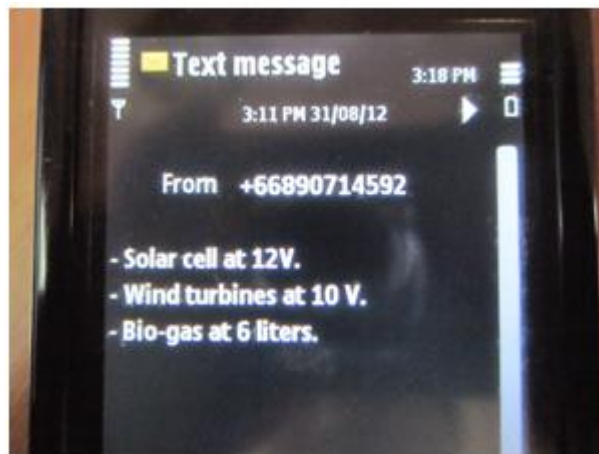


Fig. 8. The system with sliding text message

4. Conclusion

GPRS module is able to applied more than sending the data in the form of SMS as well; for example, sending in the form of data packet. This application is up to the utilization of the internet provider.

Overall, the presentation in this document is only a concept and presentation of a preliminary stage. It requires a functional test of the device, some method contents and some steps of working machine that need to be improved. These problems had been solved in the experiment.

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