IIT Tirupati Navavishkār I-Hub Foundation

भारतीय प्रौद्योगिकी संस्थान तिरुपति
IIT TIRUPATI

**Geo-Intel Lab**

Position Title: **Senior Engineer – AI/ML**
Location: **IIT Tirupati Navavishkar I-Hub Foundation (IITTNiF)**
Employment Type: **Ad-hoc (6-month contract including 3 months probation)**
Reporting To: **Tech Manager - Geosphysical Exploration**
Working Days: **Six days a week (Monday to Saturday)**
Office Timings: **9:00 AM – 5:30 PM**
Created by: **Geo-Intel Lab, IITTNiF**

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**Roles and Responsibilities**

As a Senior Engineer – AI/ML, you will build intelligent systems for geophysical and geospatial applications with a strong focus on GPR (Ground Penetrating Radar) and geophysics. You will work on machine learning, deep learning, signal & image processing, satellite imagery analysis, multimodal models, and automation of processing, interpretation, and reporting workflows. This is a hands-on engineering role where you will contribute to AI-driven analytics, data pipelines, and domain-specific tools for geophysicists.

**Key Responsibilities:**

- Develop ML/DL models (Regression, XGBoost, SVM, Neural Networks, CNNs, ResNet-based classifiers) for geophysical and geospatial pattern detection, anomaly identification, classification, and predictive modeling.
- Lead automation of GPR processing and Interpretational pipelines: filtering, dewow, migration, velocity analysis, time-to-depth conversion, stacking, attribute extraction, and amplitude analysis.
- Build interpretation and reporting modules that convert processed GPR/geophysical outputs into actionable maps, cross-sections, dashboards, and automated PDF/interactive reports.
- Work with 2D/3D geospatial datasets, point clouds, satellite imagery, raster/vector formats, and geophysical data formats (SEG-Y, ASCII, dt1 and/or other commercial formats).
- Automating Image pre-processing, data preparation for model training.
- Comparing different ML/DL models based on user case and fine tuning for hyperparameters.
- To be active in understanding and implementing new algorithms/architectures continuously published in academic domains across ML/DL domain.
- Implement signal processing algorithms using DSP libraries—frequency filtering, envelope detection, FFT/IFFT, Hilbert transforms, wavelet transforms, cross-correlation, and spectral analysis.
- Optimize ML and DSP models using GPU pipelines, quantization, and accelerated computation.
- Integrate spatial analysis with GIS teams to overlay geophysical results on maps, DEMs, and digital twins.
- Deploy AI and processing pipelines on cloud platforms (AWS preferred) ensuring scalable, efficient inference and batch automation.
- Maintain documentation, experiment logs, and version control (Git/GitHub).

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**Preferable Qualifications**

**Must-Have Skills:**

- Strong Python (NumPy, Pandas, PyTorch, TensorFlow).
- Digital Signal Processing modules: SciPy.signal, ObsPy, PyGIMLi, Segyio, H5Py, Xarray, Rasterio, and libraries for radar/signal manipulation.
- Deep Learning: CNNs, RNNs, object detection, image classification.

- Signal processing for time-series and radar data; experience with GPR data formats and workflows.
- Experience with satellite imagery or computer vision datasets.
- GIS & spatial data handling (GeoJSON, shapefiles, PostGIS).
- AWS/cloud deployment, Docker basics, Git/GitHub.
- Ability to design and optimize SQL queries, data models, and workflows to support geophysical interpretation, reporting, and decision-making.

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**Desired Traits**

**Soft Skills:**

- Curiosity for geospatial and geophysics technologies.
- Ability to work independently and solve problems creatively.
- Clear communication and collaborative mindset.

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**Eligibility**

- **Total Experience:** 4 years or more, **Relative Experience:** 2 years or more
- **Background:** Data Science, Computer Science, Geoinformatics, Geophysics, Remote Sensing, or related fields.

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**What You'll Gain**

- Exposure to GeoAI, digital twins, 3D visualization, and end-to-end geophysical processing automation.
- Opportunity to build next-generation AI systems for geophysical workflows.
- Mentorship and potential full-time growth.

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**How to Apply**

Send your resume/CV to **techmgr.geo_intel@iittnif.com** with Subject:
**"Application for the role of Senior Engineer- AI/ML: Your Name"**.

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भारतीय प्रौद्योगिकी संस्थान तिरुपति
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## Geo-Intel Lab

Position Title: **Full Stack Developer**
Location: **IIT Tirupati Navavishkar I-Hub Foundation (IITTNiF)**
Employment Type: **Ad-hoc (6-month contract including 3 months probation)**
Reporting To: **Tech Manager, Geophysical Exploration (techmgr.geo_intel@iittnif.com)**
Working Days: **Six days a week (Monday to Saturday)**
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Created by: **Geo-Intel Lab, IITTNiF**

**Roles and Responsibilities:**
As a Full Stack Developer, you will be actively involved in developing, testing, deploying, and maintaining web-based geophysical and geospatial applications. You'll work across the frontend and backend, handle 2D/3D datasets, integrate mapping libraries, and deploy applications on the cloud. This is a hands-on, learning-by-doing role with real-time projects.

