CHIRAG PADUBIDRI

@ E-mail: **chirag.padubidri@gmail.com**   in **linkedin.com/in/chiragppadubidri**   ⌨ **dotpi**   🔗 **cpadubidri**
📞 Phone: **+357 99121730**   📍 **Pentageias 3, Nicosia 1048, Cyprus**

SUMMARY

I am a researcher with a Master's in Embedded Computer Systems, specializing in Deep Learning and Computer Vision. Currently finalizing my PhD in AI-driven wildlife monitoring and species distribution modeling, I develop methods for optimizing camera-trap placement for biodiversity monitoring using remote sensing data. My work integrates Deep Learning, Pervasive Computing, and IoT to enhance real-world monitoring of humans, animals, plants, and urban environments through both Remote and On-site sensing. A strong collaborator and quick learner, I thrive in multidisciplinary environments and consistently deliver high-quality results.

COLLEGE

Doctoral Training Program (Pursing)

Cyprus University of Technologies

📅 January 2022 - Present   📍 CYENS Centre of Excellence, Cyprus

My doctoral research involves harnessing the capabilities of Species Distribution Models (SDM) to construct a species digital twin and development of the algorithms for optimizing camera-trap placement to maximize species diversity coverage using SDM.

MSc. in Embedded System

University of Twente

📅 2018 – 2020   📍 Twente, Netherlands

Master of Science in Embedded System focusing on Machine Learning, Computer Vision and Embedded System.

BE in Electrical and Electronics Engineering

Visvesvaraya Technological University

📅 2010 – 2014   📍 Belgaum, India

Bachelor's degree in Electrical and Electronics Engineering with a CGPA of 8.87 from NMAM Institute of Technology, Nitte, India.

EXPERIENCE

Satellite Data and Deep learning Expert (Co-Founder)

PERIOPSIS LTD

📅 September 2022-Present   📍 Cyprus

PERIOPSIS LTD is an innovative company providing satellite imagery and aerial photography-based analytic services employing state-of-art Artificial Intelligence and Computer Vision techniques. PERIOPSIS is a spin-off company of the CYENS – Center of Excellence

Research Associate

SuPerWorld MRG

📅 September 2020 - Present   📍 CYENS Centre of Excellence, Cyprus

Role:
-To conduct fundamental and/or applied research as part of the company's research focus in interactive media under the respective Multidisciplinary Research Group (MRG)
-To participate in the preparation of project report and deliverables, research proposals for funding, and software development.
-To have a role in dissemination activities, including presenting and publishing research results in prestigious international conferences and journals.

RESEARCH INTEREST

Remote-sensing · Deep learning · Satellite Images · Hyper-spectral · Multi-spectral · Earth Observation · Biodiversity monitoring · Pervasive computing · Cameratrap · Species Distribution Model

TECHNICAL SKILLS

Machine Learning · Deep Learning · Computer Vision · Linux · Internet of Things (IoT) · IoT Protocols (MQTT, HTTPS) · System Design (End-to-End IoT Solutions) · GIS & Remote Sensing · VMware & Virtualization

ADDITIONAL SKILLS

PyTorch · TensorFlow · Keras · OpenCV · Pandas · GeoPandas · QGIS · ArcGIS · Blender · API Development (FastAPI, Flask) · Satellite Image Processing

PROGRAMMING & TOOLS

Python
C++
Latex & Markdown
Version Control

CURRENT PROJECTS

Gaea v2 – Upgrading the Geoanalytical Platform for Cyprus

CYENS Center of Excellence

March 2024 - Present

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Following the successful deployment of GAEA v1, an interactive geoanalytical tool for environmental and real estate insights in Cyprus, Gaea v2 focuses on expanding the platform's capabilities and improving system performance. In this new phase, I am leading key technical updates including:

- Upgrading core geo-analytical services with the latest satellite imagery and environmental datasets
- Migrating the backend architecture from Flask to FastAPI to enable faster responses, better modularity, and easier integration with external systems

