

# FRANK L ENGEL

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San Antonio, Texas, 78249, USA

## SUMMARY

Geographer and researcher with 10+ years of experience developing tools, technology, and apps using remote sensing to solve real-world problems. Experienced in software design, technology deployment, and training. Passionate about project management and clear communication through scientific publications and documentation.

## EXPERIENCE

- **U.S. Geological Survey - Hydrologic Remote Sensing Branch** Jan 2022 - Present  
*Geographer, EDGE | Project Manager | Subject Matter Expert* San Antonio, TX
  - **Leadership & Program Management:** Manage the National Imagery Management System (NIMS), which delivers over 77 million images from over 800 cameras at gages nationwide.
  - **Strategic Impact:** Lead the national adoption of non-contact streamflow measurement methods, shaping policy and implementation across multiple offices.
  - **Innovation & Technology Development:** Spearhead advancements in image velocimetry, guiding national operational implementation and research.
  - **Workforce Development & Mentorship:** Provide subject matter expertise and training on image and radar velocimetry deployments and near-field remote sensing applications, influencing national adoption of best practices.
- **U.S. Geological Survey - Oklahoma-Texas Water Science Center** Jun 2017 - Dec 2021  
*Geographer | Project & Task Leader | Subject Matter Expert* San Antonio, TX
  - **Program Development & Implementation:** Led the creation of CameraDCP, automating imagery collection and improving national hydrologic monitoring programs.
  - **Efficiency & Cost-Savings:** Optimized the NWIS Imagery Project, achieving a 23% cost reduction while enhancing data accessibility and usability.
  - **Technical Leadership & Stakeholder Engagement:** Managed interagency collaborations for flood inundation modeling and sediment transport studies, supporting cooperator water resource management efforts.
- **U.S. Geological Survey - Illinois Water Science Center** Apr 2012 - Jun 2017  
*Geographer | Technical Lead* Urbana, IL
  - **Leadership in Technology & Training:** Co-developed and standardized the Velocity Mapping Toolbox, which is still in regular use for hydroacoustics applications worldwide.
  - **Strategic Research Contributions:** Published influential multi-agency studies on barge traffic impacts on Asian Carp, informing environmental managers and stakeholders.
  - **Workforce Training & Development:** Designed and delivered national hydroacoustics training courses, mentoring scientists and field staff.

## EDUCATION

- **University of Illinois at Urbana-Champaign** Sep 2007 - May 2014  
*PhD in Geography (Civil & Environmental Engineering Minor)* Urbana, IL
- **Texas State University-San Marcos** Sep 1999 - Dec 2007  
*MS in Geography, 2007*  
*BS in Physical Geography (Music Minor), 2005* San Marcos, TX

## SKILLS

- **Project Management & Leadership:** Technical team leadership, stakeholder engagement, strategic planning, budget & resource management, cross-functional collaboration, mentorship, scientific & technical writing
- **Specialized Areas:** Image velocimetry, remote sensing, hydroacoustics, training curriculum design
- **Programming Languages:** Python, JavaScript, MATLAB
- **Web Technologies:** HTML, JavaScript, CSS
- **Data Science:** OpenCV, Scikit-learn, NumPy, Pandas, SciPy
- **Cloud Technologies:** AWS (S3, Lambda, Rekognition, DynamoDB)
- **DevOps & Version Control:** Git, GitLab, Github, Docker, CI/CD Pipelines, Bash Scripting
- **Mathematical & Statistical Tools:** MATLAB, NumPy, SciPy, Uncertainty Analysis
- **Research Skills:** Field Data Collection, Scientific Writing, Algorithm Development, Peer Review
- **Other Tools & Technologies:** FFmpeg, GIS (ArcGIS, Global Mapper), LaTeX, Technical Documentation

## SELECTED PROJECTS

### • Imagery Data Storage and Persistence (and associated work)

Oct 2021 - Present

*Deliverables: NIMS, HIVIS, NWIS Imagery Dataflow Function*

- This project with developing a modern and robust imagery cyberinfrastructure for the Water Enterprise. Ultimately, the project has been fully successful, culminating in the creation of the National Imagery Management System (NIMS) and much forward progress on wide adoption and tool creation leveraging products from the NIMS, including the Hydrologic Imagery Visualization and Information System (HIVIS) and others.
- As Project Manager, I have successfully led the project from its initiation to completion. I manage a national project team of skilled professionals who work asynchronously. I have created, developed, and supported a large Stakeholder Community, providing strong leadership to ensure the successful delivery of all project outcomes.

