

Earning Doctorate Degree for Musical Signal Encoder

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Audio encoder plays a significant role in many walks of life, for instance telecommunication and entertainment. Now there are various types of audio encoder. But, there are bitrate areas under 32 kbit/s that explicitly has not been exploited for musical signals encryption.

“Encoder of time-frequency (T/F) or transform encoder is designed for all types of audio signals and prioritised to have bitrate output between 4 kbit/s up to 32 kbit/s,” said Ir. Bondhan Winduratna, M.Eng, when sitting for his open doctoral promotion in Electrical Engineering on Wednesday (18/5) at Faculty of Engineering UGM.

In his research he made musical signal encoder running in bitrate under 16 kbit/s. One example is the one that allows musical signals transmission in good quality on GSM channel.

“Encoder works with parametric method. The input signals that have been divided with overlapping cosine windows are analysed to get FM parameter. Signal analysis includes sinusoid extraction, harmonic extraction, and FM modeling,” said the Engineering lecturer.

He was able to make encoder based on FM signals model with modeling results that have very good quality for signals that have strong harmonic nature.

“Simulations showed that FM encoder has been able to encode signals of single musical instrument in bitrate around 6 kbit/s with quality equalling to MPEG2 in bitrate 16 kbit/s and is better than encoder ITU G722.1 in 16 kbit/s,” he explained.

Compared to MPEG2 and G722.1, in his opinion, encoder that is based on FM signal model has the best performance for single musical instrument signal, equal performance with ensemble musical signal and speech, and low performance for gamelan signals. Thus, he underlined that FM encoder is ideal for single musical instrument signals.

He expects the research to be used by musical signal encoder in very low bitrate. “In addition, each part of encoding system can be used for other research areas, such as music synthesis, signal analysis of ECG, frequency calibration, and so on,” he concluded.

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