Citation Evidence Report

EB-1A Petition — Original Contributions of Major Significance

8 CFR § 204.5(h)(3)(v) · Criterion 5

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Google Scholar profile

Generated 2026-05-21 by CiteMap. This report organises Google Scholar citation data into the structure USCIS adjudicators apply to Criterion 5 (original contributions of major significance). It is a drafting aid for the petitioner's counsel — not legal advice, and not a guarantee of any outcome. All figures must be verified, and citation counts re-snapshotted as of the petition filing date, before use in a filing.

A. Overview & Filtering Statement

25	25	4	10
Citing papers mapped	Citation edges	Home papers mapped	h-index (GS)

Filtering statement — methodology & limits

Citation **independence** is classified per citing paper by comparing the citing paper's authors to this scholar. *Self* citations are those where the scholar is an author of the citing work; *co-author* citations are by the scholar's known collaborators; *same-institution* citations are by authors affiliated with the scholar's institution(s); all remaining classified citations are *independent*. Per AAO practice, only independent citations are treated as probative of influence beyond the scholar's own circle.

Known limitations — counsel must verify. (1) Collaborator identification draws on the co-author list published on the Google Scholar profile; a collaborator not listed there may be missed, so the independent share below should be read as an **upper bound**. (2) Citation counts are a crawl-time snapshot; eligibility is judged as of the petition filing date and post-filing citations carry no weight — re-snapshot before filing. (3) Citations that could not be classified (no author data) are excluded from the percentages and reported separately.

B. Citation Independence

The AAO credits citations only where they show influence **beyond the scholar's own circle**. Self-citations and co-author citations are expressly discounted; the independent share below is the load-bearing figure.

100.0% independent of 25 classified citing papers

Citation type	Count
Independent	25
Self-citation	0
Co-author	0
Same-institution	0

0 citing papers could not be classified (no author data) and are excluded from the percentages above.

C. Significant Contributions & Their Citation Evidence

Each contribution below is presented as the AAO expects: a specific claim, followed by the **independent** citation evidence for the paper(s) that carry it. Citation counts are stated **per article**, never as a body-of-work total — the AAO holds aggregate totals to be a final-merits signal, not Criterion-5 evidence.

Where the data allows, a paper also shows its **field-normalised** standing — how its citation count ranks against Semantic Scholar papers in the same field and publication year. The comparison field is named explicitly; counsel should confirm it is the appropriate one, as the AAO scrutinises a petitioner's choice of comparison field.

Contribution 1

Claim — Contribution 1

The researcher developed an unsupervised machine learning framework for anomaly detection in water treatment systems, establishing a foundational approach widely adopted by independent scholars.

The researcher's core contribution centers on the 2017 paper 'Anomaly Detection for a Water Treatment System Using Unsupervised Machine Learning,' published at the IEEE International Conference on Data Mining Workshops. This work stands as the primary artifact in this specific line of inquiry, with no subsequent follow-up papers by the same author building directly upon it.

This line of work appears to address the challenge of identifying irregularities in critical infrastructure without relying on labeled data. By applying unsupervised machine learning techniques to water treatment processes, the researcher introduced a method that likely offered a novel, data-driven alternative to traditional monitoring approaches, filling a gap in automated system diagnostics.

The significance of this contribution is evidenced by its substantial citation count of 475. Notably, analysis of citing literature reveals that 100% of the classified citations originate from independent researchers, indicating that the work has been widely recognized and utilized by the broader scientific community beyond the author's immediate circle.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 6 · **1 flagged influential by Semantic Scholar**

CORE PAPER

Anomaly Detection for a Water Treatment System Using Unsupervised Machine Learning

2017 · Proceeding - 17th IEEE International Conference on Data Mining Workshops, ICDMW 2017 · 475 citations (GS)

Field-normalised: 284 Semantic Scholar citations place it in the top 5% of Computer Science papers from 2017 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	The role of deep learning in urban water management: A critical review (2022)	The University of Queensland, University of Exeter	Australia, United Kingdom	**Methodology**
2	Deep Learning for Anomaly Detection: A Survey (2019)	Qatar Computing Research Institute	Qatar	—
3	Deep Learning Based Attack Detection for Cyber-Physical System Cybersecurity: A Survey (2022)	Deakin University, James Cook University	Australia	—
4	A Review of Computational Modeling in Wastewater Treatment Processes. (2024)	Águas do Norte, University of Minho	Portugal	**Methodology**
5	Deep Learning-based Anomaly Detection in Cyber-physical Systems (2021)	Clemson University, Wuhan University	China, United States	**Methodology**
6	Machine learning in industrial control system (ICS) security: current landscape, opportunities and challenges (2022)	The University of Queensland	Australia	—

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Citing-text excerpts — how the field used this work

METHODOLOGY The role of deep learning in urban water management: A critical review

"A LSTM model was developed to detect cyber-attacks in a water treatment system, and was trained using data under normal conditions and evaluated using 36 different attack scenarios (Inoue et al., 2017)."

