UTKARSH SINGH

FORBES 30 UNDER 30, JOHNS HOPKINS UNIVERSITY

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https://dronamaps.com, https://dronemaps.com

Skills Summary

Enterprise UAV Systems Integration, Developing Distributed Enterprise-GIS Systems (ESRI and Open Source), ArcGIS Enterprise, ArcGIS GeoEvent Server, ArcGIS ImageServer , ArcGIS Notebook Server, Geoserver + Mapserver, Linux SysAdmin with CI/CD enabled DevOps, Computer Vision (Pose Estimation, Structure-from-Motion and GIS 3D Reconstructions on MVS and Poisson Surface Reconstruction pipelines), Geometric Deep Learning for 3D Point Clouds via PointNet, ShapeNet, SyncSpecCNN, YOLO3, Nvidia NERF implementations on UAVs, Databases (SAP HANA, PostGreSQL with PostGIS, MongoDB, Cassandra), HA Virtualization with Hyper-V, Xen, ESXi, AWS/Azure, Containerization with LXC, Docker and Kubernetes on HA ProxMoxVE

BS Computer Science, June 2022
Johns Hopkins University

Key Courses: Computational Genomics, Distributed Systems, Computer Vision, Foreign Gene Expression, Practical Cryptographic Systems, Parallel Programming, Artificial Intelligence, Databases, Computer Science Innovation and Entrepreneurship, Forensic Psychology

Additional:

Advanced Diploma in Data Systems & Analysis, University of Oxford CE
Harvard Summer School (Probability)
Brown University Pre-College
Grade schooling (10th and 12th) with Cambridge International Examinations (GCE A-Level and IGCSE)

Boards and Memberships

Confederation of Indian Industries (CII) Digital Agriculture Committee
National Committee on Civil Aviation, Government of India
FICCI (Federation of Indian Chambers of Commerce and Industry) Committee on Drones
ACM, IEEE, Drone Federation of India

DronaMaps Private Limited

Founder & CEO / August 2016 to July 2022 — "Continuous & Uninterrupted Rapid 3D Mapping using Drones"
Supervisor (Co-founder and Board Member): Ms. Ayushi Mishra amishra@dronamaps.com
DronaMaps builds centimeter level accurate 3D Maps using drones. It provides an end-to-end GIS+MIS pipeline for data acquisition, processing, and AI-enabled 4D Spatio-Temporal Change Detection and Analytics.

- Designed and implemented a large-scale 3D processing pipeline (for million-scale sqkm of area at a time) based on Structure-from-Motion (SfM) in C++ with CUDA, Poisson Surface Reconstruction and Python based feature-classification and species/feature identification from GeoTIFF & 3D Point-Clouds.
- Designed & Deployed On-Prem Production Cluster maintenance with 30,000+ CUDA cores, TB-sclae RAM bare-metal units for photogrammetry and distributed PB block storage for Voxel Cleanups and big-data analysis with HDFS/Spark.
- Deployed HA Databases to scale out into terabyte-scale geo-databases in SAP HANA / PostgreSQL+PostGIS.
- Developed Micro and Nano UAVs in partnership with Army Design Bureau, Govt of India. Custom UAVs for GPS-denied environments with AI based autopilot (6x RGB-d cameras) and Edge 3D Sensor Processing (Nvidia Jetson), with autonomous collision-tolerant navigation and optional payloads like Narrowband Multispectral camera for Precision Agriculture, Main Payload Stereo Camera for Indoor/Forest 3D Mapping and Navigation.

DronaMaps builds dashboards that combines GIS and MIS datasets. It brings together the GIS datasets from enterprise GIS workloads (like Geoserver or ESRI ArcGIS Enterprise suite) and integrates them with disparate MIS datasets including SAP based MIS/ERP workloads. Further, satellite and real-time drone data sources are added to it, which gives a wholistic dashboard experience to the user combining all the disparate data sources into a GIS enabled Single Source of Truth to analyze and assist in decision making. DronaMaps is enterprise focused and caters to large-scale B2B and B2G clients and has posted an average 400% growth YoY since 2016.

