Abhishek Singh Dhadwal

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Core Competencies and Technical Skills

- **Healthcare Informatics and Clinical Decision Support**: Clinical Quality Language (CQL), patient data segmentation, privacy frameworks, FHIR, HAPI-FHIR, Mobile Health and Computing
- **Artificial Intelligence and Machine Learning**: TensorFlow, Scikit-Learn, OpenCV, deep learning architectures, LangGraph, AgNo, multimodal machine learning
- **Software and Systems Development**: Python, Java, C#, TypeScript, REST, Git, PostgreSQL, OracleDB, Kotlin
- **Data Analytics and Visualization**: Pandas, SQL, Tableau, D3.js, Excel
- **Leadership and Global Engagement**: Mentorship initiatives, interdisciplinary collaboration, community outreach

Education

Arizona State University, Tempe, AZ
Master of Science in Computer Science, Biomedical Informatics (2024-2026 - Expected) - CGPA **4.0/4.0**
Research Focus: Data-driven clinical decision support, medical privacy frameworks. Herbold Fellow, 2025.

International Institute of Information Technology, Bangalore, India
Executive Post Graduate Program in Data Science (2023-2024) - CGPA **3.7/4.0**
Focus: Machine learning, data analytics, Generative AI.

Visvesvaraya National Institute of Technology, Nagpur, India
Bachelor of Technology in Computer Science and Engineering (2017-2021) - CGPA 3.5/4.0 - Major - **3.81/4.0**
Ranked in the top 0.3 percent of 1.18 million JEE-MAINS applicants; Early research in computational psychiatry.

Research Experience

Graduate Student Researcher, SHARES Lab, Arizona State University, Tempe, AZ (Aug 2024 to Present)

- Developing deterministic and AI-assisted clinical decision support models for automated, privacy-preserving segmentation of sensitive health data in compliance with 42 CFR Part 2 as part of a NIDA backed federal initiative.
- Built a FHIR R4 + CQL Consent Engine enabling physician-driven, auditable rule execution and granular data sharing for individuals with substance use disorders. Conducted large-scale benchmarking on 10k Synthea patients, achieving 18.9k FHIR resources/sec throughput with an AWS Lambda runtime cost of $0.009 (estimated).
- Collaborating with clinicians, informaticians, and policymakers to translate technical prototypes into deployable tools shaping patient-consent policy. Co-authored an accepted AMIA 2025 Systems Demonstration on consent-driven segmentation and visualization.

Undergraduate Researcher, Computational Psychiatry, VNIT Nagpur, India (Jan 2020 to Jan 2022)

- Conducted quantitative research towards the creation of a novel multimodal early detection approach for mental health ailments based on an end-to-end machine learning pipeline, under the guidance of Dr. Praveen Kumar.
- Designed remote sensing protocols for the collection of user smartphone data (via AWS S3 Buckets) and extracted high-level features for smartphone, audio, and visual data (NumPy and Pandas) using Python. Optimized memory efficiency of data collection by 90% over the pre-existing methodology.
- Published research in Springer and SCIE journals; work has received over 60 citations in two years.

Professional Experience

Exempt Non-Officer, Investment Banking Technology, Credit Suisse, Pune, India (Jul 2023 to Jun 2024)

- Designed features for global trading algorithms and order management platforms (for stocks,futures and options) to ensure regulatory compliance and operational excellence for EMEA and US regions.
- Managed deployments and modifications of trading services, including short sell order locators, compliance systems, and administrative applications. Oversaw 85+ production-level changes (RFCs) over two years, demonstrating expertise in C# and WinForms development alongside database management in Sybase and Oracle.
- Founded a mentorship program for underrepresented STEM professionals and earned two RAVE awards for leadership and innovation.

Technical Analyst, Credit Suisse Business Analytics, Mumbai, India (Jul 2021 to Jun 2023)

- Designed and optimized daily ETL (Extract, Transform, and Load) pipelines using C# that reduced processing time by 70 percent, enhancing global data-driven decision-making.

Software Developer, Google Summer of Code, Apache Software Foundation (May 2019 to July 2019)

- Developed open source implementations of cryptographic algorithms (LCG, PCG) for Apache Commons by integrating advanced pseudorandom number generators used by thousands of developers.

Technology Intern, International Wealth Management, Credit Suisse (May 2020 to June 2020)

- Collaborated on delivering Continuous Integration and DevOps solutions for the IWM Tech Department. Engaged in the deployment of Load balancers and OpenShift Clusters for cross-functional projects.

Internship Trainee, Central Technical Services, Reliance Infrastructure (May 2018 to June 2018)

- Designed innovative solutions in association with the Information Technology team to streamline web application development using JavaScript and the .NET Framework.