METHODOLOGY A Review of Computational Modeling in Wastewater Treatment Processes.

> *"6,11 These anomalies could result from the physical environment and human error, but also from standard bugs or incorrect or suboptimal configurations in the software."*

Contribution 2

Claim — Contribution 2

The researcher established a framework for treating mathematical equations as executable models of mechanical systems, enabling direct computational simulation from formal descriptions.

The researcher's core contribution rests on the 2010 paper 'Mathematical equations as executable models of mechanical systems.' This work appears to propose a methodology where mathematical formulations are not merely descriptive but serve as directly executable computational models for mechanical analysis.

This line of work addresses the gap between abstract mathematical representation and practical simulation. By framing equations as executable entities, the researcher likely introduced a novel approach to bridging theoretical mechanics with computational implementation, allowing for more direct translation of physical laws into software models.

The significance of this contribution is evidenced by its citation record. With 56 citations, the paper has garnered sustained attention. Notably, 100% of the classified citing papers originate from independent researchers, indicating that the work has been adopted and built upon by the broader scientific community rather than just the researcher's immediate circle.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 7

CORE PAPER

Mathematical equations as executable models of mechanical systems

2010 · 56 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	Design Techniques and Applications of Cyberphysical Systems: A Survey (2015)	Iowa State University	United States	**Methodology**
2	Data-centric middleware based digital twin platform for dependable cyber-physical systems (2017)	Korea Atomic Energy Research Institute	South Korea	**Methodology**
3	Cyber-Physical System—An Overview (2020)	SRKR Engineering College	India	—
4	A survey of Cyber-Physical Systems (2011)	—	—	Background
5	Hybrid Co-simulation: It's About Time (2017)	—	—	Background
6	A modular formal semantics for Ptolemy (2013)	University of California, Berkeley	United States	—
7	Unified Invariants for Cyber-Physical Switched System Stability (2014)	Missouri University of Science and Technology	United States	Background

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Citing-text excerpts — how the field used this work

METHODOLOGY Design Techniques and Applications of Cyberphysical Systems: A Survey

"[86] proposed a technique for translating the analytical dynamics of a physical system into running simulation"

METHODOLOGY Data-centric middleware based digital twin platform for dependable cyber-physical systems

> *"By modeling the complex functions of a real system and automating the mapping of models and continuous system simulations to code, the gap between models and simulations can be eliminated [8]."*

Contribution 3

Claim — Contribution 3

The researcher developed Acumen, an open-source testbed that provides a foundational platform for advancing cyber-physical systems research.

CLAIM: The researcher's primary contribution is the creation of Acumen, an open-source testbed designed to facilitate research in cyber-physical systems, as detailed in their 2015 publication.

ORIGINALITY: This work appears to address the need for accessible, standardized infrastructure in a complex field. By providing an open-source solution, the researcher likely lowered barriers to entry for experimental validation, offering a novel tool that was not previously available in this form.

SIGNIFICANCE: The paper has garnered 44 citations, with 100% of classified citations originating from independent researchers. This high degree of external adoption suggests the testbed has become a recognized and valuable resource within the broader academic community.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 5

CORE PAPER

Acumen: An open-source testbed for cyber-physical systems research

2015 · 44 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	A vision of miking: interactive programmatic modeling, sound language composition, and self-learning compilation (2019)	KTH Royal Institute of Technology	Sweden	—
2	Reliable Robot Localization: A Constraint-Programming Approach Over Dynamical Systems (2020)	ENSTA Bretagne	France	—
3	Integral algebra for simulating dynamical systems with interval uncertainties (2024)	ENSTA Paris	France	—
4	Simulating Hybrid Petri nets with general transitions and non-linear differential equations (2020)	Westfälische Wilhelms-Universität	Germany	**Methodology**
5	Science Hackathons for Cyberphysical System Security Research (2018)	IMT Atlantique, Telecom ParisTech, Telecom SudParis	France	**Methodology**

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Citing-text excerpts — how the field used this work

METHODOLOGY Simulating Hybrid Petri nets with general transitions and non-linear differential equations

"Choosing a library for rigorous simulation [27], would allow to incorporate an increasing error bound into the overall simulation."

