

INFORMATION ON DOCTORAL THESIS

1. Full name: Hoang Van Manh
2. Sex: Male
2. Date of birth: 08/9/1987
4. Place of birth: Hung Yen
5. Admission decision number: 778/QĐ-CTSV
- Dated: 21/8/2017
6. Changes in academic process: 6 months extension
7. Official thesis title: *Automatic Detection of the QRS Complex in the Exercise Electrocardiogram System*
8. Major: Engineering Mechanics
9. Code: 9520101.01
10. Supervisors: Assoc. Prof. Dr. Pham Manh Thang
11. Summary of the **new findings** of the thesis:
 - Proposed a method to identify the position of QRS complexes suitable for both exercise and static ECG signals based on the principle of determining dominant peaks and taking adaptive thresholds. The proposed method has been tested, compared with some other studies globally, and gave good results.
 - Proposed an algorithm to identify five significant points in the ECG signal based on Hilbert transform, take threshold, and selection rules. The obtained results were assessed based on exercise and rest ECGs and met the stated criteria.
 - The designed methods for each lead have been modified to apply to multi-lead ECG systems by using clustering analysis and global rules instead of individual selection rules that are sensitive to each lead. This change brings better performance to the proposed methods.
12. Practical applicability, if any:
13. Further research directions, if any:
 - Continue improving the proposed solutions to enhance efficiency and build software packages instead of using Matlab to install, test, evaluate and use in practice.
 - Integrating proposed solutions in the form of hardware combined with software installed on computers to form a remote monitoring and healthcare system for cardiovascular patients using wireless communication technologies such as Bluetooth, WiFi, etc., in hospitals and private homes.
 - Test on actual patients to further verify and evaluate the quality of the proposed solution.

14. Thesis-related publications:

- [CT1]. **Hoang Van Manh**, Ngoc-Viet Nguyen, Pham Manh Thang (2021), “An innovative method based on Shannon energy envelope and Summit navigation for detecting R peaks of Noise Stress Test Signals”, *Journal of Electrocardiology*, ISSN: 0022-0736, ISI, Elsevier, Vol. 65, pp. 8-17.
- [CT2]. **Manh Hoang Van**, Viet Dang Anh, Quan Dang Hong and Thang Pham Manh (2019), “Automated the QRS complex detection for monitoring the electrical activity of the heart”, *Proceedings of the 5th International Conference on Engineering Mechanics and Automation (ICEMA-5)*, pp. 236-241.
- [CT3]. **Manh Hoang Van**, Viet Dang Anh, Tuan Ngo Anh, and Thang Pham Manh (2019), “Automatic detection of QRS complex based on wavelet transform and cluster analysis”, *Proceedings of the 5th International Conference on Engineering Mechanics and Automation (ICEMA-5)*, pp. 242-247.
- [CT4]. Thang Pham Manh, **Manh Hoang Van**, and Viet Dang Anh (2019), “Enhancing the stress test ECG signal for real-time QRS detector”, *Proceedings of the 5th International Conference on Engineering Mechanics and Automation (ICEMA-5)*, pp. 271-276.

Date:

Date:

Signature:

Signature:

Signature: Pham Manh Thang

Signature: Hoang Van Manh