Mohtasim Hadi Rafi

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LinkedIn | GitHub | Google Scholar

Education

- **Auburn University** *May, 2024 - Present*
  MS in Biosystems Engineering | GPA: 4.00/4.00 Auburn, AL, USA
  - **Advisor:** Dr. Tanzeel Rehman
  - **Committee Members:** Dr. Jeremy Pickens, Dr. Effat Farhana
  - **Thesis:** Unmanned Ground Vehicle based Ornamental Plant Nursery Inventory Management using Deep Learning and Cloud Based Platforms

- **Islamic University of Technology** *Jan, 2019 - May, 2023*
  BSc in Software Engineering | GPA: 3.48/4.00 Gazipur, Bangladesh
  - **Advisor:** Dr. Md. Hasanul Kabir & Sabbir Ahmed
  - **Thesis:** An Efficient Deep Learning-based Approach for Recognizing Agricultural Pests in the Wild

Professional Experience

- **Auburn University** *May, 2024 - Present*
  Graduate Research Assistant Auburn, AL, USA
- **Intelligence Machines Limited** *Apr, 2022 - Mar, 2024*
  Analytics Engineer Dhaka, Bangladesh
- **Sunshine National School** *Nov, 2019 - Dec, 2019*
  Mathematics Instructor Bhaktapur, Nepal

Patents

P=In Preparation, S=In Submission, D=Complete

[P.1] **Rafi, M. H.**, Ahmed, F., & Rehman, T. U. (2025). **KBTrack: Long Term Tracking for Plant Counting with Cloud-Enabled Plant Segmentation Framework for Ornamental Nursery Inventory Management**.

[P.2] Syed, H., **Rafi, M. H.**, & Rehman, T. U. (2025). **Automated in-field inventory management and quality assessment system using end-to-end deep learning for ornamental nursery crops**.

[P.3] Waseem, M., **Rafi, M. H.**, & Rehman, T. U. (2025). **Enhancing the Ornamental Inventory and Quality Assessment Across Diverse Growth Stages using Unsupervised Domain Adaptation**.

Publications

C=Conference proceedings, J=Journal, P=In Preparation, S=In Submission

[C.1] **Rafi, M. H.**, Mahjabin, M. R., Rahman, M. S., Kabir, M. H., & Ahmed, S. (2023, December). **A Critical Analysis of Deep Learning Applications in Crop Pest Classification: Promising Pathways and Limitations.**. In *2023 26th International Conference on Computer and Information Technology (ICCIT)*, (pp. 1-6). IEEE. 13 Dec, 2023, Cox's Bazar, Bangladesh. DOI: 10.1109/ICCIT60459.2023.10441417

[S.1] Ahmed, F., Syed, H., **Rafi, M. H.**, Pickens, J. & Rehman, T. U. (2025). **Autonomous Robotic Navigation in Ornamental Crop Production Using Vision and Sensor Fusion**. In *Smart Agricultural Technology.*

[P.1] **Rafi, M. H.**, Syed, H., Ahmed, F., & Rehman, T. U. (2025). **Edge-Optimized High-Throughput Phenotyping Lightweight Deep Learning Model for Real-time Plant Tracking, Volume Estimation and Quality Assessment using Stereo Vision**.

[P.2] Syed, H., **Rafi, M. H.**, Ahmed, F., Pickens, J., Bao, Y. & Rehman, T. U. (2025). **A label-free deep learning approach to count and assess ornamental plants**.

[P.3] Syed H. H., **Rafi, M. H.**, Ahmed F., Pickens J., & Rehman, T. U. (2025). **Enhancing the Ornamental Inventory and Quality Assessment Across Diverse Growth Stages using Unsupervised Domain Adaptation.**.

[P.4] Syed, H., **Rafi, M. H.**, Ahmed, F., Pickens, J., Bao, Y. & Rehman, T. U. (2025). **Unmanned Systems and Deep Learning for Automation in Ornamental Crop Monitoring**.

