

# Caleb Schultz Kisby

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**Position:** 2023 Intern: Research Scientist – Artificial Intelligence

Dear IBM hiring team,

Hi, I'm Caleb, a 5<sup>th</sup> year PhD candidate at Indiana University. I specialize in integrating neural networks and symbolic reasoning (aka Neuro-Symbolic AI) — so I'm excited to see that you are looking for an intern to do research in (among other things) Neuro-Symbolic AI and Knowledge & Reasoning. This seems like a great fit, and so I'm here to apply.

I have 6 years of experience (4 PhD + 2 undergrad) working on research projects and proof-of-concept prototypes. I've published and presented 3 papers in AI conferences (one in AAI!), and I'm currently targeting KR for a fourth paper. My work synthesizes deep learning (e.g. neural networks, reinforcement learning) with symbolic reasoning. Every neural network architecture I've designed incorporates knowledge in some way — see the open-source projects listed on my resume. Most recently, I've been developing a Python suite [\[Link\]](#) (using Tensorflow) to both *verify* if a neural network satisfies  $P$  and to *build* neural networks satisfying  $P$ .

Unlike most machine learning researchers, I have a particularly strong background in formal logic and proofs. In fact, I've spent much of my PhD proving soundness and completeness for both a natural language-inspired logic [\[Link\]](#), and also a formal neuro-symbolic translation [\[Link\]](#). I also really enjoy using interactive theorem-provers (e.g. Agda & Lean), and I'm hoping to eventually be able to use these to formally verify properties of neural nets (I'm currently workshopping ideas).

If you are interested, I'm available for a phone or Zoom interview during normal business hours (8am–6pm, EST) — please email me at the address above to schedule a time.

Thank you for your consideration,

Caleb Schultz Kisby