



**UNIVERSITY OF CENTRAL FLORIDA**  
CENTER FOR RESEARCH IN COMPUTER VISION

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**“Estimation of deformable transformation between medical images”**  
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**ABSTRACT**

Medical image processing has allowed physicians to obtain otherwise unattainable tissue properties from medical images, and has helped clinicians transcend many limitations of conventional medicine. I will discuss two main thrusts of my research that aim to improve medical image computing. First, I will show that if multiple images are acquired while the tissue undergoes deformation, the deformation field can be computed and used to infer hidden tissue properties. I will discuss my contributions in the development of novel image processing algorithms to generate robust and accurate deformation fields. Second, I will talk about image registration, where two images of the same (possibly deformed) tissue that are acquired using different imaging modalities (e.g. ultrasound and magnetic resonance) are aligned together. Different imaging modalities cover a wide spectrum in terms of cost, ease of use and image quality, and therefore image registration has numerous applications. Here, I will describe how information theoretic measures and graph theory can be used to generate image similarity metrics. Both research fronts involve computation of parameters that lie on high-dimensional spaces, and are therefore computational and memory expensive. I will discuss my contributions in the development of efficient optimization techniques to solve these problems in near real-time.

**BIOGRAPHY**

Hassan Rivaz is a post-doctoral fellow at McGill University, where he works with D. Louis Collins on image registration. He received his PhD from Johns Hopkins University working with Gregory Hager, Gabor Fichtinger and Emad Boctor on tissue deformation estimation using medical images. He has submitted several successful research proposals to the Department of Defense, NSERC, Jeanne Timmins Costello Fellowship and Link Foundation as the PI. His research interests include medical image processing, computer vision, optimization, machine learning and graph theory.