Rancang bangun modul penyuplai daya dengan memanfaankan energi matahari untuk wireless sensor node

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Abstrak

Usia baterai yang terbatas dari embedded system dan mobile devices mengakibatkan baterai itu harus sering di recharge atau solusi yang lain adalah dengan mengganti baterai tersebut. Salah satu solusi untuk membuat embedded system dan personal device dapat beroperasi terus-menerus, yaitu dengan memanfaatkan energi matahari dan sistem fotovoltaik. Skripsi ini bertujuan untuk merancang bangun modul penyuplai daya dengan memanfaatkan energi matahari sebagai pengganti baterai untuk modern embedded system dan aplikasi-aplikasi daya rendah. Salah satu contoh dari embedded system daya rendah adalah sensor node IEEE 802.15.4/Zigbee yang digunakan pada WSN. Embedded system ini berbasis pada Freescale System-in-Package MC13213 dan sudah termasuk RF transceiver untuk aplikasi-aplikasi ZigBee. Daya yang dibutuhkan oleh alat ini adalah < 1mW untuk keadaan stand-by dan mencapai sekitar 50mW untuk keadaan aktif. Modul penyuplai daya ini dapat dibagi menjadi tiga bagian, yaitu power supply, rangkaian input (maximum power point tracker), dan rangkaian output. Modul ini ditargetkan untuk menyuplai embedded system daya rendah khususnya wireless sensor node dengan tegangan kerja 3,3 volt dan konsumsi daya sampai dengan 50 miliwatt. ;The limited battery lifetime of modern embedded systems and mobile devices necessitates frequent battery recharging or replacement. One of the solution to make embedded systems and personal devices operate continuously is utilizing the solar energy and photovoltaic system. This final project aims to design a power supply module by utilizing solar energy as a replacement of battery for modern embedded system and low power application. The example of low power embedded system is IEEE 802.15.4/ZigBee sensor node used in Wireless Sensor Network (WSN). This embedded system is based on Freescale System-in-Package MC13213 including an IEEE 802.15.4 RF transceiver for ZigBee applications. The power consumption of the wireless device provided by the manufacturer with sensors and microcontroller in standby condition is < 1wW, while the power consumption reaches approximately 50mW when microcontroller and sensors are active. This power supply module can be divided into three parts, power supply circuit, input circuit (maximum power point tracker), and the output circuit. This module is targeted to supply low power embedded systems, especially wireless sensor node with the operating voltage of 3.3 volt and the power consumption up to 50 mW.

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