

INFORMATION ON DOCTORAL DISSERTATION

Thesis title: “*Measurement Matrix Design and Improved Recovery Algorithm in Compressive Sensing*”

Specified field of study: Electrical Technology

Code of specialty: 9.52.02.03

PhD. Candidate: **Tran Vu Kien**

Scientific supervisors:

- 1. Ph.D. Nguyen Ngoc Minh**
- 2. Ph.D. Nguyen Le Cuong**

Training institution: Posts and Telecommunications Institute of Technology

THE SCIENTIFIC CONTRIBUTIONS

1. Propose a technique to build a BPNSM compressive sensing matrix with elements made up of nonlinear binary sequences. The generation of the matrix from the pseudo-random nonlinear sequences makes the compressed sampling matrix have low storage requirements, and high security, the technique of creating the matrix from the FPGA hardware combined with the switching system helps to reduce the matrix generation time, reduce hardware complexity when performing compressive sensing.
2. Propose an improved DRMP algorithm based on the original MP algorithm. The DRMP algorithm improves over the MP algorithm in the residual search step and updates the value in each iteration. Through mathematical evaluation analysis and experimental simulation, the proposed DRMP algorithm has errors in the recovery process that decrease after each iteration. The computation process at each iteration is more simple than with the original algorithm MP in case the sampling matrix satisfies the RIP condition.
3. Propose a compressed sampling model including BPNSM matrix and DRMP improvement algorithm, and compare and evaluate the performance of the proposed model.

APPLICATIONS, PRACTICAL APPLICABILITY AND MATTER NEED FURTHER STUDIES

The research results in the thesis are consistent with the results presented in the experimental section, this is also an orientation to be able to expand future studies. The next research direction of the thesis will focus on adaptive compressive sensing to improve the efficiency of the computation and storage process. Using machine learning tools, and artificial intelligence to optimize the sampling matrix based on a set of data from the input signal.

Confirmation of representative

Scientific supervisor

PhD. Nguyen Ngoc Minh

PhD.Candidate

Trần Vũ Kiên