### • Image Velocimetry Adoption in the U.S. Geological Survey

Oct 2016 - Present

*Deliverables: IVyTools, SurfVelTools, CameraDCP, 2 Class Curriculums, Procedure Documentation, & many Publications*

- Over the past decade, I have spearheaded the adoption and advancement of image velocimetry techniques in the U.S. Geological Survey. I am well recognized as a Subject Matter Expert, and my technical advice and leadership is often requested from USGS offices and international collaborators alike.
- This career-long project has led to the development of several software applications, including IVyTools, that are aimed at enabling operational adoption of image velocimetry.
- I have designed documentation and technical coursework that has been used to teach hundreds of USGS hydrographers about the correct use of image velocimetry.

## SELECTED PUBLICATIONS AND INVENTIONS

R=REPORT, J=JOURNAL, S=SOFTWARE, I=INVENTION

- [S.1] **Engel, F.L.**, and Knight, T.M., *in review*, Image Velocimetry Tools (IVyTools), U.S. Geological Survey software release, <https://doi.org/10.5066/P1KMVCNY>.
- [S.2] Lee, A., **Engel, F.L.**, Andrews, S.J., Nicotra, M.J., and Gyves, M.C. *in review*, Camera Data Collection Platform (CameraDCP), U.S. Geological Survey software release, <https://doi.org/10.5066/P13SMLIZ>.
- [I.1] Fulton, J.W., Knight, T.M., **Engel, F.L.**, Henneberg, M.F., Nicotra, M.J., Waters, B., Lee, A., (*DI-1215 submitted*), Under-ice Discharge on the Edge (ICE-Edge).
- [R.1] Fulton, J.W., **Engel, F.L.**, Eggleston, J.R., and Chiu, C.L., (*in SPN edit*), Computing River Discharge Using the Entropy-based Probability Concept: U.S. Geological Survey Techniques and Methods Report 3-A26.
- [J.1] Legleiter, C.J., Kinzel, P.J., **Engel, F.L.**, Harrison, L.R., and Hewitt, G., 2024, A two-dimensional, reach-scale implementation of Space Time Image Velocimetry (STIV) and comparison to Particle Image Velocimetry (PIV). Earth Surface Processes and Landforms. <https://doi.org/10.1002/esp.5878>.
- [J.2] Duan, J.G., **Engel, F.L.**, and Cadogan, A., 2023, Discharge estimation using video recordings from small unoccupied aircraft systems. Journal of Hydraulic Engineering, 149 (11). <https://doi.org/10.1061/JHEND8.HYENG-13591>.
- [S.3] **Engel, F.L.**, 2023, Surface Velocity Tools (SurfVelTools), U.S. Geological Survey software release, <https://doi.org/10.5066/P9I5JABK>.
- [R.2] **Engel, F.L.**, Jackson, P.R., and Murphy, E.A., 2018, Flow hydraulics and mixing characteristics in and downstream of Brandon Road Lock, Joliet, Illinois: U.S. Geological Survey Scientific Investigations Report, <https://doi.org/10.3133/sir20185094>.

## SELECTED HONORS AND AWARDS

### • Unit Award for Excellence of Service

Oct 2023

*U.S. Geological Survey*

- Awarded to the National Imagery Management System (NIMS) and Hydrologic Imagery Visualization and Information System (HIVIS) Team in recognition of the outstanding contributions towards advancing the use of cameras and imagery in water monitoring applications in the U.S. Geological Survey.

### • Departmental Reward for Outstanding Contribution to Aviation Safety

Apr 2019

*Department of Interior*

- Awarded in recognition of outstanding leadership and technical contributions to the Aviation Safety Program of the Department of Interior in support of the 2018 Mount Kilauea volcano research. The team of drone pilots and scientists of which I was a part, provided 24-7 surveillance to cover FEMA and HVO data requests, significantly reducing the risks to personnel while greatly expanding data collection capabilities.

### • Peer-to-Peer Award

Dec 2018

*Texas Water Science Center*

- Awarded in recognition of my multiple efforts in promoting non-contact gaging and work deriving lava effusion rates with drone-based image velocimetry as part of the 2018 Mount Kilauea Eruption response.

## REFERENCES

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1. **Jack Eggleston**

Chief, Hydrologic Remote Sensing Branch

U.S. Geological Survey

Email: jegglest@usgs.gov

Phone: +1-434-962-0972

*Relationship: Current Supervisor, provides mentorship and guidance on my professional development.*

2. **Daniel Pearson**

Program Coordinator, National Water Information System Program

U.S. Geological Survey

Email: dpearson@usgs.gov

Phone: +1-512-517-6545

*Relationship: Project/Program Supervisor, knows how I manage complex projects and meet challenges to enact mission vision.*

3. **Joe Federer**

Computer Scientist, Web Informatics and Mapping Team

U.S. Geological Survey

Email: jfederer@usgs.gov

Phone: +1-763-486-8932

*Relationship: NIMS Product Owner, can speak to how I lead and manage a large national project.*