Chapter 9
An Exhaustive Analysis of Energy Harvesting Absorbers and Battery Charging Systems for the Internet of Things

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ABSTRACT

Nearly all application fields are paying increased attention to the internet of things (IoT). Nearly 20 billion devices are now linked to the internet. With several applications ranging from smart buildings and smart cities to smart devices, IoT has progressed over the last few decades. As a result, the quantity of sensors, sensor nodes, and gateways has increased, making these battery-powered devices power-hungry. It will be a laborious operation to change the battery in remote monitoring applications for these smart sensors or nodes. By gathering RF energy from the environment and converting it to DC power, RF energy harvesting is a cost-effective method of extending the lifespan of wireless sensor networks (WSNs). A brand-new, IoT-based smart universal charger is suggested in this chapter for charging multichemistry

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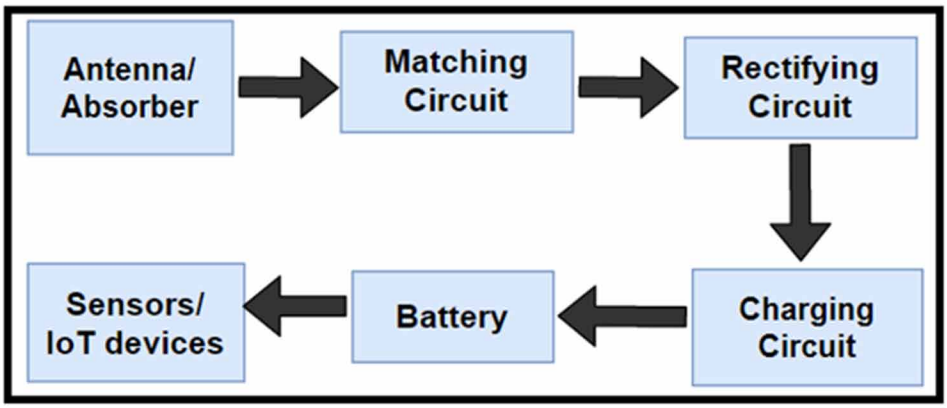
batteries. The suggested charger has an advantage over traditional chargers since it can charge both already installed batteries and any future batteries.

INTRODUCTION

In the last few years, the demand for the power has increased enormously. Researchers are looking for alternate energy sources such as solar, wind, thermal, vibration and radio frequency (RF) for energy harvesting. Inexhaustible RF energy sources with zero harmful emissions can pave way for harvesting energy unlimitedly for powering low power sensors and microcontrollers. Internet of Things (IoT) enables to connect enormous sensor nodes for remote monitoring applications to the internet. RF Energy harvesting reduces the complexity of IoT nodes by avoiding power

Figure 1. RF energy harvesting System (RFEH)



circuits, reduces the overall cost and improves the overall efficiency of the system. RF Energy harvesting or Green Energy harvesting is an excellent technique which allows size reduction in comparison with other harvesting systems such as photonic cells or wind turbines, where miniaturization really matters a lot in portable devices which uses battery (Almoneef, T. S. 2014). RF energy harvesting plays a key role in providing a sustainable energy source towards the future of wearable electronics too. Further, RF energy harvesting is reliable, portable environmental friendly and also cost effective. These advantages have attracted the researchers to unveil novel research in this field. A typical EHS consists of Antenna/absorber, matching circuit,