

CURRICULUM VITAE

Parth Parimalbhai Bhatt

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https://scholar.google.com/citations?user=Z7_kTysAAAAJ&hl=en

EDUCATION

- 2019-2022, **Ph.D., Forest Science with emphasis on GIS/Remote Sensing**, College of Forest Resources and Environmental Science, Michigan Technological University
Thesis: Fine Scale Mapping of Laurentian Mixed Forest Natural Habitat Communities Using Multispectral NAIP and UAV Datasets Combined with Machine Learning Methods
- 2022, **Graduate Certificate - Geoinformatics**, College of Forest Resources and Environmental Science, Michigan Technological University
- 2016-2018, **M.S., Geographical Information Science**, College of Forest Resources and Environmental Science, Michigan Technological University
Thesis: Mapping Coastal Wetland and Phragmites on the Hiawatha National Forest Using Unmanned Aerial System (UAS) Imagery: Proof of Concepts
- 2014-2016, **M.Sc., Environmental Science**, The Maharaja Sayajirao University of Baroda, Dept. of Environmental Studies, Gujarat, India
Thesis: Geo-Environmental study of Chilika lagoon and its surrounding environment
- 2011-2014, **B.Sc., Biotechnology**, Shree Ramkrishna Institute of Computer Education and Applied Sciences, Gujarat, India

TEACHING and PROFESSIONAL EXPERIENCE

- January 2023 – Present, **Assistant Teaching Professor/Researcher**, CFRES, Michigan Technological University
 - 2020-2022, **Graduate Teaching Instructor**¹ (FW5550, FW3540), CFRES, Michigan Technological University
 - August 2016 – December 2022, **Research Assistant**, CFRES, Michigan Technological University
 - Fall 2018, 2019, **Teaching Assistant**¹ (FW5550). CFRES, Michigan Technological University
 - Spring 2017, 2018, 2019, 2020 **Teaching Assistant** (FW3540). CFRES, Michigan Technological University
 - December 2018 – December 2023, **Research Assistant**, CFRES, Michigan Technological University and USFS, Colorado
 - January 2016 - July 2016, **Intern/Trainee**, Space Application Center, Indian Space Research Organization
- ¹Teaching evaluation score for the mean of 5-dimensions: 4.65

SPECIALIZED SKILLS

Software/Tools: ArcMap, ArcPro, ArcGIS Online, ArcGIS Image for ArcGIS Online, ArcGIS Server, ArcCatalog, QGIS, ERDAS IMAGINE, ENVI, Agisoft Metashape, Trimble Business Center, Trimble UAS Master, Google Earth Engine, R Studio, Cloud Compare, SNAP, ArcGIS Collector, Survey123, ArcGIS Field Maps, Trimble GPS Data Collector, Avenza Maps, Enterprise Geodatabase, RDBMS

Geospatial: Geodatabase Management, Image Processing & Classification, GPS Techniques/Trimble GPS Units, Spatial Statistics and Geospatial Analysis, Georectification, Machine Learning (Random Forest/Support Vector Machines), ESRI Model Builder/SQL, R, Java, Python, GDAL, Texture Analysis, HSV, Vegetation Analysis, Image Enhancement Techniques (PCA, ICA), Knowledge Engineer, 3D Analyst/SQL, Photogrammetry, Tracking Analyst, Mapping/Cartography, Metadata

Datasets: NAIP Imagery, UAV Imagery, Landsat, Sentinel, Worldview, Hyperspectral, LiDAR, SAR, GPS data

PROJECTS

Keweenaw Inventory Project (Lead PI). CFRES, MTU. The Nature Conservancy. (January 2023-Present)

- Mapping over 35,000 acres land in the Keweenaw Peninsula using Natural Habitat Communities Classification Scheme
- Mapping the Keweenaw Heartlands to ensure the protection for the forests, wildlife, rivers, lakes, wetlands, and the whole community for the generations to come.

Utility of Remote Imagery in Tree (Oak) Provenance Trials. CFRES, MTU. (September 2022-Ongoing)

- Investigating oak provenance trials using point cloud data (LiDAR/UAV), species identification using Deep Learning, assessing tree stress and correlated seed source, and compare spectral indicators.
- Collaborative project with multiple CFRES faculties.

Natural Community Based Mapping of Hiawatha National Forest (HNF) Using High-Resolution NAIP (National Agriculture Imagery Program) and Unmanned Aerial System (UAS) Imagery. U. S. Forest Service. (August 2017-April 2022)

- Mapped West and East units of HNF vegetation communities and coastal wetlands with HUC12 watershed boundaries (Total Area: 1,107 km²) using Machine Learning Algorithms in R programming language (From Data Collection to Classification and post-processing)
- Delineated and classified centimeter spatial resolution UAS imagery (NIR/RGB/MicaSense) in Agisoft Metashape. Generated Sparse Point Cloud, Dense Point Cloud, 3D-Model, and Orthophotos. Classification of UAS imagery using Machine learning algorithms
- Classified using Principal Components, Texture Analysis, Vegetation Indices, Supervised learning, Knowledge engineer rules, and Machine Learning (RF, SVM, ANN) in R programming language.