[P.5] **Rafi, M. H.**, Rahman, M. H., Pickens, J., Ahmed, F., & Rehman, T. U. (2025). **Integrating Hyperspectral Imaging in Pest Detection: A Systematic Review and Meta-Analysis**.

PRESENTATIONS

O=ORAL, P=POSTER

[O.1] **Rafi, M. H.**, Ahmed, F., Syed, H., & Rehman, T. U. (2025). **KBTrack: Long Term Tracking for Plant Counting with Cloud-Enabled Plant Segmentation Framework for Ornamental Nursery Inventory Management**. In *2025 American Society for Horticultural Science Conference*, Jul 28 - Aug 01, Hyatt Regency, New Orleans, LA, USA.

[O.2] **Rafi, M. H.**, Ahmed, F., Syed, H., & Rehman, T. U. (2025). **Cloud-Enabled Plant Segmentation and Tracking Framework for Ornamental Nursery Inventory Management.**. In *2025 Annual International Meeting of American Society of Agricultural and Biological Engineers*, Jul 13 - Jul 16, Sheraton Centre Toronto Hotel, Toronto, Ontario, Canada.

[O.3] **Rafi, M. H.**, Ahmed, F., Syed, H., & Rehman, T. U. (2025). **Cloud-Enabled Plant Segmentation and Tracking Framework for Ornamental Nursery Inventory Management.**. In *AI in Agriculture and Natural Resources Conference*, March 31 - April 02, The Mill, Starkville, MS, USA.

[P.1] **Rafi, M. H.**, Ahmed, F., Syed, H., & Rehman, T. U. (2025). **AI Enabled Cloud-based Inventory Management System for Ornamental Nurseries**. In *Harnessing Data Science for Collaborative Advances in Production Agriculture*, April 21, The Hotel at Auburn University, Auburn, AL, USA.

[P.2] **Rafi, M. H.**, Ahmed, F., Syed, H., & Rehman, T. U. (2025). **Automated In-field Ornamental Nursery Plant Counting and Quality Assessment with End-to-End Deep Learning for Inventory Management**. In *Harnessing Data Science for Collaborative Advances in Production Agriculture*, April 21, The Hotel at Auburn University, Auburn, AL, USA.

[P.3] **Rafi, M. H**, Ahmed, F., Syed, H., & Rehman, T. U. (2025). **Long-term Association with Ensemble Backbone for Accurate Plant Counting**. In *Auburn's 2025 Research Symposium*, March 26, Auburn University, Auburn, AL, USA.

HONORS AND AWARDS

- **Harnessing Data Science and AI for Collaborative Advances Forum in Production Agriculture Forum**
- Winner of Poster Competition, *AL, USA* *Apr, 2025*
- **FIRA USA Farm Robotics Challenge**, Excellency in Productivity (USD 5,000), *CA, USA* *Oct, 2024*
- **European Rover Challenge**, 10th in the world, *Remote* *Sep, 2021*
- **10th ICT Fest, IUT**, Second Runner's up in Hackathon (BDT 10,000), *Gazipur, Bangladesh* *Apr, 2019*
- **National High School Programming Contest**, Regional Winner, *Mymensingh, Bangladesh* *Jun, 2016*

GRANTS & FELLOWSHIPS

- International Conference Travel Support of $1000 for presenting work in ASABE Annual International Meeting in Torronto, Canada from College of Agriculture, Auburn University.
- GSC Travel Fellowship of $400 for presenting work in AI in Agriculture and Natural Resources Conference at Mississippi from Graduate Student Council, Auburn University
- India Bangladesh Maitree Muktijoddha Sontan Scholarship of BDT 50,000 (USD equivalent 600) during freshman year of undergrad.

