Protik Bose Pranto

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Summary

Urban Informatics Researcher specializing in urban systems through the application of machine learning, remote sensing, and geospatial analysis. My research focuses on developing AI-driven models for urban mapping, assessing extreme heat impacts, and analyzing vegetation dynamics to enhance urban sustainability and resilience through advanced technologies.

Education

Arizona State University *August, 2022 - Present*
Ph.D. in *Computer Science*
Research Area: Urban Informatics, Machine Learning, and AI-Driven Urban Mapping

Bangladesh University of Engineering and Technology *March, 2016 - February, 2021*
Bachelors in *Computer Science and Engineering*

Research Experience

SHaDE Lab: Sensable Heatscapes and Digital Environments Lab *2023 – Present*
Graduate Student Assistant

Graph Drawing and Information Visualization Laboratory, BUET *2019 – 2021*
Undergraduate Researcher with Prof. Md. Saidur Rahman

Publication

- **Protik Bose Pranto**. *Paper:* "Satire or Fake News? Machine Learning-Based Approaches to Resolve the Dilemma". In: **Accepted** at *International Conference on Electrical, Computer, Communications and Mechatronics Engineering*, **ICECCME** (**2024**).

- **Protik Bose Pranto**, Waqar Hassan Khan, Sahar Abdelnabi, Rebecca Weil, Mario Fritz and Rakibul Hasan. *Paper:* "From Bad to Worse: Using Private Data to Propagate Disinformation on Online Platforms with a Greater Efficiency". In: **Accepted** at *Design x Policy*, **CHI Workshop** (**2023**).

- **Protik Bose Pranto**, Bishal Basak Papan, and Md. Saidur Rahman. *Paper:* "k-Safe Labelings of Connected Graphs". In: **Accepted** at *IEEE International Conference on Telecommunications and Photonics*, **ICTP** (**2021**).

- Bishal Basak Papan, **Protik Bose Pranto**, and Md. Saidur Rahman. *Paper:* "On 2-Interval Pairwise Compatibility Properties of Two Classes of Grid Graphs". In: **Accepted** at *The Computer Journal*, **COMPJ** (**2021**).

Poster/Presentation

- **Protik Bose Pranto**, Waqar Hassan Khan, Ariane Middel. *Poster:* "A Systematic Literature Review on Urban Climate Informatics". In: **Accepted** at *Urban Climate Research Center Poster Event*, **UCRC** (**2025**).

- **Protik Bose Pranto**, Waqar Hassan Khan, Sahar Abdelnabi, Rebecca Weil, Mario Fritz and Rakibul Hasan. *Poster:* "Understanding the Effect of Private Data in Disinformation Propagation". In: **Accepted** at *Symposium on Usable Privacy and Security*, **SOUPS** (**2023**).

- Waqar Hassan Khan, **Protik Bose Pranto**, Tianyi Yang, Rakibul Hasan. *Poster:* "Exploring Privacy and Security Concerns of EdTech Users: A Qualitative Analysis of User Written Reviews". In: **Accepted** at *Symposium on Usable Privacy and Security*, **SOUPS** (**2023**).

Selected Research Experience

- **Literature Review on Urban Climate Informatics**: Conducting a comprehensive systematic literature review to explore the intersection of urban climate and computer science and examine how this cross-disciplinary approach addresses various urban climate challenges. Our initial findings show a growing interest in social media and crowdsourced approaches in urban climate research.

- **Pedestrian Network Mapping**: Developed WalkNet, a scalable framework for generating detailed pedestrian networks by integrating street-level imagery with open geospatial data. The framework uses semantic segmentation to extract sidewalks and roads, and classifies them into arterial, collector, or residential categories. Implemented in Phoenix, Arizona, WalkNet achieved 78.2% overall classification accuracy, with high precision for arterial (98.05%) and residential roads (78.19%). The results highlighted gaps in OpenStreetMap data and demonstrate WalkNet's potential for low-cost, city-scale infrastructure mapping, supporting walkability analysis and urban planning.