Remote Sensing & Image Analysis/Forest Health Monitoring/NAIP Point Digitizing (December 2018-Ongoing)

- The USDA Forest Service, Forest Health Monitoring (FHM) is a national program designed to determine the status, changes, and trends in indicators of forest condition on an annual basis.
- The NAIP Point Digitizing (NPD) application collects training points from NAIP imagery for all states for all years to be used as input into supervised machine learning models, which can be used to classify imagery into various categories, such as healthy vegetation, dead, and dying trees.

Designing and Implementing a File Geodatabase for Yellowstone National Park Using GIS Techniques.

- Used Pre and post fire Landsat imagery for analysis.
- Created a Geodatabase with required dataset. Used Model Builder to streamline the workflow.
- Created Subtypes and Domains, used Least Cost Path Analysis technique to create trail path.
- Used Tracking Analyst and Animation tool to create Fire perimeter animation.

Change Detection using Landsat 5, 8 and Sentinel 2A data coupled with spectral indices in Surat city and surrounding areas in Gujarat (India).

- Observed changes in Urban and Agriculture areas using Landsat 5 and 8 images over 17 year of time.
- Used Vegetation Indices (such as: NDVI, SAVI, SARVI, GNDVI, NDMI) for analyzing and monitoring the changes.

Geo-Environmental Study of Chilika Lagoon and Its Surrounding Environment, Space Application Center, Indian Space Research Organization

- Understand changes in the morphology of Chilika Lagoon using Landsat 8 imagery using Unsupervised Classification
- Observed changes in coastal morphology and dynamics
- Observed impact of storm surges, seasonal and annual changes on lagoon
- Observed changes due to anthropogenic activities

PUBLICATIONS

- **Bhatt, P.,** & Maclean, A. L. (2023). Comparison of high-resolution NAIP and unmanned aerial vehicle (UAV) imagery for natural vegetation communities classification using machine learning approaches. Special Issue: Remote sensing for sustainable forest and wetland management under climate change. *GIScience & Remote Sensing*, 60(1), 2177448.
- LaRue, E., Fahey, R., Alvshere, B., Atkins, J., **Bhatt, P.,** Buma, B., Chen, A., Cousins, S., Elliott, J., Elmore, A., Hakkenberg, C., Hardiman, B., Johnson, J., Kashian, D., Koirala, A., Papes, M., St. Hilarie, J., Surasinghe, T., Zambrano, J., Zhai, L., Fei, S. 2022. A theoretical framework for the ecological role of structural diversity. Special Issue: Ecological Roles of Structural Diversity. *Frontiers in Ecology and the Environment*. February 2023. <https://doi.org/10.1002/fee.2587>
- **Bhatt, P.,** Edson, C., & Maclean, A. (2022). Image Processing in Dense Forest Areas using Unmanned Aerial System (UAS). <http://doi.org/10.37099/mtu.dc.michigantech-p/16366>
- **Bhatt P,** Maclean A, Dickinson Y, Kumar C. Fine-Scale Mapping of Natural Ecological Communities Using Machine Learning Approaches. Special Issue: Advanced Earth Observations of Forest and Wetland Environment. *Remote Sensing*. 2022; 14(3):563. <https://doi.org/10.3390/rs14030563>
- Monahan WB, Arnspiger CE, **Bhatt P,** An Z, Krist FJ, Liu T, et al. (2022) A spectral three-dimensional color space model of tree crown health. *PLoS ONE* 17(10): e0272360. <https://doi.org/10.1371/journal.pone.0272360>
- Atkins, J., **Bhatt, P.,** Carrasco, L., Francis, E., Garabedian, J., Hakkenberg, C., Hardiman, B., Jung, J., Koirala, A., LaRue, E., Oh,