Key Projects and Verticals

- **URBAN**: Deployed India's largest GIS Command and Control Center for the State Govt of Punjab, India (https://gis.punjab.gov.in). Consists of fully autonomous drone processing pipeline managing autonomous drone deployments across the State of Punjab, full Enterprise Real-Time GIS System for collecting and managing Property Taxes for 23 districts, 250+ Towns Urban data, and Terabyte scale drone and satellite data acquisition and management. Other Clients: Govt of Arunachal Pradesh, India, etc.
- **PRECISION AGRICULTURE**: Using AI based UAV Pest & Disease Detection and Species Identification from RGB-d cameras, built analytics of Temporal Stress Change Detection, Plant Count, Yield Estimation, Carbon Sequestration and leaf-by-leaf Stress Indexing using Near Infra-Red and Red-Edge spectrum cameras. Developed novel indexes like New Leaf Index, and Mature Plant Index for Yield estimation and prediction. Crops: Banana and other Horticulture Crops, Brinjal and Groundnut and Other Vegetable crops.
- **WATER PIPELINES**: Mapped several hundred sqkm of major cities in India to extract Junction Elevation Levels using survey-grade 3D Drone data acquired at absolute accuracy of ± 4mm (x,y) and ± 9mm (z).
- **CONSTRUCTION & INDUSTRIAL AREAS**: UAV 3D-Maps of large-scale industrial sites with Spatio-Temporal Change Detection and Analytics for construction progress monitoring, centimeter-scale contour extraction, floor counts, encroachment detection & alerts, and booking of properties via the 3D portal. Clients: Govt of Rajasthan, Department of Industries; Madhya Pradesh State Electronics Development Corporation; etc.
- **AERIAL FOREST SEEDING**: Designed, developed, and deployed a custom drone for autonomous large-scale forest area seeding using drones, under a mission to plant million-scale trees rapidly, including in hard-to-reach areas. Clients: Govt of Rajasthan, Department of Forests
- **HIGHWAYS**: Deployed Drone based traffic studies, drone-assisted enforcement, and GIS Change Detection based National Highway Monitoring System using a network of 600+ drone providers.
- **DISASTER RESPONSE**: Regularly deployed Search & Rescue drones with flashlights and Live Feeds to HQ for disaster response with National Disaster Response Force, Govt of India at high-altitude areas and flood areas. Drones equipped with edge Real-time 3D mapping and AI based navigation for GPS-denied environments like tunnels and caves.
- **RURAL DEVELOPMENT**: Deployed large-scale 3D mapping system using drones for village level mapping for Govt of UP, India. AI-based feature extraction for building footprints, roads, wells, ponds, agricultural fields, health of crops, and Statewide village-by-village level analytics.
- **SECURITY & SURVEILLANCE**: Deployed large-scale continuous monitoring for District Police using Live Telecasting Swarm of UAVs and real-time updating 3D map data from drones with RTK-accuracy for monitoring & emergency response of 3 million+ footfall during a festival in the City of Ayodhya, UP, India.
- **R&D**: Led the research team to develop novel drone techniques for Continuous and Uninterrupted Rapid 3D Mapping, and custom Micro and Nano UAVs with Edge Processing capabilities in GPS+Network denied indoor environments.
- **COVID19 RESPONSE**: Deployed COVID tracking dashboards with 1.4million+ DAU for 11 State Governments in India, endorsed by Johns Hopkins University. Developed GIS-based Quarantine Violation tracking at 10meter scale using cellular networks, and Transmission Dynamics and Disease Spread Analysis.

Enterprise Partnerships

- **ESRI Inc, USA**, Silver Partner (2018-present): Accepted into ESRI Startups Program for custom GIS product development, graduated into Silver Partner, closed combined revenue of 1M+ USD with ESRI India.
- **SAP SE, Germany** (2018-present): Accepted into the Co-Innovation Lab (SAP COIL) and executed the SAP PartnerEdge Contract with SAP India Private Limited for co-sales to Enterprises.
- **Kotak Mahindra Bank Limited** (2017-present): Executed a multi-year contract for co-selling with KMBL to convert high-value urban sector accounts like that of Municipal Corporations. Co-developed a product under partnership to inspect and assess properties for Loan-Against-Property (LAP) portfolio in Tier 2 and Tier 3 towns in India.
- **KPMG India** (2020-present): Executed a co-sales partnership for public sector clients, executed partnership to provide Subject Matter Experts for KPMGs UAV projects in the public sector in India.
- **Aditya Birla Group, India** (2021): Executed a partnership with ABG for UAV integration into its group companies with a focus on developing custom products for managing & monitoring 250+ mines for cement manufacturing using drone based monitoring & stockpile volumetric assessments.

