DRUBO PAUL

GIS Analyst | Remote Sensing & Environmental Analytics

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Research Interests

Remote Sensing & GIS • Forest and Coastal Ecosystem Monitoring • Mangrove Health Assessment • Machine Learning & Deep Learning for Environmental Applications • Spatiotemporal Analysis • Satellite Data Fusion (Optical & SAR) • Land Use/Land Cover Change Detection • Climate Change Impact Assessment

Education

Master of Science in Forestry

University of Chittagong Bangladesh
Session: 2021–2022 | January 2024 – June 2025 *CGPA: 3.73/4.00*

- Total Credits: 36
- Thesis: "Assessment of Soil Organic Carbon and Factors Influencing Carbon Stock in Chittagong City Corporation Area"

Bachelor of Science in Forestry (Honours)

University of Chittagong Bangladesh
Session: 2018–2021 | January 2018 – December 2023 *CGPA: 3.68/4.00*

- Total Credits: 192 | Last Semester CGPA: 3.75/4.00
- Undergraduate Research: "Composition and Diversity of Natural Regeneration in Batali Hill, Chittagong"

Professional Experience

GIS Analyst

Institute of Water Modelling (IWM) Dhaka, Bangladesh
February 2025 – Present

- Apply spatial modeling and statistical analysis for hydrological and environmental research
- Process and analyze satellite imagery (optical & SAR) for flood monitoring and land cover classification
- Automate geospatial workflows using Python (GeoPandas, Rasterio) and Google Earth Engine
- Develop geospatial databases supporting water resource management and climate adaptation research
- Collaborate with multidisciplinary teams on flood risk assessment and environmental modeling projects
- Integrate remote sensing data with GIS workflows for environmental decision-support systems

Research Projects

SAR Surface Water Explorer (Google Earth Engine App)

Research Project | 2025 | Live App: earthengine.app

- Developed an interactive web application using Google Earth Engine to analyze monthly, seasonal, and interannual surface water dynamics for Bangladesh
- Implemented SAR (VV) thresholding, change detection, and spatial aggregation with export functionality (GeoTIFF)

MangroveHealth-DL – Deep Learning for Mangrove Prediction

Research Project | 2025–Present | GitHub: Repository accessible for reviewers upon request | Manuscript in Preparation

- Developing hybrid CNN-LSTM framework for spatiotemporal prediction and forecasting of mangrove health dynamics in coastal Bangladesh
- Integrating multi-source satellite data (Sentinel-1, Sentinel-2, ERA5) using Google Earth Engine for data fusion
- Implementing Explainable AI (SHAP) for model interpretation and uncertainty quantification using Monte Carlo Dropout
- Generating 6-12 month ahead degradation risk maps for early-warning decision support

LandslideRisk-CHT – 3D Susceptibility Mapping

Research Project | 2025–Present | GitHub: Technical implementation available for review upon request | Manuscript in Preparation

- Developing hybrid ML-DL framework for multi-temporal 3D landslide susceptibility mapping in Chittagong Hill Tracts

- Combining Random Forest/XGBoost baselines with CNN-LSTM for dynamic hazard zonation
- Validating model against 2017 Rangamati disaster event data
- Creating interactive 3D visualization using PyVista and Plotly

GeoUrbanHealth – Urban Environmental Health Framework

Research Project | 2025–Present | GitHub: Code available upon request | Manuscript in Preparation

- Developing scalable framework for satellite-based urban environmental health assessment and sustainable redesign
- Creating Multi-Dimensional Urban Health Index (MUHI) with hierarchical satellite data fusion
- Implementing constraint-aware NSGA-II optimization for generating sustainable urban redesign scenarios
- Establishing quantitative SDG alignment scoring system (SDG 11, 13, 15)

Geospatial Meteorological Modeling & Predictive AI Analytics

Research Project | 2025 | Live App: Hugging Face Spaces | GitHub

- Developed a machine learning framework for multi-city weather forecasting using Random Forest, trained on 1M+ meteorological records
- Created an interactive geospatial impact dashboard with Folium and Gradio, integrating spatial clustering and confidence interval visualization
- Implemented automated feature engineering pipelines and optimized model performance for high-accuracy meteorological predictions
- Deployed a live cloud-based application for real-time inference and public research dissemination

VectorMatrix – Geospatial Suite

Automation Desktop Software Development | 2025 | GitHub: vector-matrix

- Developed a GIS utility suite for automated vector data cleaning and topological validation

SurveyScriber – OCR & NLP Automation Tool

Software Development Project | 2025 | Live link: surveyscriber.netlify.app

- Developed cross-platform web-based application using Tauri, React, and Python
- Integrated multiple OCR engines (PaddleOCR, Google Vision AI, Azure Cognitive Services)
- Implemented NLP-based text analysis pipeline for structured data extraction from field surveys

GeoTerrain – 3D Geospatial Visualization App

Geospatial Engineering | 2026 | Live App: ShinyApps | GitHub Repository

- Developed a commercial-grade R Shiny suite (web and desktop) for interactive 3D rendering of topographic surveys and buildings, featuring automated CSV-to-DEM conversion via IDW and Kriging interpolation (terra, gstat).
- Enabled real-time, high-resolution DEM and contour generation using spatial algorithms.
- Leveraged ShinyApps.io for scalable cloud deployment and seamless remote collaboration.

Field & Applied Research Experience

Forest Management Planning – Teknaf South Forest Division, Chittagong (8th Semester)
Comprehensive forest management planning; ecological assessments and stakeholder consultations

Baseline Survey Enumerator – Cox's Bazar Bamboo Afforestation Project
Household surveys and GIS-based location tracking for "Climate Action through Bamboo Afforestation"

Household & Visitor Survey Enumerator – Eco Park Masterplan Project
Demographic and perception-based data collection for Sitakunda, Banshkhali, Rajeshpur Eco Parks

Technical Skills

Programming:	Python (Pandas, NumPy, Scikit-learn, TensorFlow, PyTorch), R, JavaScript, SQL
Geospatial/GIS:	ArcGIS Pro, ArcGIS, QGIS, Google Earth Engine, Spatial Analysis, SAR Processing
Data Science:	Machine Learning, Deep Learning, NLP, Statistical Modeling, Time Series
Cloud & Tools:	AWS, Google Cloud, Azure ML, Spark, Git, Docker, Tableau, Power BI

Publications

Manuscripts in Preparation

References

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