

## **Abstract**

As humans today we always need technology, one of which is a smartwatch, nowadays the relationship of this kind of device with the natural environment is becoming more important to study because the power extraction that is commonly used is through non-renewable energy. Smartwatches require energy to operate and this energy is stored in the battery connected to the device. Recently, there has been a shift in the way batteries are charged in some devices, including smartwatches, from wired to wireless charging. Wireless Charging is considered a transformational technology in the world, many major manufacturers have invested in this technology. However, the current wireless charging mechanism which includes one for smartwatches is considered slow and energy inefficient compared to wired charging. Such inefficiencies may in turn exacerbate the adverse environmental impact of smartwatches. This paper addresses the issue of energy inefficiency during wireless charging of smartwatches by comparing different charging practices to identify energy saving opportunities. There are 3 scenarios considered namely, charging when the smartwatch is ON and when the smartwatch is OFF, and when the smartwatch is ON with Wi-Fi ON. In addition, to measure the energy performance of wireless charging for each of these 3 scenarios, it was carried out again but using a conventional or cable-based charger for consideration. Overall in the investigated experiments wireless charging in the off state was found to be more energy efficient than the other two conditions potentially saving 0.098 Wh and likewise in cable-based charging potentially saving 0.096 Wh. The highest average energy consumption in wired and wireless charging occurs when the smartwatch is ON + WiFi ON where wireless charging consumes 0.228 Wh while wired charging consumes 0.205 Wh.

**Keywords:** wireless charging; smartwatch; energy efficiency; power consumption; battery

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