

Kenneth W. Chapman, Ph.D.

Research Scientist — Computer Vision — Quantitative Measurement — Applied Machine Learning

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Research Profile

Interdisciplinary research scientist with a 2023 Ph.D. in Natural Resource Sciences and more than four decades of experience developing quantitative methods from images and image sequences. Across environmental, biomedical, behavioral, and industrial work, the recurring problem has been converting visual phenomena into **repeatable, defensible measurements**. Current interest is in applying that measurement and computational background to experimental cognition while developing deeper training in psychological science, particularly where quantitative image analysis can strengthen stimulus construction, feature measurement, experimental control, or interpretation of behavioral data.

Research & Methodological Strengths

- **Quantitative measurement from imagery:** Segmentation, geometry, temporal tracking, 2D/3D measurement, feature extraction, uncertainty/error characterization, and ML/AI inference.
- **Human visual and behavioral measurement:** High-speed pupil/corneal-glint tracking for gaze estimation and time-domain full-body image analysis for patient movement and behavioral monitoring.
- **Scientific validation:** Identifying error sources, validating algorithms against real-world data, and building reproducible computational methods for scientific use.
- **Interdisciplinary collaboration:** Working with domain scientists where improved measurement, research software, and computational methods materially strengthen the underlying research.

Education

University of Nebraska-Lincoln

2023

Ph.D., Natural Resource Sciences

Lincoln, NE

Research focus: Image processing and ML/AI for water-height and flow-rate measurement.

University of Texas at El Paso

1990

M.S., Industrial Engineering (Machine Vision)

El Paso, TX

Oregon State University

1978

B.S., Business Administration & Marketing

Corvallis, OR

Selected Research Experience

Image-Based Environmental Measurement & Scientific Software — GaugeCam

- Led long-term development and support of GRIME2, free open-source GaugeCam software for image-based water-level measurement; developed calibration and measurement methods, characterized field performance and error sources, and currently developing GRIME3.

Human Behavioral Image Analysis — CareView Communications research

- Performed initial time-domain full-body image analysis aimed at identifying patient movement patterns associated with imminent bed-exit/fall risk; related work contributed to awarded patient-monitoring patents.

Ocular Dynamics and Gaze Measurement — Brien Holden Vision Diagnostics

- Developed high-speed (400–600 fps) pupil/corneal-glint tracking on commodity hardware for gaze-angle estimation in concussion-related assessment research; also developed retinal segmentation and pathology-feature methods.

Longitudinal Biological Imaging — Thrive Bioscience

- Direct algorithm development for longitudinal cell-imaging systems using single-image and time-domain measurements, quantitative phase imaging, depth-from-focus methods, modern segmentation models, quantitative features, and ML/AI inference.

Selected Publications

- **Chapman, K.W.**, Gilmore, T.E., et al. (2022). Open-Source Software for Water-Level Measurement in Images With a Calibration Target. *Water Resources Research*, 58(8).
- Birgand, F., **Chapman, K.**, et al. (2022). Field performance of the GaugeCam image-based water level measurement system. *PLoS Water*, 1(7).
- Gilmore, T.E., Birgand, F., & **Chapman, K.W.** (2013). Source and magnitude of error in an inexpensive image-based water level measurement system. *Journal of Hydrology*, 496, 178–186.
- **Chapman, K.W.**, Johnson, W.C., & McLean, T.J. (1990). A high speed statistical process control application of machine vision to electronics manufacturing. *Computers & Industrial Engineering*, 19(1–4).

Google Scholar metrics: h-index 10; i10-index 12.

Selected Professional Experience

Thrive Bioscience 2018 – Present
Vice President of Algorithms Beverly, MA (Remote)

- Direct computer-vision and ML/AI development for longitudinal biological imaging and automated cell-culture monitoring; translate scientific questions into quantitative image-derived measurements and decision algorithms.

Brien Holden Vision Diagnostics 2012 – 2015
Director, Image Analysis Prescott, AZ

- Led an international image-analysis team developing retinal and ocular-motion algorithms for diagnostic and research applications.

Bioptigen 2010 – 2013
Senior Research Engineer Research Triangle Park, NC

- Developed segmentation and temporal/spatial feature-extraction methods for 3D Optical Coherence Tomography (OCT) images.

Hemex Health / Case Western Reserve University 2016 – 2018
Research Consultant Various Locations

- Developed segmentation, velocity profiling, and shape characterization for low-cost image-based sickle cell disease diagnosis.

Earlier senior machine-vision roles: LMI Technologies, DW Fritz Automation, and Centice Corporation — high-precision 2D/3D measurement, metrology, classification, robot guidance, and feature detection.

Selected Patents

- Johnson, S.G., del Carpio, D., & **Chapman, K.W.** (2018). *Patient video monitoring systems and methods for thermal detection of liquids*. US Patent 9,959,471.
- Clark, M., del Carpio, D., & **Chapman, K.** (2018). *Systems and methods for dynamically identifying a patient support surface and patient monitoring*. US Patent 10,045,716.

Technical Expertise

Programming & research tools: Python, C/C++, OpenCV, PyTorch, Detectron2, Git, LaTeX.

Vision / segmentation: SAM-family models (SAM/SAM 2), Mask R-CNN, Mask2Former.

Languages: English (Native), Spanish (Fluent).