- **City-scaled LiDAR-Based Tree Species Mapping** : Developing an automated pipeline using LiDAR and machine learning to create a high-resolution tree inventory in the CAP LTER region. The project is focusing on classifying native vs. non-native species, analyzing canopy structure (height, width, shape), and mapping spatial distribution. Outcome: Provided data to inform urban forestry planning and heat mitigation strategies for Phoenix-Tempe.

- **Feature-Based App Analysis**: Conducted an automated exploration of app features to scrutinize collected data through network traffic analysis. In cases of obfuscated or altered data, Frida Hooking was employed to identify and understand the specific permission methods called by the app. Outcome: Enhanced understanding of app data collection practices and potential privacy concerns.

- **Real-Time Violence Detection from Videos**: Applied I3D (video classification model) and OpenPose (real-time human pose detection) to detect violations in surveillance video. The Hierarchical Multiple Instance Learning model was used to identify patterns of violation. Outcome: Developed a robust system for detecting and classifying violent events in real-time surveillance footage.

- **Satire or Fake news? Machine Learning Based Approaches to Resolve the Dilemma**: Investigated the effectiveness of nine traditional machine learning models and three transformer-based models (BERT, XLM-RoBERTa, DistilBERT) in distinguishing between fake and satirical news. The study found that SVM performed best with a small dataset after text preprocessing, while XLM-RoBERTa achieved 97% accuracy after text augmentation. Outcome: Established a reliable approach for classifying fake vs. satirical news.

- **Bengali Covid Related Misinformation Detection**: Developed machine learning models, particularly BERT, to detect fake news in Bengali related to COVID-19. The model achieved an F1-score of 0.97. The analysis revealed 10 topics grouped into categories: System (e.g., medical system), belief (e.g., religious rituals), and social (e.g., scientific awareness). Outcome: Advanced the detection of misinformation in regional languages, contributing to public health efforts.

Research Area

- AI-Driven Urban Mapping
- Remote Sensing and Geospatial Analysis
- Urban Climate Informatics
- Machine Learning for Urban Systems

Achievements

- Secured runners-up at **SpaceHACK for Sustainability Hackathon** *2025*
- Won 3rd place in the graduate category at the **UCRC Poster Event** *2025*
- Awarded **USENIX Security Student Grant** *2023*
- Got accepted into the **post-CHI summer school** on Usable Privacy and Security *2023*
- Been awarded the **SCAI Doctoral Fellowship** *2022*
- Completed **Google Foobar Challenge** *2020*
- Ranked 3rd place in **South Asia Center for Media in Development** *2020*
- Winner of the **HackTheCode contest** in **Google Cloud DevFest** *2019*

Grants

- **CAP LTER Grad Grant:** Awarded $5000 in funding from the Central Arizona–Phoenix Long-Term Ecological Research program (CAP LTER), a National Science Foundation (NSF)-funded initiative focusing on urban ecology. As the lead researcher on the project "Mapping the Distribution and Characteristics of Native and Non-Native Tree Species," I am developing an automated pipeline using LiDAR and machine learning to create a high-resolution urban tree inventory. This work supports urban forestry planning and heat mitigation strategies in the Phoenix-Tempe region.

- **USENIX Security Student Grant:** Awarded $700 to attend the USENIX Security'23 conference, where I presented my work on misinformation. This grant supported my participation in the conference.

Academic Services

- **Peer Reviewer for Papers** *ICECCME 2025, ICECET 2025, ACDSA 2025*
- **Conference Session Chair** *ICECCME 2024*
- **Invited Talk** *ASU CyberSecurity Symposium 2023*
- **Student Volunteer** *SOUPS 2023*

Leadership Experiences

- **Coordinator**, OLsA-Arizona Laboratorians Chapter *2024 - Present*
- **Student Representative**, Bangladesh Student Association, Arizona State University *2023 - Present*
- **Organising Member**, Laboratorian Association of BUET *2019 - 2020*

Industry Experience

Start Network *March, 2022 - July, 2022*
Consultant

On their Forecast-based, Warning, Analysis, and Response Network (FOREWARN) project, I conducted a Data Science program. I also worked with the team and provide technical assistance in the pursuit of a peer-reviewed publication.