Project Website: GAEA

InsectAI - Image-based AI for Insect Monitoring

CYENS Center of Excellence

November 2023 - Present

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InsectAI – COST Action CA22129, *Image-based AI for Insect Monitoring*. InsectAI aims to support large-scale insect monitoring and conservation efforts across Europe to counteract widespread insect declines. This initiative brings together researchers and stakeholders in image-based AI technologies to drive research, foster innovation, and provide standardized, high-resolution biodiversity data essential for conservation policies, including the EU Biodiversity Strategy 2030 and the EU Nature Restoration Law.
As part of InsectAI, I am contributing to the development of AI-driven insect monitoring solutions using *Computer Vision, Machine Learning, Deep Learning, and IoT*. My focus includes designing and deploying image-based models for real-time insect classification and behavior analysis, integrating pervasive computing and edge AI for scalable, efficient biodiversity tracking. The project is actively collaborating with a diverse network of European partners to advance standardized methodologies in insect monitoring.
Project Website: InsectAI - COST Action
More Info: COST Action CA22129

MED4PEST - MEDiterranean Alliance for Ecological Pest Management

CYENS Center of Excellence

June 2022 - Present

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MED4PEST – *Ecologically Based Rodent Management (EBRM) for Sustainable Agriculture*. MED4PEST aims to develop eco-friendly rodent management solutions to reduce reliance on synthetic pest control in Mediterranean agriculture. The project fosters sustainable, ecologically based pest management by integrating research from universities, research institutes, and industry partners. Funded by the PRIMA Foundation, MED4PEST contributes to higher-quality crop production, ecosystem health, and sustainable farming through innovative, data-driven approaches.
As part of MED4PEST, I contributed to the development of *SPYCE*, a modular rodent-monitoring device (RMD) designed for real-time rodent detection and behavioral analysis. SPYCE integrates multi-sensor technology, including PIR, ultrasonic, infrared, mmWave radar, and environmental sensors, all managed via Raspberry Pi. The system supports adaptive monitoring modes and is deployed in Greece and Turkey for field validation. SPYCE is open-source, allowing customization and scalability for deep-learning-based rodent detection, behavior analysis, and anomaly detection. The collected data will enable the development of multi-modal AI models for precision rodent monitoring and sustainable pest management.
Project Repository: MED4PEST - Github **Kamilaris2023**

COMPLETED PROJECTS

BE-HIVE - Smart Beehives and Camera Traps for Bees and Wasps

CYENS Center of Excellence

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BE-HIVE aimed to develop AI-powered smart beehives and camera trap systems for real-time monitoring of bee populations and behavior. Using *IoT, Computer Vision, Deep Learning, and Remote Sensing*, the project investigated environmental factors affecting bee health, identified potential threats, and optimized hive placement for sustainable beekeeping. Advanced sensor integration and deep learning models were used to track bee activity, detect anomalies, and assess biodiversity impacts. The project contributed to open datasets for honeybee monitoring and supported research on climate change effects on pollinator populations.

Techniques Used: *IoT, Computer Vision, Deep Learning, GIS, Aerial Photography, Machine Learning, Open Hardware.*

Collaboration with: *CYENS LEAR MRG, CYENS MakerSpace, EMME-CARE Center.* Status: *Completed*

Counting Wildlife Using AI and Aerial Photography

CYENS Center of Excellence

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This project explored the use of *deep learning and aerial photography* to *automate wildlife population surveys* with high precision. By integrating *density maps and AI models*, the study successfully estimated the number of *sea lions and African elephants*, achieving improved accuracy over state-of-the-art counting techniques. The findings demonstrate the potential for *large-scale AI-driven wildlife monitoring*, supporting species conservation and long-term ecological research.

