

DEVELOPMENT OF MEASURING INSTRUMENTS FOR THE MEASUREMENT OF VHF AND UHF ANTENNA PARAMETERS (2nd YEAR)

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ABSTRACT

Antenna is a very important component in building wireless telecommunications systems especially for radio communication systems. Antennas play an important role in conducting electromagnetic wave radiation into the air (for the transmitter) and receiving electromagnetic waves (for the receiver). This study studies alternative solutions related to components used in the development of antenna parameter measuring devices so that a measuring instrument is obtained that is more affordable and can be used to meet the needs of laboratory equipment as a measurement tool when measuring antenna parameters and as well as learning media.

The purpose of this study is to develop a VHF and UHF Antenna Parameter Measurement Tool and to test the accuracy of the VHF and UHF Antenna Parameter Measurement tool that has been developed. This research was conducted in a multi-year scheme, which is for 2 years. The results of the first year of research (2018) that have been achieved are the development and testing of prototypes of the RF signal data acquisition system of VHF and UHF antennas. The target of the second year (2019) is the development of software for processing digital signals resulting from data acquisition, displaying graphs of radiation patterns and other parameters needed in the measurement of VHF and UHF antennas. The measurement results are presented in graphical form and begins with a graphical display of the antenna's radiation pattern, so that other parameters such as aperture, beamwidth, gain, and directivity can be obtained from the measurement results of the radiation pattern. The chosen software development method is Rational Unified Process (RUP), where the risks and errors found will be corrected in several iterations so as to produce a good architecture and high quality software applications. RUP consists of several stages, namely Inception, Elaboration, Construction, and Transition. At each stage in the RUP iterates business process modeling, requirements, analysis & design, implementation, testing, deployment, configuration & change management, project management, and environment. Based on the results of experiments measuring antenna radiation patterns using the Antenna Radiation Pattern instrument that has been made, the conclusions obtained are: (1) Antenna Radiation Pattern instrument consisting of hardware Module-1 and Module-2 as well as applications to display graphs of radiation patterns have functioned well for measuring the antenna's radiation pattern. (2) Measurement of the radiation pattern is greatly influenced by the environmental conditions in which the measurements are carried out, especially the interference of electromagnetic waves produced by devices other than the RF signal transmitters used, for example electromagnetic waves generated by spark plugs in motor vehicles. (3) Display of radiation patterns that are really close to the ideal radiation pattern images according to theory can be obtained by processing digital signals resulting from the quantization of RF to DC signals before they are displayed in the form of radiation pattern graphs.

Kata Kunci: Antenna, antenna parameters, radiation pattern, gain, bandwidth, vhf, uhf, antenna rotator, arduino, computer, visual basic.