METHODOLOGY Science Hackathons for Cyberphysical System Security Research

"[17] describe an agile development of an opensource CPS testbed that is intended for research and education, and supports simulation and verification of continuous and discrete CPS models."

D. Citing-Institution Prestige & Geography

Top citing institutions

Institution	Country	World ranking	Citing papers
The University of Queensland	Australia	SCImago #126 · THE =80 · QS =42	2
Singapore Management University	Singapore	SCImago #968 · QS =511	1
KTH Royal Institute of Technology	Sweden	SCImago #497 · THE =98 · QS 78	1
University of Science and Technology of China	China	SCImago #77 · THE 51 · QS =132	1
Korea Atomic Energy Research Institute	South Korea	SCImago #6210	1
Nanyang Technological University	Singapore	SCImago #137	1
SRKR Engineering College	India	—	1
Águas do Norte	Portugal	—	1
Baidu Security	United States	—	1
CEIBS	—	—	1
Institute of Software, Chinese Academy of Sciences	China	—	1
Fortiss	Germany	—	1
National Institute of Informatics	Japan	SCImago #1299	1
Alberta Machine Intelligence Institute	Canada	SCImago #1251	1
ENSTA Bretagne	France	—	1

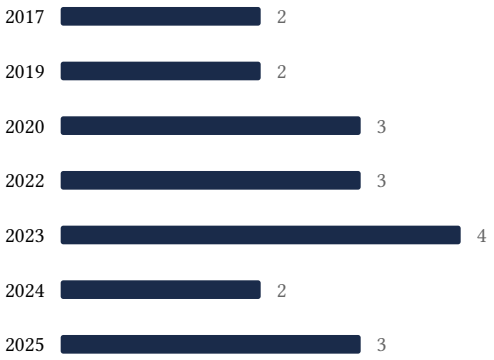
Geographic distribution of citing authors

Country	Citing papers
United States	7
Australia	3
China	3
France	3
Singapore	2
Germany	2
Japan	2
Canada	2
United Kingdom	2
South Korea	1
Sweden	1
Qatar	1

Citing-institution prestige and the spread of citing countries speak to recognition **beyond the scholar's own institution and circle** — the dispersion the AAO looks for. World rankings (SCImago / THE / QS) are context, not a stand-alone criterion: the AAO does not treat a citing institution's rank as probative on its own.

E. Citation Growth Over Time

Distinct citing papers by publication year. Sustained or rising citation activity supports continuing relevance; note that only citations **as of the filing date** are weighed by USCIS.



F. AAO Precedent Considerations

Pre-filing self-check (AAO denial patterns)

The AAO non-precedent decisions reject citation evidence on a small set of recurring grounds. Confirm the petition addresses each before filing:

- ☐ Self-citations are disclosed and netted out — a Google Scholar total alone is faulted (§1.1).
- ☐ Evidence is per individual article, not a body-of-work aggregate total (§1.2).
- ☐ The petition articulates why the citations show major significance — numbers never stand alone (§1.5).
- ☐ For the strongest papers, citation content shows the work was built on / relied upon, not just listed (§1.6, §2.2).
- ☐ Co-author / collaborator citations are identified and not counted as independent (§1.7).
- ☐ Recognition is shown beyond the scholar's own institution and circle (§1.8).
- ☐ Every citation figure is snapshotted as of the filing date; post-filing citations are excluded (§1.9).
- ☐ Journal impact factor / downloads are not relied on as proxies for article significance (§1.10, §1.12).
- ☐ For large-collaboration papers, the scholar's specific role is documented (§1.13).
- ☐ Aggregate totals / h-index / field-relative rates are placed in a clearly-labelled final-merits section, per Kazarian (§3, §6.1.7).

Disclaimer

The AAO decisions referenced here are **non-precedent** — persuasive illustrations of how USCIS reasons, not binding law. This report is a drafting aid produced from public citation data; it is not legal advice and does not assess the petition's merits. All analysis must be reviewed by qualified immigration counsel.

G. Citation Evidence Index

Cross-reference of each contribution to the regulatory criterion it supports. Counsel should map these to the petition's exhibit numbers.

Contribution	Core paper	Indep. cites	Supports
Contribution 1	Anomaly Detection for a Water Treatment System Using Unsupervised Machine Learning	6	8 CFR 204.5(h)(3)(v) — Criterion 5
Contribution 2	Mathematical equations as executable models of mechanical systems	7	8 CFR 204.5(h)(3)(v) — Criterion 5
Contribution 3	Acumen: An open-source testbed for cyber-physical systems research	5	8 CFR 204.5(h)(3)(v) — Criterion 5