Techniques Used: *Deep Learning, Aerial Photography, Visualizations, Modelling.*

Collaboration with: *Jacob Kamminga (University of Twente).*

Status: *Completed*

Exploiting Heightmaps for Super-Resolution of Satellite Imagery

CYENS Center of Excellence

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his project explored a novel *super-resolution reconstruction (SRR) approach* for *remote sensing imagery*, addressing common challenges such as noise, low resolution, and texture complexity. By integrating *normalized Digital Surface Model (nDSM) data* into the training process, the model achieved significantly improved super-resolution outputs without requiring additional data during inference. The approach was evaluated on *DFC2018 and Luxembourg Lidar datasets*, producing *high-quality reconstructions indistinguishable from ground truth imagery.*

Techniques Used: *Super-Resolution, Deep Learning, Digital Surface Models (DSM), Remote Sensing.*

Status: *Completed*

Land Use - Land Cover (LULC) Mapping of Cyprus

CYENS Center of Excellence

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This project aimed to generate a *detailed LULC map of Cyprus for 1990*, aligning with Kyoto Protocol requirements. Using *satellite imagery from Landsat 1-5* and *deep learning-based classification*, the study reconstructed historical land cover data with *85%+ accuracy*, filling the gap left by missing CORINE inventory records. The 2000 LULC map served as ground truth data to train *computer vision models* for *land change detection* over a decade at a 60m/pixel resolution.

Techniques Used: *Satellite Imagery, Deep Learning, GIS.*

Collaboration with: *Department of Environment, Ministry of Agriculture, Rural Development and Environment, Republic of Cyprus.*

Status: *Completed*

Identifying Illegal Dumping from Satellite Imagery

CYENS Center of Excellence

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This project focused on detecting illegal dumping sites in *Cyprus* using *satellite imagery, deep learning, and geospatial analysis*. A citizen-driven *crowdsourcing approach* was integrated, where users reported suspected dumping locations via mobile applications. Automated *AI-based classification models* processed satellite data to confirm the presence of waste, linking verified reports to municipal services for further action. The project aimed to improve waste management policies and environmental protection, with a strong focus on suburban areas of *Nicosia*.

Techniques Used: *Satellite Imagery, Deep Learning, Mobile Crowdsourcing, GIS, Geospatial Analysis.*

Collaboration with: *CLEANathon Team (Cyprus), Friends of the Earth (Cyprus).*

Status: *Completed*

PRODUCTS

Gaea: Geoanalytical Tool for Natural Environment and Real Estate Market in Cyprus

CYENS Center of Excellence

Completed

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Gaea is an interactive online *geo-analytical tool* designed to provide comprehensive insights into the real estate market and environmental conditions in Cyprus. Built on the *SuPerWorld Geo-API v2.0*, it integrates *earth observation technologies, artificial intelligence, and geospatial analysis* to assess the impact of environmental risks and climate change on properties across the country.
Gaea enables users to compare locations, analyze geospatial trends, and assess risks related to *land use change, vegetation, wildfires, floods, landslides, subsidence, and proximity to key infrastructure*. The tool provides valuable insights for *property developers, investors, and homeowners*, offering a data-driven approach to real estate decision-making.
Techniques Used: *Satellite Imagery, Computer Vision, Deep Learning, GIS, Geospatial Analysis.*
Output: *An interactive online tool branded as Gaea Environmental Digital Twin.*
Access: http://gaea.cyens.org.cy (*Each Cypriot citizen receives 50 free credits per year*).

SuPerWorld Geo-API: AI-Powered Risk Modelling for Real Estate

CYENS Center of Excellence

Completed

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SuPerWorld Geo-API is an advanced *geospatial analytics platform* integrating *AI, satellite imagery, and GIS* to assess environmental and climate-related risks for real estate in Cyprus. It provides *automated property evaluations* and risk assessments for landslides, flooding, earthquakes, wildfires, and vegetation density, supporting *insurance, finance, and real estate sectors*.
The latest *v2.0* introduces improved accuracy, expanded geospatial services, and polygon-based queries, enabling comprehensive land use analysis, location suitability assessments, and property valuation. The API powers *Gaea*, offering insights into real estate trends, land cover changes, and environmental sustainability.
Techniques Used: *Satellite Imagery, AI, Computer Vision, Deep Learning, GIS.*
Output: *A geospatial API providing automated risk assessments and property evaluations.*

PUBLICATIONS

- **Chirag Padubidri**, Pranesh Velmurugan, Andreas Lanitis, and Andreas Kamilaris. **"FrogDeepSDM: Improving Frog Counting and Occurrence Prediction Using Multimodal Data and Pseudo-Absence Imputation." Under review in Animal Biotelemetry**.

