# Sara Shoouri

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## Education

**University of Michigan** **2021-present**
*Ph.D. in Electrical and Computer Engineering* *Ann Arbor, USA*
*Computer Vision and Machine Learning. GPA:4/4*

**University of Michigan** **2019-2021**
*M.Sc. in Electrical and Computer Engineering* *Ann Arbor, USA*
*Signal and Image Processing and Machine Learning. GPA:4/4*

**Sharif University of Technology** **2014-2019**
*B.Sc. in Electrical Engineering* *Tehran, Iran*
*Communication Systems. GPA: 17/20 (3.70/4)*

## Technical Skills

**Languages**: Python, MATLAB, Julia, C.
**Machine Learning Libraries:** Pytorch, Tensorflow, Scikit-Learn, Pandas.
**Relevant courses:** (1) Probability and Random Processes, (2) Matrix Methods for Signal Processing and Machine Learning, (3) Optimization Methods in Signal Processing and Machine Learning, (4) Computer Vision, (5) Advanced Computer Vision, (6) Hybrid Control.

## Research Interest

Efficient Deep Learning Networks, Low-Cost Computer Vision Models, Multi-Task Learning, Multi-Modality, Real-time Video Processing

## Professional Experience

**University of Michigan** **2020 – present**
***Graduate Student Research Assistant* | *Advisor: Prof. Hun-Seok Kim*** *Ann Arbor, MI*

Efficient multi-modality sensor fusion for 3D object detection

- Conducting research on adaptive LiDAR for 3D object detection.

Efficient Computation Sharing for Multi-Task Visual Scene Understanding

- Introduced a novel framework that efficiently addresses multiple visual tasks by sharing knowledge through computation and parameter sharing among individually trained single-task transformers, outperforming SOTA in accuracy and resource utilization across image and video data. Our model achieves 40.5% and 65.7% reduction in FLOPS for the single image and video, respectively.

Siamese Learning-based Monarch Butterfly Localization

- Advocated a GPS-less strategy utilizing deep learning sensor fusion to enhance daily Monarch butterfly tracking accuracy. The model incorporates daylight intensity and temperature data, enabling accurate butterfly localization through the utilization of Siamese networks. This model can achieve a mean absolute error of 1.416° in latitude and 0.393° in longitude coordinates outperforming the SOTA.

**University of Michigan** **2019 – 2020**
***Graduate Student Research Assistant* | *Advisor: Prof. Necmiye Ozay*** *Ann Arbor, MI*

Falsification of a Vision-based Automatic Landing System

- Performed an exhaustive analysis of automatic landing system reliability for fixed-wing aircraft, utilizing camera-centric sensing. Devised an innovative vision-oriented landing framework, integrating PID control and runway location estimation.

**Commonwealth Scientific and Industrial Research Organisation** **Fall 2018**
***Research Intern*** *Brisbane, Australia*

Estimating heart rate and detecting feeding events of fish using an implantable biologger

- Devised an advanced processing pipeline for resource-constrained embedded systems, extracting key insights like heart rate and feeding events.

**Sharif University of Technology** **2017 – 2018**
***Student Research Assistant*** *Tehran, Iran*

- Developed a novel model for the accurate detection of Apnea disease utilizing ECG signals.

## Publications

**Sara Shoouri**, et al. "Efficient Computation Sharing for Multi-Task Visual Scene Understanding." In Proceedings of the IEEE/CVF International Conference on Computer Vision (**ICCV**). 2023.

Fan, Zichen, Qirui Zhang, Pierre Abillama, **Sara Shoouri**, et al. "TaskFusion: An Efficient Transfer Learning Architecture with Dual Delta Sparsity for Multi-Task Natural Language Processing." In Proceedings of the 50th Annual International Symposium on Computer Architecture (**ISCA**), 2023.

Morteza Tavakoli Taba, S. M. Hossein Naghavi, **Sara Shoouri**, et al. "A 53-62 GHz Two-channel Differential 6-bit Active Phase Shifter in 55-nm SiGe Technology." In Proceedings of IEEE 49th European Solid State Circuits Conference (**ESSCIRC**), 2023.

**Sara Shoouri**, et al. "Siamese Learning-based Monarch Butterfly Localization." In IEEE Data Science and Learning Workshop (DSLW), 2022. | [Code]

Inhee Lee, Roger Hsiao, Gordy Carichner, Mingyu Yang, **Sara Shoouri**, et al. "mSAIL: milligram-scale multi-modal sensor platform for monarch butterfly migration tracking." In Proceedings of the 27th Annual International Conference on Mobile Computing and Networking (**Mobicom**), 2021. | [Code]

Lee, Inhee, Roger Hsiao, Gordy Carichner, Mingyu Yang, **Sara Shoouri**, et al. "Tracking the Migration of the Monarch Butterflies with the World's Smallest Computer." GetMobile: Mobile Computing and Communications, 2021.

Shen, Yiran, Reza Arablouei, Frank De Hoog, Xing Hao, James Sharp, **Sara Shoouri**, et al."In-situ Fish Heart Rate Estimation and Feeding Event Detection Using an Implantable Biologger." IEEE Transactions on Mobile Computing, 2021.

**Shoouri, Sara**, et al."Falsification of a Vision-based Automatic Landing System." In AIAA Scitech 2021 Forum, 2021.

Shen, Yiran, Reza Arablouei, Frank de Hoog, James Sharp, **Sara Shoouri**, et al. "Estimating heart rate and detecting feeding events of fish using an implantable biologger." In 19th ACM/IEEE International Conference on Information Processing in Sensor Networks (**IPSN**), 2020.

## Course Projects

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|---|---|
| 3D Shape Synthesis via Style and Deep Geometric Texture Transfer \| [Code] \|*EECS 542* | **Fall 2021** |
| COVID-19 X-Ray Image Classification Using Contrastive Learning \| [Code] \| *EECS 545* | **Winter 2021** |
| Invariant set computation for auto-landing systems using HJB toolbox \| *EECS 563* | **Fall 2020** |
| MPC controller for dynamic vehicle collision avoidance and path-following \| [Code] \| *EECS 561* | **Winter 2020** |
| Unpaired Image-to-Image Translation using CycleGaN \| [Code] \| *EECS 504* | **Fall 2019** |

## Scholarships & Awards

- Audience choice awards for the paper presentation at DSLW 2022. | *May 2022.*
- Full fund PhD offers from UMICH, Purdue University, WISC. | *Fall 2021.*
- Full fund PhD offers from WISC, Rice University, UCSB, NCSU, ND. | *Fall 2019.*
- Ranked 85th (top 0.038 percent) among 222'507 participants in the Iranian Nationwide University Entrance Exam Known as Konkoor. | *Fall 2014.*