**Key Responsibilities:**

- Assist in designing and developing geospatial applications with interactive web dashboards.
- Work with 2D and 3D datasets (e.g., shapefiles, GeoJSON, CityGML, point clouds).
- Integrate GIS/mapping libraries such as **Leaflet, Mapbox, CesiumJS, or OpenLayers**.
- Build RESTful APIs and backend logic to handle spatial data.
- Ensure mobile-responsive and user-friendly UI/UX.
- Collaborate with data scientists, GIS analysts, and designers to convert concepts into products.
- Test, debug, and optimize code for performance and scalability.
- Deploy and maintain applications on cloud platforms (e.g., **AWS, GCP, Azure**).
- Maintain version control and documentation (**GitHub/GitLab**).

**Preferable Qualifications:**

- Frontend: **HTML5, CSS3 (Tailwind or Bootstrap), JavaScript (ES6+), React.js or Vue.js.**
- Map rendering: experience with **Leaflet, Mapbox GL JS, CesiumJS**, and charting libraries like **D3.js, Chart.js, Recharts**.
- Backend: **Node.js/Express.js** or **Python (Flask/FastAPI/Django)** and REST API development.
- Spatial DB: **PostGIS / PostgreSQL** or equivalent spatial databases.
- Basic command-line and scripting skills.
- GIS/Geospatial: good understanding of **CRS, raster/vector, projections**, and formats like **GeoJSON, KML, GPKG, WMS/WFS, shapefiles**. Experience with **QGIS/ArcGIS** is a bonus.
- DevOps & Deployment: **Git, GitHub/GitLab, Docker basics**, CI/CD exposure, and hosting on **AWS/GCP/Azure or Vercel/Netlify**.

**Desired Traits:**

- Eagerness to learn and solve problems independently.
- Strong team spirit and clear communication.
- Attention to detail and curiosity for new technologies.
- Willingness to work on multidisciplinary geospatial projects and iterate quickly on feedback.
- Good documentation habits and disciplined version-control practices.

**Eligibility & Duration:**

- Recent graduates or early-career professionals (**0–2 years**) with background in **Computer Science / GIS / Geophysics / Geoinformatics / Remote Sensing / Urban Planning / Environmental Studies** or related disciplines.

- **Duration:** 1 year (with possibility of extension based on performance).

**What You'll Gain:**

- Mentorship and guidance from experts in the geospatial and web development domain.
- Exposure to real-world geospatial applications, clients, and advanced 3D GIS / digital twin technologies.
- Practical experience across frontend, backend, spatial databases, and cloud deployment.
- Certificate of Completion and potential full-time offer.

**How to Apply:**

Send your resume/CV to **techmgr.geo_intel@iittnif.com** with Subject:
**"Application for the role of Full Stack Developer: Your Name"**.

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**Geo-Intel Lab**

**Position Title:** CAD Drafting Engineer
**Location:** IIT Tirupati Navavishkar I-Hub Foundation (IITTNiF)
**Employment Type:** Ad-hoc (6-month contract including 3 months probation)
**Reporting To:** Technology Manager, **Geophysical Exploration** (techmgr.geo_intel@iittnif.com)
**Working Days:** Six days a week (Monday to Saturday)
**Office Timings:** 9:00 AM – 5:30 PM
**Created by:** Geo-Intel Lab, IITTNiF

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**Roles and Responsibilities:**
As a CAD Drafting Engineer in the geology and geophysics domain, you will support drafting and documentation for subsurface investigations, GPR surveys, ERT layouts, geological mapping, site surveys, and GIS-based projects. You will prepare accurate as-built drawings, geological cross-sections, survey layouts, cadastral maps, and digitized GIS layers using AutoCAD, Autodesk tools, or NanoCAD. This role is ideal for a fresher with internship or academic project exposure in geospatial/CAD drafting.

**Key Responsibilities:**

- Prepare **as-built drawings** for geophysical surveys (GPR, ERT, Seismic), incorporating field modifications, instrument offsets, and real-world survey conditions.
- Draft **survey layouts**, including traverses, station locations, profiles, benchmarks, utilities, and topographic/ground features.
- Create **geological and geophysical cross-sections**, borehole logs, lithological columns, stratigraphic layers, and subsurface interpretation sketches.
- Develop and update **cadastral maps**, boundary layouts, right-of-way drawings, and land parcel divisions relevant to field survey planning.
- Perform **GIS drafting and digitization**, converting field sketches, satellite imagery, geological maps, and old survey sheets into accurate CAD/GIS layers.
- Produce **site plans** showing GPR grids, electrode arrays, drilling/BH positions, and survey coordinates.
- Maintain drawing standards: layering, symbol conventions, northing/easting grids, scale bars, annotations, and legend preparation.
- Collaborate with geophysicists, geologists, and GIS analysts to convert technical data into clear drawings and maps.
- Prepare plot-ready drawings, PDF maps, and documentation packages for reports, proposals, and client submissions.
- Manage CAD files with proper naming, version control, and folder structure.

