

Visualization EM Field Application for WPT system Based on AR Technology

Yunchong TANG⁽¹⁾, Qiaowei YUAN⁽¹⁾

(1) Tohoku Instituted of Technology, Sendai, Japan; e-mail: m22@st.tohtech.ac.jp; qwyuan616@tohtech.ac.jp

It is necessary to create an intuitive way for consumers and public people to alleviate their concerns about the safety aspects of non-ionizing radiation, especially from high-power wireless power transfer (WPT) systems[1]-[3]. In this report, an automated AR-based EM (electromagnetic) field visualization application is developed for the above purpose. The application consists of three parts as shown in Fig. 1.

Part 1 is the field measurement which is carried out by using a probe and a spectrum analyzer. The measured data is collected and controlled by a MATLAB program developed in Part 2. Moreover, the probe is attached with an OpenCV-based ArUco marker which is further used to detect the probe position in Part 3.

Part 2 is the data relay station implemented by a MATLAB program which can control spectrum analyzer's frequency band. This MATLAB also collects data from spectrum analyzer using USB cable and sends out data to Part 3 via Wi-Fi.

Part 3 is an android visualization application based on AR technology. The visualization application is installed in a smartphone which makes user to confirm EM-field distribution very easily and friendly. The application receives the measured EM field data from Part 2 and also simultaneously detect the probe position with the ArUco marker detection technique. The color ball at real AR image which is proportional to the EM filed distribution will be finally shown at the smartphone as shown in Fig. 2. At the last of the report, some measurements for the transmitters surrounding EM field distribution will validate our application as one example.

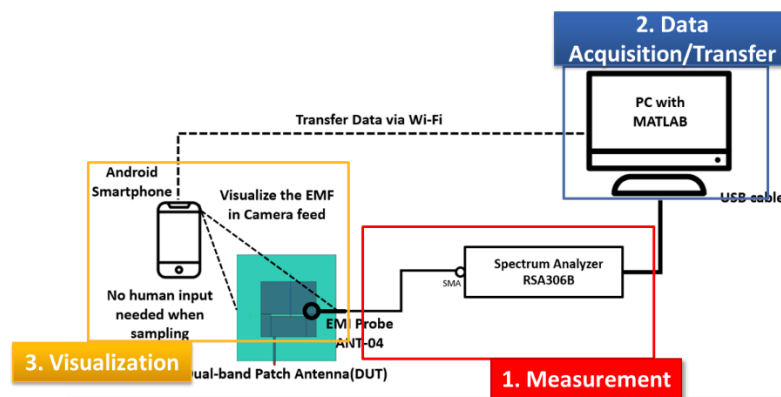


Figure 1. Application configuration diagram

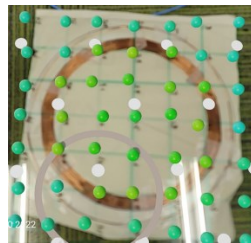


Figure 2. EM field visualization

References

- [1] Sato MURAOKA, Sinzi Abe, Qiaowei YUAN, Akiko TAKAHASHI, "Design of a magnetic field distribution visualization system based on augmented reality," 2013 General Conference of IEICE, D-9-28, March 2013.
- [2] IEC 62650-1: "Wireless Power Transfer (WPT) - Part 1: General requirements and definitions" and IEC 62651-1: "Wireless Power Transfer (WPT) - Part 1-1: Assessment of electromagnetic compatibility (EMC) of systems and devices."
- [3] IEEE 1775 standard for wireless charging of electric vehicles.