Startup Incubators

- **US Embassy Nexus Startups** (Cohort 7): Incubated by Nexus Startups for the development of Impact focused solutions in drone industry.
- **Reliance Industries Limited** (JioGenNext 2018 batch): Accepted into JioGenNext batch of 2018 and co-developed products for Precision Agriculture.
- **NASSCOM** (Center of Excellence IoT and 10K Startups): Accepted into NASSCOM 10k Startups, graduated to NASSCOM Center of Excellence IoT. Won NASSCOM Product Conclave 2017, NASSCOM Emerge 50, and NASSCOM Innotrek San Francisco 2018. Signed co-selling for custom drone solutions in public sector.
- **ACT Grants** (2020): Secured $50,000 USD grant for continued deployment of COVID-19 portals for quarantine management and patient-tracking for Government of India.
- **SINE IIT Bombay** (2021): Secured an additional $50,000 USD grant for development of drone solutions for the Urban Vertical for various agencies and departments under Govt of India and MEITY.
- **Advantage Austria** (2022): Accepted into the 2022 batch of Advantage Austria facilitated by the Embassy of Austria, Commercial Division, New Delhi.

Awards

1. Forbes 30 Under 30 (Asia) – 2020
2. Economic Times Innovation Award for Contribution to AI – 2020
3. Johns Hopkins Alumni Award, Outstanding Recent Graduates for DronaMaps – 2021
4. ESRI Partner of the Year – 2021
5. Shield for Distinguished Services, National Disaster Response Force – 2021
6. NASSCOM Emerge 50 – 2020
7. YOURSTORY Tech30 – 2020
8. Inc42 BIGSHIFT Startups – 2020
9. National Startup Award Finalist 2020, India
10. World Bank Tech Emerge Resilience – 2020
11. Startup of the Year – Business World – 2019
12. Startup of the Year – Asia Pacific Week, Berlin – 2019
13. ASSOCHAM Young Achiever of the Year – 2019
14. ESRI User Conference Geospatial Innovation of the Year – 2018, 2019
15. NASSCOM Product Conclave, Product of the Year – 2017

Past Experiences (2011-2016)

Johns Hopkins University, Department of IT

Assistant System Administrator / August 2015 – January 2016

Apple Certified System Repair Technician, Enterprise ADFS and identity management, support tickets and issue tracking for replacement systems, SAN and HA systems for classrooms.

Johns Hopkins Medicine

Research Assistant / August 2014 – March 2015

The Pan Lab – Dr. Duojia Pan

Reversal of Hippo-growth pathways in Drosophila for Tumor Reduction. Implemented micro-surgical techniques of organ extraction for *Drosophila* flies. Performed sample preparation, separation, wing and eye-disc surgical extraction from larvae, and GFP analysis.

Freelance Developer

2011-16 / "Designed and developed web-application systems with a total of $80,000+ revenue."

Key Projects: DanceInTime web-application system for booking, Internal Employee Application System for LeggMason, Web-Publishing Application for Johns Hopkins Department of Pharmacology, IT Support.

Johns Hopkins University, Disability Services

Note Taker / October 2012- December 2012

Note taking for classes for the JHU Office of Student Disability Services

Academic Projects

Johns Hopkins Libraries: Public Access Submission System (pass.jhu.edu)

Supervised By: Stephen Walli, Principal Program Manager, Azure Office of the CTO

Helped develop the Java backend & implemented ElasticSearch and containerization for the JHU PASS system at JHU Libraries.

Beans.org (2015 – 2016)

Instructor: Dr. Lawrence Aronhime

"Read and get paid". An NLP based system where each user earns credit-per-minute for interacting with sponsored media content and reading articles. Sponsoring proceeds are distributed intelligently between users based on profile-wise NLP based ranking-score. Android application developed for alpha runs, highest articles paid over $12 per user for 2-minute interactions, with an average of around $2 per article.

