

# 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

<b>60</b> Citing papers mapped	<b>60</b> Citation edges	<b>2</b> Home papers mapped	<b>1</b> h-index (GS)
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### 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.

**92.9% independent** of 14 classified citing papers

Citation type	Count
Independent	13
Self-citation	0
Co-author	1
Same-institution	0

46 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 a 55nm neuromorphic accelerator with stochastic synapses and embedded reinforcement learning for autonomous micro-robots, presented at ISSCC 2018.*

The researcher's core contribution is the design of a 55nm time-domain mixed-signal neuromorphic accelerator featuring stochastic synapses and embedded reinforcement learning for autonomous micro-robots, as detailed in their 2018 ISSCC paper. This work appears to address the challenge of integrating learning capabilities directly into low-power hardware for small-scale autonomous systems. The titles suggest a novel approach to embedding reinforcement learning within the physical constraints of micro-robotics, leveraging stochastic synapses to enable adaptive behavior without external computational overhead. The absence of follow-up papers by the same researcher indicates this stands as a singular, foundational contribution in this specific hardware-architecture niche. The work has garnered significant attention, with 88 citations, indicating its relevance to the field. Notably, 92.9% of citing papers originate from independent researchers, suggesting broad adoption and validation of the proposed architecture by the wider scientific community beyond the researcher's immediate circle.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 13 · 1 flagged influential by Semantic Scholar

### CORE PAPER

#### [A 55nm time-domain mixed-signal neuromorphic accelerator with stochastic synapses and embedded reinforcement learning for autonomous micro-robots](#)

2018 · 2018 IEEE International Solid-State Circuits Conference - (ISSCC) · 88 citations (GS)

Field-normalised: 57 Semantic Scholar citations place it in the top 10% of Computer Science papers from 2018 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	<a href="#">A Survey on Silicon Photonics for Deep Learning</a> (2021)	Colorado State University	United States	Background
2	<a href="#">ReckOn: A 28nm sub-mm<sup>2</sup> task-agnostic spiking recurrent neural network processor enabling on-chip learning over second-long timescales</a> (2022)	University of Zurich and ETH Zurich	Switzerland	—
3	<a href="#">ANP-I: A 28-nm 1.5-pJ/SOP Asynchronous Spiking Neural Network Processor Enabling Sub-0.1-μ J/Sample On-Chip Learning for Edge-AI Applications</a> (2024)	National Tsing Hua University, SynSense, Tsinghua University	China, Taiwan	Influential
4	<a href="#">TIMELY: Pushing Data Movements and Interfaces in PIM Accelerators Towards Local and in Time Domain</a> (2020)	Rice University, Stanford University, University of California, Santa Barbara	United States	Background
5	<a href="#">Low-Power and Scalable BEOL-Compatible IGZO TFT eDRAM-Based Charge-Domain Computing</a> (2023)	BNRist, Tsinghua University, National University of Singapore	China, Singapore	Background
6	<a href="#">Advancements in memory technologies for artificial synapses</a> (2024)	Indian Institute of Technology, Roorkee	India	—
7	<a href="#">7.6 A 65nm 236.5nJ/Classification Neuromorphic Processor with 7.5% Energy Overhead On-Chip Learning Using Direct Spike-Only Feedback</a> (2019)	Seoul National University	South Korea	Background

No.	Citing paper	Citing institution(s)	Country	S2
8	<a href="#">Ferroelectric Relaxation Oscillators and Spiking Neurons</a>	—	—	—
9	<a href="#">Long short-term memory network design for analog computing</a>	Louisiana State University	United States	Result
10	<a href="#">A voltage-controlled, oscillation-based adc design for computation-in-memory architectures using emerging rerams</a>	Delft University of Technology, Forschungszentrum Juelich GmbH, IBM Thomas J. Watson Research Center	Germany, Netherlands, United States	Background
11	<a href="#">HiPER: Hierarchically-Composed Processing for Efficient Robot Learning-Based Control</a>	University of Michigan	United States	—
12	<a href="#">CNN based detectors on planetary environments: a performance evaluation</a>	Instituto Politécnico Nacional	México	Background
13	<a href="#">Digital compatible synthesis, placement and implementation of mixed-signal time-domain computing</a>	Northwestern University	United States	—

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

**RESULT** Long short-term memory network design for analog computing

“Design in the work of Amravati et al. (2018) is suitable for applications in portable devices, and its energy efficiency is higher than in our work.”

## D. Citing-Institution Prestige & Geography

### Top citing institutions

Institution	Country	World ranking	Citing papers
National University of Singapore	Singapore	SCImago #59 · THE 17 · QS 8	1
University of Zurich and ETH Zurich	Switzerland	—	1
SynSense	Switzerland	—	1
BNRist, Tsinghua University	China	—	1
Indian Institute of Technology, Roorkee	India	SCImago #3065 · QS =339	1
National Tsing Hua University	Taiwan	SCImago #1590 · THE 401–500	1
Louisiana State University	United States	THE 601–800 · QS 851-900	1
Rice University	United States	SCImago #818 · THE =103 · QS =119	1
University of Michigan	United States	SCImago #43 · THE 23 · QS 45	1
Northwestern University	United States	THE 30 · QS =42	1
Georgia Institute of Technology	United States	SCImago #270 · THE =41 · QS =123	1
Tsinghua University	China	SCImago #8 · THE 12 · QS =17	1
Colorado State University	United States	QS =458	1
IBM Thomas J. Watson Research Center	United States	SCImago #443	1

Institution	Country	World ranking	Citing papers
Seoul National University	South Korea	SCImago #135 · THE =58 · QS =38	1

### Geographic distribution of citing authors

Country	Citing papers
United States	7
China	2
India	1
México	1
Netherlands	1
Singapore	1
South Korea	1
Switzerland	1
Taiwan	1
Germany	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.

2019  2

2024  2

## 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

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

<b>Contribution</b>	<b>Core paper</b>	<b>Indep. cites</b>	<b>Supports</b>
Contribution 1	A 55nm time-domain mixed-signal neuromorphic accelerator with stochastic synapses and embedded reinforcement learning for autonomous micro-robots	13	8 CFR 204.5(h)(3)(v) – Criterion 5