- S., Shao, G., Shao, G., Shugart, H., Spiers, A., Stovall, A., Surasinghe, T., Tai, X., Zhai, L., Zhang, T., Krause, K. 2022. Measuring forest structural diversity: advances, limitations, and possibilities. ECOSPHERE (Manuscript #ECS22-0636). UNDER REVISION.
- Monahan, William et al. (2022), Data and Code from: A spectral three-dimensional color space model of tree crown health, Dryad, Dataset, <https://doi.org/10.5061/dryad.wm37pvmpp>
 - **Bhatt, P.** (2018). Mapping Coastal Wetland and Phragmites on the Hiawatha National Forest Using Unmanned Aerial System (UAS) Imagery: Proof of Concepts (Master's Thesis, Michigan Technological University).
 - Drone-gathered data helps sustain important shoreline habitats on Hiawatha National Forest ("Inside the FS", Forest Service U.S. DEPARTMENT OF AGRICULTURE): <https://www.fs.usda.gov/inside-fs/delivering-mission/sustain/drone-gathered-data-helps-sustain-important-shoreline-habitats>
 - Michigan Tech, Forest Service use drone to research Hiawatha shoreline (Daily Press): <https://www.dailypress.net/news/community/2019/09/michigan-tech-forest-service-use-drone-to-research-hiawatha-shoreline/?fbclid=IwAR3TBthRljuWB2jfj0BDYNPvfzZd06xgq4wBXP2djc6i9-ffvyREujm6DE>
 - Researchers Enlist Drones for Hiawatha National Forest Work (U.S. News): <https://www.usnews.com/news/best-states/michigan/articles/2019-09-15/researchers-enlist-drones-for-hiawatha-national-forest-work>

PEER REVIEWS

- WELA-D-22-00245, "Modeling Wetland Habitat Quality State through Remote Sensing with Artificial Intelligence: A Study of Rarh Tract in West Bengal". Journal: WETLANDS, Springer

TEACHING AWARDS and ACHIEVEMENTS

- Awarded "**Outstanding Graduate Student Award**", College of Forest Resources and Environmental Science, Michigan Technological University, April 2022.
- Awarded "**Outstanding Teaching Assistant Award**", College of Forest Resources and Environmental Science, Michigan Technological University, April 2022.
- Awarded **Midwestern Association of Graduate School (MAGS) "Excellence in Teaching Award" nomination for representing Michigan Technological University as a nominee.** College of Forest Resources and Environmental Science, March 2022. <https://blogs.mtu.edu/gradschool/2022/02/21/2022-nominee-for-mags-excellence-in-teaching-award-parth-bhatt/>
- Awarded "**Outstanding Teaching Award**", College of Forest Resources and Environmental Science, Michigan Technological University, Spring 2021.
- Awarded "**Merit Award**" (\$100) by Ecosystem Science Center, College of Forest Resources and Environmental Science, Michigan Technological University, Spring 2021.
- Awarded "**Honorable Mention Award**" at HxGN LIVE Las Vegas 2018 conference and presented research titled "Mapping Coastal Wetland on the Hiawatha National Forest Using Unmanned Aerial System (UAS) Imagery: Proof of Concepts", June 2018. <https://blog.hexagongeospatial.com/mapping-coastal-wetland-on-the-hiawatha-national-forest-using-uas-imagery/>
- **People's Choice Award** and 3rd Prize (\$700): Bob Mark Elevator Pitch Competition Business School, Michigan Technological University, 2016. <https://mtulode.com/284/pulse/284/>; <https://www.uppermichiganssource.com/content/news/MTU-students-pitch-innovate-business-proposals-to-community-396248491.html>
- Awarded by Surat Municipal Corporation (Surat, Gujarat, India) for noble work of tree plantation for the community in Surat city and for starting a volunteer environment group "GREEN FOOTPRINTS", 2013.

GRANTS AND FELLOWSHIPS (\$56,029)

- The Nature Conservancy, Project Title: Keweenaw Inventory Project. PI – Parth Bhatt, Co-PI – David Flaspohler (\$36,302)
 - Lead the full grant proposal as PI.
- 2022, Doctoral Finishing Fellowship, Graduate Dean Awards Advisory Panel, Graduate School, Michigan Technological University, <https://blogs.mtu.edu/gradschool/2022/09/26/doctoral-finishing-fellowship-fall-2022-recipient-parth-bhatt/> (\$9,577)
- 2022, Graduate Student Government, Travel Grant (\$150)
- 2022, Graduate Student Government, Career Enrichment Grant (\$50)
- 2021, The Nature Conservancy, Research Proposal Grant, PI-Yvette Dickinson, Co-PI-Ann Maclean, Summer Stipend (\$8,400)
 - Helped as a Ph.D. student.
- 2018, Hexagon Geospatial, Honorable Mention Award Grant (\$800)
- 2018, Ecosystem Science Center, Michigan Tech, Travel Grant (\$500)
- 2018, Graduate Student Government, Travel Grant (\$250)

PROFESSIONAL COMMITTEES

- Served as a search committee member for a tenure track "Remote Sensing Faculty" position at the College of Forest Resources and Environmental Science, Michigan Technological University, Spring 2020.

