DAVID G. SHATWELL (PH.D. STUDENT)

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Research Interests: 3D-Vision, 3D-Reconstruction, Geo-Localization, Multimodal Retrieval, Representation Learning

Education

Ph.D. in Computer Science University of Central Florida, USA **Aug 2023 – May 2028 (Expected)**
Advisor: Dr. Mubarak Shah, *GPA: 3.95/4.00* *ORC Doctoral Fellowship*

B.Sc. in Electrical Engineering Universidad de Ingenieria y Tecnologia (UTEC), Peru **2015 – 2020**
GPA: 16.33/20.00 *Graduated first place (Fall 2020 semester)*

Publications

1. **David Shatwell**, Ishan Dave, Sirnam Swetha, and Mubarak Shah. GT-Loc: Unifying When and Where in Images Through a Joint Embedding Space, International Conference on Computer Vision (**ICCV**), 2025. **Oral presentation**.
2. **David Shatwell**, Victor Murray, Augusto Barton. Real-Time Ore Sorting Using Color and Texture Analysis, International Journal of Mining Science and Technology (IJMST), 2023.
3. (Under review) Swetha Sirnam, Rohit Gupta, Parth Parag Kulkarni, **David G Shatwell**, Jeffrey A Chan Santiago, Nyle Siddiqui, Joseph Fioresi, Mubarak Shah. ImplicitQA: Going beyond frames towards Implicit Video Reasoning, 2025.
4. (In progress) Shambel Mengistu*, **David G Shatwell***, Mubarak Shah, Mara Pistellato. Enhs3r: Improving 3D Reconstruction through Auxiliary Geometric Supervision, 2025. (*equal contribution).

Work Experience

Center for Research in Computer Vision (CRCV) *Graduate Research Assistant* **Aug 2023 – Present**
- Perform rigorous research in geo-spatial computer vision, with special focus on multi-view 3D reconstruction and geo-localization.
- Regularly engaged in collaborative research with peers and professors, fostering interdisciplinary cooperation.

Manaflex LLC *Software Engineer* **Feb 2023 – Oct 2023**
- Developed vision algorithms to automatically inspect manufactured battery parts by comparing product images with CAD models.
- Worked closely with the manufacturing team and customers to validate and discuss the software implementation.

Hochschild Mining PLC *R&D Engineer* **Mar 2019 – Oct 2022**
- Developed a real-time ore sorting algorithm to classify gold-bearing minerals from barren rocks using RGB, hyperspectral and 3D sensors, resulting in an accuracy of 95%.
- Implemented algorithm to control and synchronize the image acquisition of multiple cameras and high-powered LEDs with mineral passing through a conveyor belt.
- Filed patent, paper accepted in IJMST [2].

Geophysical Institute of Peru *R&D Intern* **Mar 2019 – Oct 2022**
- Developed a digital system used to capture and repackage raw data from the Jicamarca Observatory's main radar and send it through Gigabit Ethernet using a System-on-Chip (FPGA + microprocessor).

Major Research Projects

3D Reconstruction and Cross-View Geometry **2024 – Present**
- *ENHs3R: Unified 3D reconstruction with auxiliary tasks* (2025 – Present): A DUSt3R-based framework that augments image features with a lightweight relative-pose module and jointly predicts point maps, surface normals, and out-painted views. Supports test-time adaptation through a small learnable prompt for unseen scenes.
- *Evidence across multi-view tasks and datasets* (2025 – Present): Demonstrated competitive accuracy and completeness on both sparse and dense 3D reconstruction, along with improvements in relative pose estimation. The use of multi-task heads and confidence-aware regression enhances geometric fidelity without significant overhead.
- *Cross-view 3D (ground ↔ aerial/satellite)* (2025 – Present): Developing a 3D reconstruction framework capable of handling large scale and viewpoint differences across ground-to-aerial and ground-to-satellite image pairs. .
- *New datasets for cross-view reconstruction* (2025 – Present): Curated datasets from Google Earth containing ground, aerial, and satellite triplets, and building a complementary real-world campus dataset with diverse heights, FOVs, and coarse GPS/camera metadata to validate cross-view alignment and metric-scale recovery.

Geo-Localization & Time Prediction **2024 – Present**

- *GT-Loc: Unified image–time–location retrieval (core project)* (2024 – 2025): Designed a triple-encoder framework (image, time, location) that aligns all three modalities in a shared embedding space and performs retrieval to predict both GPS and timestamp from a single image. Demonstrated competitive geo-localization and strong zero-shot time-of-capture prediction across standard benchmarks.
- *Temporal Metric Learning (TML) for cyclic time* (2024 – 2025): Proposed a loss that models month and hour on a torus with soft targets proportional to toroidal time differences, outperforming standard contrastive losses.
- *Compositional and text-grounded retrieval* (2024 – 2025): Enabled composed retrieval (Time + Location → Image) and text-conditioned geo-temporal queries by reusing the trained embedding heads, improving recall over adapted classification baselines.
- *Robustness studies* (2024 – 2025): Quantified resilience to limited training data and label noise; maintained strong performance under significant data reduction and moderate annotation noise.
- *Ongoing: Fusion transformer & new tasks* (2025 – Present): Extending GT-Loc with a fusion transformer over image, time, and location tokens, a larger curated dataset, and time-aware composed image retrieval (e.g., retrieval constrained by season and hour), targeting stronger cross-domain generalization and finer retrieval granularity.

Funded Projects

IARPA – Walk-Through Rendering of Images from Varying Altitudes (WRIVA) **Aug 2023 – present**

- Worked in a multidisciplinary, cross-university engineering research project focused on developing algorithms for 3D reconstruction, novel-view synthesis and metadata correction.
- Developed model to estimate the time-of-capture of images, securing 1st place in the leader-board against the SRI and JHU teams. Paper accepted as an oral presentation in ICCV 2025 [1].
- Currently working on a multi-view camera localization model. Preliminary results show an 8% lower metric error compared to algorithms like COLMAP and MASt3R.

Awards and Honors

ORCGS Doctoral Fellowship **2023-2028**
First Place Graduate, B.Sc. in Electrical Engineering **2020**
UTEC Thesis Honors Highest possible grade in thesis dissertation **2020**
UTEC Thesis Competition, 2nd place **2020**
UTEC Academic Achievement Scholarship **2018, 2019**

Skills

Programming Languages	Python, MATLAB
Deep Learning frameworks	PyTorch, Keras
Tools/Frameworks	OpenCV, Open3D, COLMAP

Coursework

- Advanced Computer Vision (*CAP 6412*)
- 3D Computer Vision (*CAP 6419*)
- Advanced AI (*CAP 5636*)

Professional Services

- Reviewer for CVPR, ICLR, ICCV, ECCV, NeurIPS
- Mentored student of NSF Research Experience for Undergrad (REU) 2024

Character Referees

- Dr. Mubarak Shah, UCF Board of Trustees Chair Professor, University of Central Florida, shah@crcv.ucf.edu
- Dr. Victor Murray, Assistant Attending Physicist, Memorial Sloan Kettering Cancer Center, murrayv@mskcc.org
- Augusto Barton, Chief Technology Officer, Manaflex LLC, augusto.barton@manaflex.com