New Horizons Pluto Flyby Imagery (Spring 2015)

Instructors: K. Lewis, D. Strobel

Retrieved, processed and analyzed in lab imagery data from NASA New Horizons Spacecraft during its 2015 Pluto Fly-by. Techniques used were photogrammetry, mosaicking, and AT. Monochrome sensor point-wise data was processed into full-color mosaic imagery for publishing.

Institute for Data-Intensive Engineering and Science, JHU (Fall 2013)

Coordinated and automated application deployment strategies for production machines. Designed and implemented a C#-based web dashboard to provide in-depth data analytics about Office client open/save file telemetry; including performance, usage, and error data aggregation. Updated and maintained critical hardware and software on a 10-petabyte high performance computing cluster (HA).

Foreign Gene Expression (Spring 2013)

Instructor: Dr. Robert Horner

Molecular cloning that allow bacteria to be used to produce a particular gene product. Recombinant plasmids (pMal-p and pMC-1820) carrying a fusion protein gene were used to transform E.Coli and the gene products were isolated.

Media Mentions

1. Johns Hopkins Newsletter - Hopkins coronavirus-tracking map is the key source for governments and the public
2. Johns Hopkins University – Engineering Our Community: Utkarsh Singh and Ayushi Mishra
3. The Hindu – 3D Maps at your Fingertips
4. The Hindu – NASSCOM Selects 4 Tech Based Startups
5. The Hindu – Nasscom CoE-incubated start-ups help combat challenges posed by COVID-19
6. Times of India – Safety concerns over two lakh illegal drones in India: Experts
7. Times of India – BBMP drones to survey properties in five wards
8. Niti Aayog, Govt of India, PIB: Empowered Group 6 Engages CSOs/NGOs/Industry/Intl Organisations in India's fight against COVID-19
9. Yourstory – DronaMaps
10. Yourstory – [Tech30] Drona Maps' drone tech collects and digests data to provide decision-makers with usable insights
11. Yourstory – How Drona Maps is using drones to create 3D maps of cities in India to track COVID-19 hotspots
12. Yourstory – 'The Future is now' says startups on how COVID-19 has accelerated changes in market dynamics
13. Business Standard – Nasscom CoE-incubated DronaMaps help combat challenges posed by COVID-19
14. Business Standard – UAVs can map better town planning
15. Financial Express – Containing Covid-19: Nasscom CoE incubated startups show their mettle
16. BusinessLine – Nasscom CoE-incubated start-ups help combat challenges posed by COVID-19
17. Elets Egov Magazine – DronaMaps – Deploying drones as geospatial data gathering tool for rural and urban development
18. Vogue Magazine – 8 women in STEM who are leading the battle against COVID-19 in India
19. Forbes Profile on DronaMaps
20. Forbes 30 Under 30 in Enterprise Technology
21. Digit Magazine – DronaMaps leverages drone imagery to create large-scale 3D maps
22. Indian Express (written by Amitabh Kant, CEO Niti Aayog, Govt of India) – Empowered Groups have joined hands with government against Covid
23. Indian Express – Punjab uses cell phone data to fence people in quarantine, track contacts
24. DronaMaps Case Study in "India Automated: How the Fourth Industrial Revolution is Transforming India" (written by Pranjal Sharma, WEF advisor)
25. Inc 42 – The 12 Amazing Indian Startups Inc42 Discovered During BIGShift
26. CNBC TV 18 Interview by Shereen Bhan – India gets its first drone policy: Here is what experts have to say
27. IndiaAI – Interview: Utkarsh Singh, CEO & Founder, DronaMaps on geospatial analysis aiding state governments track COVID19 patients
28. ACTGrants – Equipping State War rooms : The Drona Maps Solution
29. DigitalTerminal – Punjab Government Makes Public Delivery System Efficient And Transparent With DronaMaps
30. ExpressHealthcare.in – Drones, AI helped improve COVID-19 healthcare delivery in Punjab
31. NewsPatrolling – Punjab Mandi Board establishes GIS command center with DronaMaps
32. Economic Times Government – Punjab Govt use DronaMaps to reach COVID patients in remote areas
33. BISInfotech – NASSCOM CoE Incubates DronaMaps during Uttarakhand Floods
34. DronaMaps Published Articles on Medium - https://medium.com/dronamaps/latest
35. DronaMaps Youtube Channel – https://www.youtube.com/channel/UC-aFzcZb2fi6Wu0sqRjUZXQ