- **Chirag Padubidri**, Ioannis Louloudakis, Ioannis Daliakopoulos, Sukru Esin, and Andreas Kamilaris. **"SPYCE: A Multi-Modal Rodent Monitoring Device for Enhanced Detection, Monitoring, and Behavior Analysis."** *Poster presentation at EGU General Assembly 2025, Session HS1.2.2 - The MacGyver session for innovative and/or self-made tools to observe the geosphere, Vienna, Austria*.

- **Chirag Padubidri**, Heleen Visserman, Andreas Lanitis, and Andreas Kamilaris. **"TaxaNet: Harnessing a Hierarchical Loss Function for Insect Classification Using Deep Learning."** *4th International Workshop on Camera Traps, AI, and Ecology*, Hagenberg, Austria, September 2024.

- Savvas Karatsiolis, **Chirag Padubidri**, and Andreas Kamilaris. **"Scalable Retrieval of Similar Landscapes in Optical Satellite Imagery Using Unsupervised Representation Learning."** *Remote Sensing Journal*, vol. 16, no. 1, December 2023. DOI: 10.3390/rs16010142.

- Asfa Jamil, **Chirag Padubidri**, Savvas Karatsiolis, Indrajit Kalita, Aytac Guley, and Andreas Kamilaris. **"GAEA - A Country-Scale Geospatial Environmental Modelling Tool: Towards a Digital Twin for Real Estate."** *Proceedings of the 37th edition of Environmental Informatics Conference (EnviroInfo 2023)*, Munich, Germany, October 2023.

- **Chirag Padubidri**, Andreas Kamilaris, Alexis Charalambous, Andreas Lanitis, and Marios Constantinides. **"The Be-Hive Project - Counting Bee Traffic based on Deep Learning and Pose Estimation."** *International Conference on Intelligent Systems (IntelliSys)*, Amsterdam, The Netherlands, September 2023.

- Andreas Kamilaris, J.B. Filippi, **Chirag Padubidri**, R. Koole, and Savvas Karatsiolis. **"Examining the Potential of Mobile Applications to Assist People to Escape Wildfires in Real-Time."** *Fire Safety Journal*, vol. 136, no. 103747, April 2023. DOI: 10.1016/j.firesaf.2023.103747.

- Savvas Karatsiolis, **Chirag Padubidri**, and Andreas Kamilaris. **"Exploiting Digital Surface Models for Inferring Super-Resolution for Remotely Sensed Images."** *IEEE Transactions on Geoscience and Remote Sensing*, vol. 60, 2022, pp. 1–13.

- **Chirag Padubidri**, Andreas Kamilaris, and Savvas Karatsiolis. **"Accurate Detection of Illegal Dumping Sites Using High Resolution Aerial Photography and Deep Learning."** *2022 IEEE International Conference on Pervasive Computing and Communications Workshops and other Affiliated Events (PerCom Workshops)*, 2022.

- **Chirag Padubidri**, Andreas Kamilaris, Savvas Karatsiolis, and Jacob Kamminga. **"Counting Sea Lions and Elephants from Aerial Photography Using Deep Learning with Density Maps."** *Animal Biotelemetry*, vol. 9, no. 1, 2021.

- Andreas Kamilaris, Jesper Provoost, Jean-Baptiste Filippi, **Chirag Padubidri**, Savvas Karatsiolis, Ian Cole, Wouter Couwenbergh, and Evi Demetriou. **"EscapeWildFire: Assisting People to Escape Wildfires in Real-Time."** *2021 IEEE International Conference on Pervasive Computing and Communications Workshops and other Affiliated Events (PerCom Workshops)*, 2021.