MENTORSHIP AND ADVISING

Undergraduate

- **Ayesha Afroza Mohsin**, Software Engineering, Islamic University of Technology *Sep, 2023 - Jan, 2024*
- **Nafisa Maliat**, Software Engineering, Islamic University of Technology *Sep, 2023 - Jan, 2024*
- **Shanta Maria**, Software Engineering, Islamic University of Technology *Sep, 2023 - Jan, 2024*

SKILLS

- **Programming Languages:** Python, JavaScript, TypeScript, R, Java, C, C++, Java, Bash, SQL
- **Data Science & Machine Learning:** NumPy, Pandas, Matplotlib, PyTorch, Tensorflow, Tensorboard, Keras, OpenCV, Textract, Scikit-Learn, Tableau, Google Big Query, Microsoft Power BI
- **Web Technologies:** FastAPI, Flask, Django, Selenium, Flask, React, Node, Express
- **Database Systems:** MySQL, MongoDB, Firebase, Oracle
- **Cloud Technologies:** Azure, AWS, RabbitMQ
- **DevOps & Version Control:** Git & GitHub, Docker, Kubernetes
- **Embedded Systems:** Nvidia Jetson Modules, Raspberry Pi, Arduino
- **Other Tools & Technologies:** ArcGIS, Pix4DMapper, Markdown, Latex, Office Suits, Figma, Photoshop, Illustrator

Certifications

- Google Data Analytics Professional Certificate *2022*
- Introduction to TensorFlow for Artificial Intelligence *2022*
- Building Web Applications in Django *2022*
- Neural Networks and Deep Learning by DeepLearning.AI *2021*

Projects

- **Florabot: [Website]** *May, 2024 - Dec, 2024*
  Affiliation: Auburn University
  ◦ Ornamental nurseries contain hundreds of thousands of plants across various varieties, making their counting, quality assessment and continuous management challenging. Florabot offers a solution to address these issues by tackling labor shortages, optimizing costs, and ensuring high-quality standards in nurseries.
- **Biponon Retail AI: [YouTube Preview]** *Aug, 2023 - Mar, 2024*
  Affiliation: Intelligent Machines Limited
  ◦ Millions of street retailers (micro-merchants) in Asia are out of coverage of important infrastructure and services which make them particularly vulnerable due to the fact that they also lack critical skills like inventory or category management and suffer from poor finance practices. Connecting these outlets would make direct positive impacts on the lives of millions of people. And, this operation would be sustainable because businesses would benefit from outlet-level data and access.
- **Dharapat Bank Statement & CIB Analyzer with Credit Scoring: [YouTube Preview]** *Apr, 2022 - Mar, 2024*
  Affiliation: Intelligent Machines Limited
  ◦ Developed AI and Analytics module for Dharapat, a bank statements and CIB report analyzer used by IDLC Finance and Prime Bank Limited, by researching, proposing, and developing analytic modules and data pipelines. These solutions efficiently extract and analyze data from PDF files, streamlining operations and enhancing data insights.
- **Sheba.XYZ Database Normalization:** *Jun, 2023 - Sept, 2023*
  Affiliation: Intelligent Machines Limited
  ◦ Revamped Sheba.XYZ's database for faster query execution by documenting entity relationships, designing optimized structures, and enhancing overall efficiency.
- **Jontro - Predictive Maintenance:** *Jan, 2023 - Jun, 2023*
  Affiliation: Intelligent Machines Limited
  ◦ Developed and implemented a state-of-the-art Predictive Maintenance AI module, reducing downtime, improving operational efficiency, and achieving cost savings through advanced machine learning algorithms for British American Tobacco, Bangladesh.

Leadership Experience

- **Islamic University of Technology Computer Society**, Head of Public Relations *2020-2022*
- **IUT 10th National ICT Fest**, Organizer, *Gazipur, Bangladesh* *2019*

Professional Associations

- **American Society of Agriculture and Biological Engineers**
- **International Society of Precision Agriculture**
- **American Society for Horticultural Sience**
- **Institute of Electrical and Electronics Engineers**

References

1. **Dr. Tanzeel Rehman**
   Assistant Professor, Biosystems Engineering
   Auburn University
   Email: tur0001@auburn.edu
2. **Sabbir Ahmed**
   Assistant Professor, Computer Science & Engineering
   Islamic University of Technology
   Email: sabbirahmed@iut-dhaka.edu
3. **Tarique Siddique**
   Head of Analytics Engineering
   Intelligent Machines Limited
   Email: tarique@intelligentmachin.es