

# Mingyu Yang

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## EDUCATION

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### University of Michigan

*Doctor of Philosophy in Electrical and Computer Engineering; GPA: 4.0*

Ann Arbor, MI

*Dec. 2024 (Expected)*

### University of Michigan

*Master of Science in Electrical and Computer Engineering; GPA: 4.0*

Ann Arbor, MI

*Apr. 2019*

### Beijing University of Technology

*Bachelor of Engineer in Internet of Things; GPA: 4.19/4.2*

Beijing, China

*Jun. 2017*

## WORK EXPERIENCE

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### Samsung Research America

*Research Intern - AI Center*

MountainView, CA

*May 2024 - Aug 2024*

- Explored **time series foundation models (TSFM)** and their usage in the time series classification task.
- Performed multiple fine-tuning techniques (e.g., Linear Probing, Full Finetuning, LoRA, etc) on multiple cutting-edge transformer-based TSFMs such as Moment, UniTS, and Chronos.
- Proposed a learnable input normalization layer and a channel mixing module to boost TSFMs' downstream performance by 9.88% on popular multivariate time series classification datasets.

### Meta

*Machine Learning Software Engineer Intern - Ads Integrity Team*

Seattle, WA

*May 2022 - Aug 2022*

- Worked on ML solutions for Business Manager (BM) Abuse and Compromise Detection using Activity Sequences.
- Managed two data pipelines with **Presto** to prepare the training dataset and perform data pre-processing.
- Developed the first sequential model for abusive BM detection and BM compromise detection using CNN-based TIES model, and achieved 1% and 57% improvement in AUROC respectively.
- Proposed the first learning-based method to interpret and visualize the importance of each business activity using the attention maps of a two-layer **Transformer**.

## RESEARCH EXPERIENCE

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### High realism Wireless Image Transmission with Conditional Diffusion Models

- Proposed a two-stage Joint Source-Channel Coding (JSCC) framework to enable high realism wireless image transmission using the pre-trained **Stable Diffusion** model.
- Designed a controllable module to finetune the Stable Diffusion model at the receiver side, which takes multimodal spatial and textual features from the received signals as the conditions.
- The proposed method enables realistic image reconstruction even at 0.008 symbols/pixel, with 43.8% and 61.4% reduction in LPIPS and FID score on the Kodak dataset.

### SAM-guided Source-free Domain Adaptation for Multi-modal 3D Semantic Segmentation

- Proposed a novel scheme to generate reliable pseudo labels for source-free 3D semantic segmentation domain adaptation using the zero-shot prior knowledge of the **Segment Anything Model (SAM)**.
- Developed an adaptive pseudo-label propagation strategy using both 3D descriptors and SAM masks.
- The proposed method exhibits a 4% improvement in mIoU when adapting from A2D2 to Semantic KITTI.

### Adaptive Modality Selection for Efficient Deep Visual Inertial Odometry

- Proposed a novel deep learning-based **Visual Inertial Odometry** system that dynamically disables the visual modality based on the IMU readings and previous motion states to save the computations.
- Designed a pose estimation network using **LSTM** and a policy network using the **Gumbel-Softmax**.
- The proposed method learned an interpretable policy with an integrate-and-fire pattern and achieved state-of-the-art performance on KITTI with only 20% visual modality usage, providing 78.8% reduction in FLOPS.

## Efficient Computation Sharing for Multi-Task Visual Scene Understanding

- Proposed a novel computation sharing scheme for Multi-task Visual Transformers, where each task (semantic segmentation, depth estimation, edge detection) can be trained individually without balancing the losses.
- Proposed to extend the computation sharing scheme to temporal domain to save more computations.
- The proposed method achieves state-of-the-art performance among multi-tasking transformers on NYU-v2 and PASCAL dataset with 40.5% and 65.7% reduction in FLOPS for single image and video respectively

## Multi-Modal Migrating Monarch Butterfly Localization using Light Intensity and Temperature

- Designed the first **multi-modal late fusion** framework to estimate the likelihood of arbitrary location queries given one day's measurement of light intensity and temperature from a migrating Monarch butterfly.
- The proposed method could provide  $< 1.7^\circ$  latitude error and  $< 0.6^\circ$  longitude error through maximum likelihood estimation, outperforming the baseline thresholding method by 80%.
- Extended the method with **Particle Filtering & Smoothing** to perform further optimization for the entire path, which decreased the error by 47.6% in simulated migration paths

## RF-based Local Positioning System with Simultaneous Localization and Communications

- Developed an RF-based **indoor localization system** that could simultaneously locate an unlimited number of tags in a decimeter accuracy while providing reliable wireless communications.
- Designed a learning-based **Time-of-Arrival (ToA) estimation** algorithm given **channel responses (CIR)**.
- Performed field trials using Universal Software Radio Peripheral (USRP) and achieved decimeter-level accuracy.

## SELECTED PUBLICATIONS/PREPRINTS

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- **M. Yang**, B. Liu, and H. Kim. "Diffusion-Aided Joint Source Channel Coding For High Realism Wireless Image Transmission", **Arxiv**, 2024
- S. Shouri, **M. Yang**, Z. Fan, et al. "Efficient Computation Sharing for Multi-Task Visual Scene Understanding", International Conference on Computer Vision (**ICCV**), 2023
- Y. Chen, **M. Yang**, and H. Kim. "Search for Efficient Deep Visual-Inertial Odometry through Neural Architecture Search", International Conference on Acoustics, Speech, and Signal Processing (**ICASSP**), 2023
- **M. Yang**, Y. Chen, and H. Kim. "Efficient Deep Visual and Inertial Odometry with Adaptive Visual Modality Selection", European Conference on Computer Vision (**ECCV**), 2022
- **M. Yang** and H. Kim. "Deep Joint Source Channel Coding for Wireless Image Transmission with Adaptive Rate Control", International Conference on Acoustics, Speech, and Signal Processing (**ICASSP**), 2022
- **M. Yang**, C. Bian, et al. "OFDM-guided deep joint source-channel coding for wireless multipath fading channels", IEEE Transactions on Cognitive Communications and Networking (**IEEE TCCN**), 2022
- S. Shouri, **M. Yang**, G. Carichner, et al. "Siamese Learning-Based monarch Butterfly Localization", IEEE Data Science and Learning Workshop (**DSLW**), 2022
- C. Bian, **M. Yang**, C. Hsu, et al. "Deep Learning Based Near-Orthogonal Superposition Code for Short Message Transmission", International Conference on Communications (**ICC**), 2022
- **M. Yang**, C. Bian, and H. Kim. "Deep Joint Source Channel Coding for Wireless Image Transmission with OFDM", International Conference on Communications (**ICC**), 2021
- **M. Yang**\*, Y. Hsiao\*, and H. Kim. "Super-Resolution Time-of-Arrival Estimation using Neural Networks", European Signal Processing Conference (**EUSIPCO**), 2020
- **M. Yang**, R. Hsiao, G. Carichner, et al. "Migrating Monarch Butterfly Localization Using Multi-Modal Sensor Fusion Neural Networks", European Signal Processing Conference (**EUSIPCO**), 2020
- **M. Yang**, L. Chuo, K. Suri, et al. "iLPS: Local Positioning System with Simultaneous Localization and Wireless Communication", IEEE Conference on Computer Communications (**INFOCOM**), 2019

## PATENTS

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- "Low-Power, Long-Range RF Localization System And Method", Application US16654547

## TECHNICAL SKILLS

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Python, PyTorch, MATLAB, Presto, SQL, C/C++, LaTeX, Github, R, Julia, HTML