Chaldal Engineering *March, 2021 - February, 2022*
Software Engineer

I have worked in Customer Experience team managing their website, mobile app, order APIs, search catalog and other user-facing services. I also worked in the *EggShell* team, which is a tech stack for front end apps. It combines a number of technologies like React, Fable, ReactXP, RenderDSL, and StyleDSL exhibiting a common framework for both web and android.

Teaching Assistant

- **CSE 100 (Principle of Programming with C++)**
  The course focuses on programming concepts, problem solving, and program design.

- **CSE 360 (Introduction to Software Engineering)**
  Introduces software engineering principles such as life cycle models, development methods, UML, project management, testing, and quality assurance standards.

- **CSE 467 (Data and Information Security)**
  This course is intended to provide students with an introductory understanding of the technical and behavioral mechanisms for information security and privacy.

- **CSE 470 (Computer Graphics)**
  This course introduces the basic concepts of interactive computer graphics, realistic rendering, and 3D viewing.

- **CSE 477 (Intro Computer-Aided Geometric Design)**
  The course introduces basic concepts of 3-D computer geometry, including curves, surfaces, and meshes.

- **CSE 485 (ASU Capstone Project)**
  It is a project-based course linking students with industry and faculty-sponsored projects, cultivating practical experience and preparing them for the professional world.

Skills

- **Programming Languages:** C, C++, Java, Python, R, Dart, SQL, HTML, Typescript, F#.
- **Mobile App Development:** Android, Flutter, React Native.
- **Machine Learning and Data Science:** TensorFlow, Keras, PyTorch, Scikit-learn, Matlab, Probability and Statistics.
- **Geospatial and Computer Vision:** OpenCV, CUDA, Unity, LiDAR.
- **Tools and Platforms:** Git, JavaFX Scene Builder, Qualtrics.

Selected Academic Projects

Vasha-Sikkha
Dart

- A Flutter-based application designed to help users learn English interactively. Users can practice speaking, reading, listening, and writing through various tasks. Scores are tracked, and upon completing lessons, they are updated. Users can also view their rankings on the leaderboard.

CovidLife
Dart

- This Flutter-based health app displays COVID-19 information for Bangladesh, using two built-in APIs to provide district-wise and daily data. Doctor's appointments, phone calls or messages can be made easily.

Real-Time Vehicle Detection and Tracking Using a Fisheye Camera
Python

- A dataset of traffic videos from a fisheye camera is trained using the YOLOv5 algorithm. Fisheye images are mathematically modified to get a low distortion ratio so that vehicles at the junction can easily be identified.

Gesture Sensed Snake Game
C,C++,Makefile

- This hardware project utilizes an Atmega32 microcontroller and an accelerometer sensor. Four 8×8 RGB dot matrices are controlled by three types of decoders, with the rows managed by two 3×8 decoders (IC 74138).

Hotel Management System
Java,SQL

- This is a Java and Oracle Database-based project. JavaFX Scene Builder is used for the UI parts. In the database system, employees can be identified by their name, address, phone number, ID, job title, salary, and hire date. The user can also add, delete, and edit the reservation.

References

Dr. Ariane Middel
Associate Professor, School of Computing and Augmented Intelligence, Arizona State University
Relationship: Ph.D. Advisor
Email: amiddel@asu.edu

Dr. Isaac Buo
Postdoctoral Scholar, School of Arts, Media and Engineering, Arizona State University
Relationship: Research Collaborator
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Dr. Lynn Robert Carter
Professor of Practice, School of Computing and Augmented Intelligence, Arizona State University
Relationship: Teaching Mentor
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