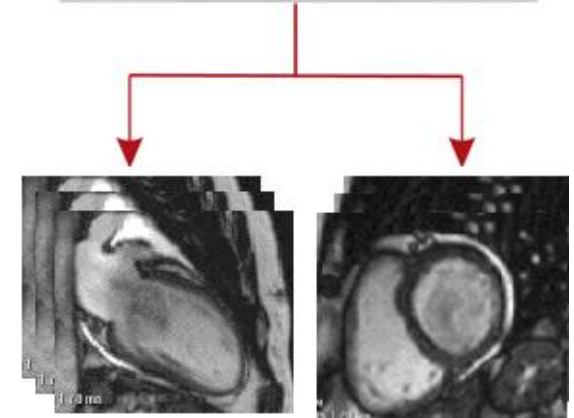




Cardiovascular Image and Signal Analysis Group (CISAG)



[http:// amt.mui.ac.ir/en](http://amt.mui.ac.ir/en)

Email: Kermani@med.mui.ac.ir

Phone: 031-37923861

Aim and Scope

- LV segmentation and LV wall analysis
- Infarct region determination
- Cardiac wall motion analysis and modeling
- RV segmentation and RV wall analysis
- Automatic detection of ARVD

Co-Workers

- Rajae Medical Imaging Center
- Isafahn MRI Center
- Khajeh Nasir Toosi University of Technology

Group Members

Director: Dr. saeed Kermani (PhD of Medical Engineering)

Dr Alireza Mehri Dehnavi (PhD of Medical Engineering)

Dr. Hamid Abrishami Moghaddam (PhD of Medical Engineering)

Dr Nasim Dadashi (PhD of Medical Engineering)

Dr Hamid Sanei (MD Cardiologist)

Dr Mohammad Hashemi (MD Cardiologist)

Dr. Mahdi Karami (MD Radiologist)

Dr Ali Mohammadzadeh (MD Radiologist)

Dr Alireza Daneshmehr (PhD of Mechanical Engineering)

Hossein Yousefi-Banaem (PhD candidate)

Mostafa Ghelich oghli (PhD candidate)

Sina Houshyar (PhD candidate)

Hassan Khajepoor (PhD candidate)

Nasrin Bastani (Master student)

Published Papers:

Yousefi-Banaem H, Kermani S, Asiaei S, Sanei H. Prediction of myocardial infarction by assessing regional cardiac wall in CMR images through active mesh modeling. *Comp. in Bio. and Med.*, vol. 80, 2017, p. 56-64.

Dinan FJ, Mosayebi P, Moghadam HA, Giti M, **Kermani S.** A fully 3D system for cardiac wall deformation analysis in MRI data. In: *Functional Imaging and Modeling of the Heart*. Springer;

Cardiovascular Image and Signal Analysis

Group (CISAG)

The main purpose of medical image analysis is the extraction of meaningful information to support disease diagnosis and therapy. Individual analysis algorithms are however rarely used standalone in clinical practice; usually multiple algorithms are integrated into dedicated clinical applications, together with a dedicated user interface and workflow. Research on clinical applications deals with the selection of the optimal combination of algorithms, their optimization and as much as possible automation for specific types of medical images and diseases, and the evaluation of their performance in an as realistic as possible clinical setting. In the IMAG/e group, clinical application research focuses amongst others on cardiovascular and neurological diseases, using magnetic resonance imaging (MRI) as the main imaging modality. MRI is a very flexible imaging technique, capable of visualizing multiple aspects of the human body including anatomy, morphology, function, and flow. Cardiac MRI analysis enables the study of abnormalities in the structure, contractile function, blood perfusion and tissue composition of the heart muscle, all important aspects used to diagnose heart disease and to select, plan and guide therapy. Research focuses on automatic segmentation (delineation) of all relevant heart structures needed to quantify heart shape and function, e.g. left-ventricular volume over time (see above picture). Furthermore, since the heart itself is a moving object, and since the complete heart may move due to breathing, image registration algorithms are often needed to compensate for the resulting motion. Another important research area is the comprehensive visualization of the multitude of quantitative analysis results, so that clinicians can easily relate them. The ultimate goal of medical image analysis applications is to improve the effectiveness and efficiency of patient care: better and faster diagnosis and therapy at acceptable cost.

