

# Poster: Mobile Power Management Using FreeRTOS-based Uninterruptible Generator Supply

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## ABSTRACT

Current designs of battery-powered uninterruptible power supplies only provide power for a short time, and offer few control options. We combined a compact synchronous generator with a battery with 10% of the capacity of a UPS of the same rating to produce an uninterruptible generator supply (UGS). The controller of this UGS runs FreeRTOS, which enables it to respond quickly to a power outage. A wifi module provides connectivity to a web server for real-time monitoring and management on a remote PC or cellphone.

## CCS Concepts

•Computer systems organization → Real-time operating systems; Real-time operating systems; •Software and its engineering → Power management;

## Keywords

Mobile power management; FreeRTOS; UGS

## 1. MOBIL POWER MANAGEMENT

Fig. 1 is a block diagram of our UGS and its management module. The controller, which has an ARM Cortex-M4 core running FreeRTOS™ [1], monitors the supply and the battery state. When an outage occurs, energy from the battery is used to support the load while a compact synchronous generator is started.

The controller also transmits the status of the UGS to a web server, which can start and stop the generator. We used Python and Tornado to develop this server, and the data from the UGS are stored in a PostgreSQL database. Fig. 2a shows a chart of the status over time produced by an implementation of this server on a laptop. Finally, a user can monitor and control the UGS using a smartphone which accesses the server over the web, as shown in Fig. 2b.

Fig. 2c shows a prototype of our FreeRTOS-based UGS for mobile power management. In experiments with this prototype, it was demonstrated that it provided convenience for

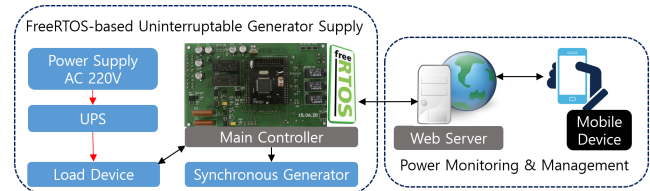


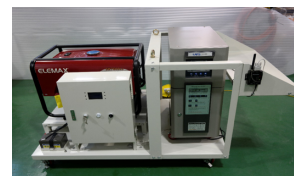
Figure 1: Block diagram of proposed mobile power management system.



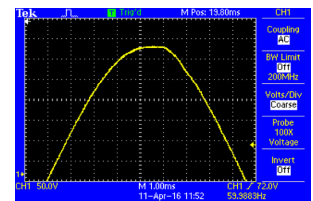
(a) Web server.



(b) Mobile device.



(c) Prototype UGS.



(d) Output Voltage

Figure 2: Mobile power management using the proposed FreeRTOS-based uninterruptible generator supply.

users and reduced the maintenance costs when managing power. Furthermore, the output voltage exhibited a stable waveform, as shown in Fig. 2d, which means that good quality power was supplied to load from our UGS in real time, in the case of a power outage.

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## 3. REFERENCES

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