PRESENTATIONS, CONFERENCES, and EXTRA CURRICULAR

- Presented Ph.D. research work at an invited talk "Midwest Regional Soils and Ecology Conference Call", U.S. Forest Service,

Hiawatha National Forest, August 2022.

- Attended ESRI User's Conference representing Michigan Technological University. San Diego, July 2022.
- Served as a "Department Representative" at the Graduate Student Government. College of Forest Resources and Environmental Science, Michigan Technological University, May-December 2022.
- Served as a Judge for Michigan Tech 2022 Senior Design Expo, Michigan Technological University, April 2022.
- Presented Ph.D. research work at 3MT, GSG, Michigan Technological University, November 2021.
- At an **invited talk** Research was presented for "GeoConvergence Workshop", by the American Geographical Society in support of the National Science Foundation, May 2021. <https://www.geoconvergence.org/lightning-talks>
- Attended GeoIgnite 2021: Canada's National Geospatial Conference. April, 2021.
- Presented research work titled "Mapping Natural Community Habitats in Hiawatha National Forest Using High-Resolution NAIP Imagery Data and Machine Learning Algorithms" in ESC Research Forum at College of Forest resources and Environmental Science, Michigan Technological University, April 2021.
- Presented MS research work at 3MT, GSG, Michigan Technological University, November 2019.
- Presented a poster titled "Preliminary Processing of UAS Imagery for Delineating and Mapping of Coastal Wetlands" in ESC Research Forum at School of Forest resources and Environmental Science, Michigan Technological University, April 2018.
- Sponsored entrepreneurial trip of "Silicon Valley Experience" by Michigan Technological University as part of winning Bob Marker Elevator Pitch Competition: Visited LinkedIn, NETFLIX, FORD Research Center, HP, Twilio etc., March 2017.
- Attended 4th National Climate Assessment Regional Engagement Workshop Midwest at Houghton satellite location, February 2017.
- Participated in United Nations "Paris Climate Summit Programme", 2015.
- Served as a "Pitcher" for the softball team of College of Forest Resources and Environmental Science. Summer 2021 and 2022.

PROFESSIONAL SOCIETY MEMBERSHIP/GROUPS

- American Society for Photogrammetry and Remote Sensing (ASPRS), The Imaging and Geospatial Information Society
- ESRI Forestry Group
- Society of American Foresters
- ESRI Young Professional Network
- Natural Resource Management Professionals

WEBINARS AND CERTIFICATE TRAININGS

- Transform AEC Projects with GIS and BIM, ESRI MOOC, October 2022.
- Mapping Crops and their Biophysical Characteristics with Polarimetric Synthetic Aperture Radar and Optical Remote Sensing, NASA ARSET, June 2022.
- Agricultural Crop Classification with Synthetic Aperture Radar and Optical Remote Sensing, NASA ARSET, October 2021.
- Introduction and Access to Global Air Quality Forecasting Data and Tools, NASA ARSET, September 2021.
- Species Distribution Modeling with Remote Sensing, NASA ARSET, August 2021.
- Using Google Earth Engine for Land Monitoring Applications. NASA ARSET, June 2021.
- NASA Earth Observations for Energy Management. NASA ARSET June 2021
- Introduction to Population Grids and their Integration with Remote Sensing Data for Sustainable Development and Disaster Management. NASA ARSET, March & April 2021.
- Mapping and Monitoring Lakes and Reservoirs with Satellite Observations. NASA ARSET, February 2021.
- Spectral Sessions. L3Harris Geospatial. January 2021.
- Introductory Webinar: Hyperspectral Data for Land and Coastal Systems. NASA ARSET, January 2021.
- Webinar: Applications of High Spatial and Spectral Resolution UAV Imagery. L3Harris Geospatial. May 2020.
- Forest Mapping and Monitoring with SAR Data. NASA ARSET. May 2020.
- Introductory Webinar: Using the UN Biodiversity Lab to Support National Conservation and Sustainable Development Goals. NASA ARSET, March-April 2020.
- SAR for Landcover Applications. August-September 2019.
- Advanced Webinar: Remote Sensing for Monitoring Land Degradation and Sustainable Cities SDGs. NASA ARSET, July 2019.
- Introduction to SAR. NASA ARSET. June-July 2017.
- Introduction to Coordinate Systems. ESRI, September 2021.
- Teaching with GIS: Field Data Collection Using ArcGIS. ESRI, October 2018.
- The Location Advantage. ESRI, December 2017.
- Change Detection Using Imagery. ESRI, November 2017.
- Python for Everyone. ESRI, November 2017.
- Getting Started with the Geodatabase. ESRI, April 2017.
- 3D Visualization Techniques Using ArcGIS. ESRI, April 2017.