Publications

Peer-Reviewed and Accepted Works

- Thati Ravi Prasad, Abhishek Singh Dhadwal, Praveen Kumar, and Sainaba. "*A novel multi-modal depression detection approach based on mobile crowdsensing and task-based mechanisms.*" Multimedia Tools and Applications: 1-34
- Thati Ravi Prasad, Abhishek Singh Dhadwal, Praveen Kumar, and Sainaba. "*Multimodal Depression Detection: Using Fusion Strategies with Smart Phone Usage and Audio-Visual Behaviour*" International Journal on Artificial Intelligence Tools 2023 32:02
- Abhishek Singh Dhadwal "*4 Hz, 4 Pages: Just-in-Time Substance Use Relapse Risk Detection from Wearable Time Series Data*" NeurIPS 2025 Workshop on Learning from Time Series for Health (TS4H).
- Abhishek S. Dhadwal and Aditya R. Kotwal. "*A Privacy-Preserving Framework for Continuous Mobile Authentication Using Digital Twins and Multimodal Biometrics.*" Under review at PeerJ Computer Science.
- Preston Lee, Abhishek Singh Dhadwal, Martha Kaiser, Soroush Dianaty, Eric Lott, Gagandeep Singh, Darwyn Chern, Jason A. Walonoski, and Adela Grando. "*Assessing the Effectiveness and Scalability of FHIR-Based Granular Data Segmentation Technology.*" Under review at the Journal of Applied Clinical Informatics.

Other Scholarly and Professional Works

- Abhishek Singh Dhadwal. "*FHIR-Based Data Segmentation for Substance Use Disorders: Current Landscape and the Promise of Large Language Models.*" *The Medical Tech Magazine*, 2025. (Invited article)
- Abhishek Singh Dhadwal "*CQL Foundry: Consent-Safe, Rule-First Blueprint from Clinical Notes to Auditable CDS Using LLMs.*" Conceptual paper submitted to the *NeurIPS 2025 GenAI4Health Workshop.*

Key Projects and Innovations

SHARES Tech Stack – FHIR-Based Consent and CQL Automation Ecosystem

- Engineering the SHARES (Substance Use Healthcare Record Sharing) platform for granular patient consent management and clinical decision support, including the *SHARES-CLI* for CQL-to-FHIR automation, a clinical decision support engine (CDS-Hooks based ruling and CQL variants) for privacy enforcement, and supporting developer tools such as *CQL-Playground* and *CQL-CLI* for rapid testing and validation on HAPI-FHIR servers.

Sharpnr – AI-Powered Academic Assistant

- Developed a privacy-first AI Agent that aggregates academic updates from Canvas, Slack and Google Calendar to deliver smart notifications, lecture summaries, and personalized VARK-based study plans, using multi-agent workflows with Python (FastAPI), React/Next.js, and MongoDB to secure 4th place in the Agentic AI in Education Hackathon at ASU.

FHIRLight – Clinician-Centered FHIR Visualization

- Built a fully in-browser, privacy-preserving pipeline that parses HL7 FHIR R4 bundles into interactive patient timelines, hierarchical condition maps, and dynamic filters via a lightweight *FHIRLightPatientLoader*, with batch cohort loading, provenance tracing, and helper APIs; integrated risk-score gauges (CHA_2DS_2-VASc, HAS-BLED, Charlson, Framingham, qSOFA), an interactive tutorial, and validated with a clinician survey (N=24).

Indian Sign Language Translator

- Developed an open-source ISL translator using YOLO-v3 hand detection + CNN-LSTM sequence model for real-time gesture recognition to assist non-verbal patients. Constructed a standardized ISL dataset in challenging real-world conditions; the project now averages over 100 downloads globally each year.

MRI Style Transfer with CycleGAN

- Developed a CycleGAN-based model using Python and TensorFlow to generate T2-weighted MRI images from T1 scans. Handled unpaired datasets, applied image augmentation, and implemented custom loss functions. The approach offers a cost-effective method to augment medical imaging data and support improved diagnostic accuracy.

