Earning Doctoral Degree After Developing Radio Signal Source Position Tracking System

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Two ways communication technology using electromagnetic wave develops rapidly in the community life. However, this communication still can be disturbed if there is another transmitter with the same frequency. This condition often causes communication jammed due to the crowded frequency.

“The conventional Radio Direction Finder which is usually used to look for the disturbing transmitter still be performed by direct mobility, thus we have to swap many times until we find the position of signal source we are looking for,” said Samuel Kristiyana, S.T., M.T. during an open examination for Doctoral Programme of Electrical and Information Engineering at Faculty of Engineering UGM on Thursday (6/7).

Conducting research on radio frequency signal source position based on Doppler effect and multi-triangulation method, Samuel tried to find a signal source tracking system without mobility. He utilizes a signal source tracking method with the development of Doppler effect that is implemented at more than three immobile monitoring stations which their position coordinates had been determined before.

The result is in the form of coordinate points visualization of the radio frequency signal source position we are looking for with the angle accuracy of one-hundredth degree. This result is obtained from the intersection of three directional lines of the coming frequency signal towards the three immobile monitoring stations.

On the other hand, data processing using multi-triangulation method produces a prediction of the coordinate position of the transmitter signal and visualization at a digital map. Meanwhile, the angle accuracy increases from 22.5 degrees to 0.01 degree.

The testing result in determining the Earth coordinate using signal tracking with two stations has an error up to 83.20 meters while using the three stations produces an error up to 14.60 meters. The multi-triangulation method using five transmitter stations has an average error up to 6.63 meters with the maximum distance between the radio frequency signal source and the immobile monitoring stations at 50 kilometers.

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