- using partial linear transformation. In: *Bioinformatics & Bioengineering (BIBE)*, 2012 IEEE 12th Int. Conf. on. IEEE; 2012. p. 95–8.
- Oghli MG**, Fallahi A, Dehlaqi V, Pooyan M, Abdollahi N. A Novel Method for Left Ventricle Volume Measurement on Short Axis MRI Images Based on Deformable Superellipses. In: *Signal Processing and Information Technology*. Springer; 2012. p. 101–6.
- Vahabi Z, **Kermani S**. Desired Accuracy Estimation of Noise Function from ECG Signal by Fuzzy Approach. *J Med Signals Sens. Medknow Publications*; 2012;2(3):176.
- Oghli MG**, Fallahi A, Dehlaghi V, Pooyan M. Left Ventricle Volume Measurement on Short Axis MRI Images Using a Combined Region Growing and Superellipse Fitting Method. *Int J Signal Image Process. Association of Computer Electronics & Electrical Engineers*; 2013;4(2):6.
- Yousefi-Banaem H**, **Kermani S**, Sarrafzadeh O, Khodadad D. An improved spatial FCM algorithm for cardiac image segmentation. In: *Proc 13th Iranian Conference on Fuzzy Systems*. 2013. p. 1–4.
- Oghli MG**, Dehlaghi V, Zadeh AM, Fallahi A, Pooyan M. Right Ventricle Functional Parameters Estimation in Arrhythmogenic Right Ventricular Dysplasia Using a Robust Shape Based Deformable Model. *J Med Signals Sens. Medknow Publications*; 2014;4(3):211.
- Khajepour H**, **Kermani S**, Hashemi M, **Karami M**. Cardiac dense filed Mining and estimation using three-dimensional Cardiac CT images sequence. *J Isfahan Med Sch*. 2012;31(234):521–31.
- Kermani S**, **Abrishamimoghadam H**, Moradi M. The use of active mesh to estimate local and global left ventricular indicators using sequence of cardiac magnetic resonance images. *J Biomed Eng*. 2007;2(3):215–32.
- Salehpour N, **Mehri A**, **Rabbani H**, Behjati M. Linear transformation between Vectorcardiogram signal and 12 channel Electrocardiogram signal Frank leads (XYZ). *Journal of Isfahan Medical School*; 2014;32(302):1557–66.
- electrocardiogram in wavelet domain using entropy measure. *J Res Med Sci*. 2011;16(11).
- Rabbani H**, Mahjoob MP, Farahabadi E, Farahabadi A. R peak detection in electrocardiogram signal based on an optimal combination of wavelet transform, Hilbert transform, and adaptive thresholding. *J Med Signals Sens. Medknow Publications*; 2011;1(2):91.
- Golabbakhsh M, Masoumzadeh M, Sabahi MF. ECG and power line noise removal from respiratory EMG signal using adaptive filters. *Majlesi J Electr Eng*. 2011;5(4).
- Zeraatkar E, **Kermani S**, Mehridehnavi A, Aminzadeh A, Zeraatkar E, Sanei H. Arrhythmia detection based on morphological and timefrequency features of t-wave in electrocardiogram. *J Med Signals Sens. Medknow Publications*; 2011;1(2):99–106.
- Dehnavi AM**, Fakhrpour A, Tavakoli MB, Nikoo MH. Investigation of the BNP level changes in blood stream in different modes and lead locations after pacemaker implementation. *J Med Signals Sens. Medknow Publications*; 2012;2(1):38.
- Farahabadi A, Farahabadi E, **Rabbani H**, Mahjoob MP. Detection of QRS complex in electrocardiogram signal based on a combination of hilbert transform, wavelet transform and adaptive thresholding. In: *Biomedical and Health Informatics (BHI)*, 2012 IEEE-EMBS International Conference on. IEEE; 2012.
- Farahabadi A, Farahabadi E, **Rabbani H**, Mahjoob MP, **Dehnavi AM**. Ischemia detection via dynamic time warping and fuzzy rules. In: *Biomedical and Health Informatics (BHI)*, 2012 IEEE-EMBS Int. Conf. on. IEEE; 2012. p. 166–9.
- Mehridehnavi A**, Salehpour N, **Rabbani H**, Behjati M. Partial linear transformation of vectorcardiogram to 12 lead electrocardiogram signals. In: *Bioinformatics & Bioengineering (BIBE)*, 2012 IEEE 12th International Conference on. IEEE; 2012. p. 91–4.
- Mehridehnavi A**, Salehpour N, Rabbani H, Behjati M. Posterior ECG: Producing a new electrocardiogram signal from vectorcardiogram 2007. p. 12–21.
- Kermani S**, Moradi MH, **Abrishami-Moghaddam H**, **Saneei H**, Marashi-Shoshtari MJ. 3D Point Wise Tracking of the Left Ventricle over Cardiac Image Sequences Using Active Mesh and Physical Models. *J Appl Sci*. 2008;8(24):4500–11.
- Farahabadi E, Farahabadi A, Rabbani H, Mahjoob MP, **Dehnavi AM**. Noise removal from electrocardiogram signal employing an artificial neural network in wavelet domain. In: *Information Technology and Applications in Biomedicine*, 2009 ITAB 2009 9th International Conference on. IEEE; 2009. p. 1–4.
- Kermani S**, Moradi MH, **Abrishami-Moghaddam H**, **Saneei H**, Marashi MJ, Shahbazi-Gahrouei D. Quantitative analysis of left ventricular performance from sequences of cardiac magnetic resonance imaging using active mesh model. *Comput Med Imaging Graph. Elsevier*; 2009;33(3):222–34.
- Akbary P, **Rabbani H**. Removing power line interference and ECG signal from EMG signal using matching pursuit. In: *Signal Processing (ICSP)*, 2010 IEEE 10th International Conference on. IEEE; 2010. p. 1717–41.
- Farahabadi E, Farahabadi A, Rabbani H, **Dehnavi AM**, Mahjoob MP. An entropy-based method for ischemia diagnosis using ECG signal in wavelet domain. In: *Signal Processing (ICSP)*, 2010 IEEE 10th International Conference on. IEEE; 2010. p. 195–8.
- Zeraatkar E, **Kermani S**, **Mehridehnavi A**, Aminzadeh A. Improving QRS detection for artifacts reduction. In: *Biomedical Engineering (ICBME)*, 2010 17th Iranian Conference of. IEEE; 2010. p. 1–4.
- Dehnavi ARM**, Farahabadi I, Rabbani H, Farahabadi A, Mahjoob MP, Dehnavi NR. Detection and classification of cardiac ischemia using vectorcardiogram signal via neural network. *J Res Med Sci*. 2011;16(2).
- Rabbani H, Mahjoob MP, Farahabadi E, Farahabadi A, **Dehnavi AM**. Ischemia detection by