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**Preferable Qualifications:**

- Hands-on knowledge of **AutoCAD / Autodesk tools / NanoCAD** (via training, internship, or projects).
- Ability to draft **geophysical survey grids, cross-sections, borelogs, and geological profiles**.
- Understanding of **survey drawings, coordinates, UTM/GCS systems, contour representation, and field map interpretation**.
- Experience with **digitization**, tracing geological features, converting scanned maps to CAD, and basic georeferencing.
- Familiarity with GIS concepts and formats (**shapefiles, GeoJSON**) is an added advantage.

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**Desired Traits:**

- Strong attention to detail and neat drafting practices.
- Willingness to learn and adapt to project needs.

- Good communication and teamwork habits.
- Organized approach to file and document management.
- Proactive, reliable, and able to follow drafting standards and technical instructions.

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**Eligibility:**

- **Freshers or candidates with 0–1 year experience.**
- Diploma / B.Sc / B.Tech in **Geology, Geophysics, Civil, Geoinformatics, Remote Sensing, or related fields.**
- Certified training in **AutoDesk or NanoCAD** is highly preferred.

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**How to Apply:**

Send your resume/CV to **techmgr.geo_intel@iittnif.com** with Subject:
**"Application for the role of CAD Drafting Engineer (Fresher): Your Name"**

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**Geo-Intel Lab**

**Position Title**: Geophysical Data Modeler
**Location:** IIT Tirupati Navavishkar I-Hub Foundation (IITTNiF)
**Employment Type:** Ad-hoc (6-month contract including 3 months probation)
**Reporting To:** Technology Manager, **Geophysical Exploration** (techmgr.geo_intel@iittnif.com)
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**Created by:** Geo-Intel Lab, IITTNiF

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**Roles and Responsibilities:**

As a Geophysical Data Modeler, you will work on numerical modelling, EM simulations, synthetic data generation, and the development of desktop tools for geophysical applications—particularly Ground Penetrating Radar (GPR). You will use gprMax, Python, R, and Visual Studio–based environments to build FDTD models, automate simulation workflows, and design small GUI-driven tools that support processing, modelling, and data analysis. This role is ideal for someone with strong computational skills and a foundational understanding of geophysics or computer science.

Key Responsibilities:

- Configure and run gprMax simulations to model subsurface targets, soil layers, antenna responses, and EM wave interactions.
- Develop FDTD models to study EM propagation, scattering, attenuation, and dielectric contrast in geological media.
- Generate synthetic GPR datasets for training, testing, validation, and algorithm development.
- Simulate various geophysical environments including utilities, voids, rebar, pipelines, heterogeneous layers, and geological structures.
- Design and build small desktop tools with GUI (using Tkinter, PyQt, PySide, or Visual Studio/.NET) for simulation setup, data viewing, or workflow automation.
- Use Visual Studio for coding, debugging, packaging, and maintaining modelling utilities and engineering tools.
- Write Python and R scripts for preprocessing, numerical computations, visualization, and statistical analysis of simulation outputs.
- Perform calibration studies comparing simulated outputs with real GPR data.
- Manage, document, and maintain libraries of simulation models, templates, and reproducible workflows.
- Collaborate with geophysicists, ML specialists, and software engineers to integrate simulation datasets into processing systems and GeoAI pipelines.

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**Preferable Qualifications:**

- 1 year (internship / academic / professional) experience in modelling, simulations, or computational EM (GPR simulation preferred).
- Educational background in Computer Science, Geophysics, Applied Geophysics, Physics, or related disciplines.
- Hands-on experience with gprMax and EM/GPR simulation work.
- Strong grasp of FDTD, EM wave propagation, permittivity, conductivity, and dielectric behaviour.
- Medium-to-advanced programming in Python (NumPy, SciPy, Matplotlib, Xarray, H5Py).
- Working experience with R for computational/statistical tasks.
- Excellent working knowledge of Visual Studio and ability to develop/maintain desktop tools.
- Ability to create clean GUI applications (Tkinter, PyQt, PySide, .NET forms/WPF).

**Desired Traits:**

- Experience with geophysical libraries such as ObsPy, PyGIMLi, Segyio.
- Background in radar signal processing (FFT, filtering, wavelets).
- Familiarity with computational optimization, meshing strategies, or GPU-accelerated simulations.
- Strong analytical thinking, attention to detail, excellent documentation habits, and collaborative communication.
- Proactive problem solver, comfortable working in multidisciplinary teams, and eager to learn domain-specific workflows.

**How to Apply:**

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