Other Technical Projects

- **DaprTS**: Designed a deterministic, auditable NLP pipeline that transforms unstructured clinical notes into CDS-ready artifacts (JSON/CSV) with full terminology validation across SNOMED CT, LOINC, RxNorm, ICD-10-CM, and UCUM. Implements MedGemma-3 planner loops (via Ollama) and FastAPI–Streamlit stack for transparent provenance, standards compliance, and reproducible inference.
- **Genotype–Allele Contingency Analysis**: Implemented 2×3 genotype and 2×2 allele chi-square tests with PLINK–R integration; automated QQ/Manhattan plotting and CFH gene annotation to study AMD-linked SNP associations.
- **Pathway & Network Analysis**: Conducted multi-tool enrichment and PPI analysis using Enrichr, STRING, and DAVID; contrasted ChEA and PWM motif results, FDR-adjusted GO/KEGG pathways, and interpreted high-confidence functional networks.
- **In-Surely**: Retrieval-augmented question-answering system for insurance documents; built end-to-end semantic search, reranking, and generative response stack with hybrid vector search and GPT models.
- **TelecomChurnPredictor**: Applied machine learning pipeline for telecom churn prediction; performed feature engineering, PCA, and comparative evaluation of classification models to identify attrition drivers.
- **Entropy, Joy and Art**: Interactive D3.js visualization mapping social media metrics onto facial landmark meshes; applied dithering, Gaussian blur, and dynamic color encoding to abstract influence as emotion-driven art.
- **Interactive Halftone Portrait (Teaching Assignment for CSE 578)**: Authored an end-to-end D3.js exercise using Floyd–Steinberg dithering, force-directed halftone rendering, and linked brushing histogram to teach image processing and data visualization.
- **KierAlign**: Built a web-based visualization of the Needleman–Wunsch algorithm with animated dynamic programming, traceback, and real-time sequence alignment feedback inspired by the "Lumon Terminal Pro" interface.

Awards and Recognitions

- Herbold Fellow, Fulton School of Engineering, 2025, $10,000.
- Graduate Student Resilience Award, ASU Graduate Student Government, 2025, $500.
- RAVE (Recognizing Value and Excellence) Award recipient at Credit Suisse (2022)
- Ryan Star Award for Academic Excellence, Ryan Group of Institutions, 2017.
- Elemental Member, American Association for the Advancement of Science (AAAS) - Neuroscience (2025 to present)
- Student Member, American Medical Informatics Association (AMIA)

Leadership and Community Engagement

- **STEM Mentorship and Diversity Advocacy**: Co-founded a global mentorship program at Credit Suisse to empower underrepresented STEM professionals
- **CSR and Community Outreach**: Led career guidance initiatives with the Antarang Foundation to support at-risk youth in technology careers
- **Technical Advocacy and Content Development** Led STEM engagement initiatives for Credit Suisse's Global Coding Challenges and edited the TA newsletter (2021-22), recognized as "exceptional" by global management

Presentations and Talks

- **FHIR-Based Visual Simulation of Consent-Driven Granular Patient Data Segmentation** , AMIA Annual Symposium 2025, Applications Track (Clinical Informatics), Programmatic Theme: Clinical Informatics, Preston Lee; Abhishek Singh Dhadwal; Adela Grando; (Keywords: Data Sharing, Clinical Decision Support, Patient Engagement and Preferences).
- **AMIA Year In Review Keynote Presentation**, AMIA Annual Symposium 2025; Multiple Authors.
- **An Indian Sign Language Translator**, Capstone Project Presentation, Visvesvaraya National Institute of Technology, Nagpur, 2021; Authors: Abhishek Singh Dhadwal, Saurabh Pujari, Kopal Bhatnagar, and Yash Kumar.

Teaching and Service

- Student Tutor, VNIT Nagpur. Taught computing fundamentals and DSA to underserved students.
- Peer Reviewer, NeurIPS Workshop on Time Series for Health, 2025.
- Reviewer, International Journal of Human-Computer Studies, Springer Nature, 2025.
- Member, AMIA Student Working Group. Reviewed, analysed and collated into themes over 200 articles for the 2025 AMIA Year In Review Presentation.

Certifications and Online Learning

- **Machine Learning** – Stanford University (Coursera) *Instructor*: Dr. Andrew Ng *Topics*: Linear regression, logistic regression, neural networks, ML system design, dimensionality reduction using Principal Component Analysis
- **Complete Python Bootcamp** – Udemy *Instructor*: Mr. Jose Portilla *Topics*: Python syntax, data structures, object-oriented programming, file handling, and library utilization
- **Data Analysis using Excel and Tableau** – EntryLevel *Instructor*: Mr. Nabeel Siddiqui *Topics*: Data collection, cleaning, in-depth analysis using formulas, pivot tables, root cause analysis, and Tableau for impactful visualizations
- **Introduction to Psychology** – Yale University (Coursera) *Instructor*: Dr. Paul Bloom *Topics*: Neuroscience, human variation, personality, language acquisition, cognitive and social psychology, developmental psychology
- **HIPAA for ASU Researchers** – Arizona State University *Instructor*: Aaron Krasnow