OMB No. 0925-0001 and 0925-0002 (Rev. 09/17 Approved Through 03/31/2020)

BIOGRAPHICAL SKETCH

**Provide the following information for the Senior/key personnel and other significant contributors.**

**Follow this format for each person. DO NOT EXCEED FIVE PAGES**.

NAME: Bashiri, Fereshteh S

eRA COMMONS USER NAME (credential, e.g., agency login): BASHIRIF

POSITION TITLE: Project Scientist

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

| INSTITUTION AND LOCATION | DEGREE  (if applicable) | Completion Date  MM/YYYY | FIELD OF STUDY |
| --- | --- | --- | --- |
| Shahid Beheshti University, Tehran, Iran | B.S. | 08/2007 | Electrical Engineering |
| Sharif University of Technology, Tehran, Iran | M.S. | 08/2009 | Electrical Engineering |
| University of Wisconsin-Milwaukee, WI, USA | Ph.D. | 05/2019 | Electrical Engineering |

# A. Personal Statement

I have the training, knowledge, and motivation necessary to successfully carry out the proposed research project. I have a broad background in image processing for different applications ranging from character recognition to medical image analysis, and over 15 years of experience in programming and algorithm development. My research includes co-registration of multi-modal medical scans and data-driven analysis of geometric shapes (see publications below). The findings of my recent research on diagnostic classification of lung nodules have encouraged me to expand my research into the relationship between histology images and molecular structures of cancerous cells, for accurate drug-response prediction of different cancer diseases. My previous experiences in industry and academia have built-up my team-work ethics and professional communication skills. These experiences, coupled with my passion for artificial intelligence, data science, and applied mathematics, support my ability to contribute to this proposal.

1. **Bashiri, F. S.**, Badger, J. C., D’Souza, R. M., Yu, Z., Peissig, P. (2019). Lung Nodule Classification Using Combined Deep and Spectral 3D Shape Features. In IEEE-EMBS Int. Conf. on Biomedical and Health Informatics. Accepted.
2. Tafti, A. P., **Bashiri, F. S.**, LaRose, E., Peissig, P. (2018). Diagnostic Classification of Lung CT Images Using Deep 3D Multi-Scale Convolutional Neural Network. In 2018 IEEE Int. Conf. on Healthcare Informatics (ICHI) (pp. 412-414). IEEE.
3. **Bashiri, F. S.**, LaRose, E., Badger, J. C., D’Souza, R. M., Yu, Z., Peissig, P. (2018). Object Detection to Assist Visually Impaired People: A Deep Neural Network Adventure. In 2018 Int. Sym. On Visual Computing (ISVC) (pp. 500-510). Springer, Cham.
4. **Bashiri, F. S.**, Baghaie, A., Rostami, R., Yu, Z., & D’Souza, R. M. (2018). Multi-Modal Medical Image Registration with Full or Partial Data: A Manifold Learning Approach. Journal of Imaging, 5(1).

# B. Positions and Honors

## Positions and Employment

2009 – 2010 Research Engineer, Iran Telecommunication Research Center, Tehran, Iran

2010 – 2012 Electronic and Firmware Engineer, Hoorpendar C.T.I., Tehran, Iran

2012 – 2013 Research Engineer, Sherkat Kontorsazi Iran (SKI), Tehran, Iran

2017 – 2017 Graduate Research Assistant Intern, Marshfield Clinic Research Institute, Marshfield, WI

2017 – 2019 Research Specialist, Marshfield Clinic Research Institute, Marshfield, WI

2019 – Present Project Scientist, Marshfield Clinic Research Institute, Marshfield, WI

## Professional Memberships

2019 Institute of Electrical and Electronics Engineers (IEEE)

2018 American Medical Informatics Association (AMIA)

## Honors

2013 – 2017 Dean’s Fellowship, University of Wisconsin-Milwaukee, WI

2016 Graduate Research Poster Award, 3rd place, University of Wisconsin-Milwaukee, WI

2016 – 2017 Research Assistantship, GE Catalyst Award, University of Wisconsin-Milwaukee, WI

2019 Mike Krauski Award Finalist, University of Wisconsin-Milwaukee, WI

2019 Best Paper, 3rd Prize, IEEE-EMBS Biomedical and Health Informatics Conference

# C. Contribution to Science

1. Diagnostic classification of lung nodules

Accurate diagnosis of lung nodules, as a possible representative of lung cancer, depends highly on the efficacy of features that characterize a nodule. With the availability of advanced computational methods, developing a non-invasive computer-aided diagnosis has become possible. We conducted several studies using deep/machine learning methods and spectral analysis of 3D geometric structures to extract efficient features for accurate prediction of future samples. The findings of our studies in automatic extraction of features using machine intelligence can simply be generalized to a classification of abnormalities at other organs. Below is a list of publications reflecting our contributions in this domain:

* 1. Tafti, A. P., **Bashiri, F. S.**, LaRose, E., Peissig, P. (2018). Diagnostic Classification of Lung CT Images Using Deep 3D Multi-Scale Convolutional Neural Network. In 2018 IEEE Int. Conf. on Healthcare Informatics (ICHI) (pp. 412-414). IEEE.
  2. **Bashiri, F. S.**, Badger, J. C., D’Souza, R. M., Yu, Z., Peissig, P. (2019). Lung Nodule Classification Using Combined Deep and Spectral 3D Shape Features. In IEEE-EMBS Int. Conf. on Biomedical and Health Informatics. Accepted.

1. Data-driven analysis of geometric shapes

Quantitative assessment of organic structures includes numerical analysis of 3D structures, which may have been represented in the form of a stack of 2D images, 3D volume, and 3D surface meshes. Data-driven methods, e.g., deep and machine learning, coupled with spectral analysis of geometric structures provide a descriptive explanation of data that is useful for predicting future outcomes and decision support. Particularly, as part of my Ph.D. thesis, we studied manifold learning methods and its application in developing a shape descriptor, which has application in classification, shape retrieval, and matching.

* 1. Rostami, R., **Bashiri, F. S.**, Rostami, B., Yu, Z. (2018). A Survey on Data-Driven 3D Shape Descriptors. In Computer Graphics Forum.
  2. **Bashiri, F. S.**, Rostami, R., Peissig, P., D’Souza, R. M., Yu, Z. (2019). An Application of Manifold Learning in Global Shape Descriptors. arXiv preprint arXiv:1901.02508.

## Complete List of Published Work: <https://scholar.google.com/citations?user=2XAf0-gAAAAJ&hl=en>

# D. Additional Information: Research Support and/or Scholastic Performance

## Ongoing Research Support

None.

## Completed Research Support

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| --- | --- | --- |
| GE Catalyst Award | D’Souza (PI) | 09/01/2015 – 08/31/2017 |
| Co-registration of medical scans from different imaging modalities | | |
| The goal of this project is to develop an algorithm for co-registration of multi-modal medical scans which will benefit images with full or partial data. The algorithm is expected to facilitate recovering strong scales, rotations, and translations.  Role: Co-Investigator | | |