

Caleb Schultz Kisby

Email: cckisby@iu.edu Phone: +1 609 455 0673

Position: PhD Residency - AI/ML - LLMs, NLP, Abstraction, Reasoning

Dear X hiring team,

Hi, I'm Caleb, a 5th year PhD candidate at Indiana University. I specialize in integrating neural networks and symbolic reasoning (aka neuro-symbolic AI), and I'm excited to see that you are looking for a PhD Resident to do just that. 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 fast prototypes in different research environments. I've published and presented 3 papers in AI conferences (one in AAAI!). My work synthesizes machine learning (neural networks, reinforcement learning) with formal reasoning (logic, formal verification, interpreters). Every neural network architecture I've designed incorporates symbolic reasoning in some way — see the open-source projects listed on my resume. Most recently, I've been developing a suite (in Python, via Tensorflow) to both *verify* if a neural network satisfies P and to *build* neural networks satisfying P (this uses a neuro-symbolic translation that I've proved is formally sound).

This also means that, unlike most machine learning researchers, I have a particularly strong background in formal logic and programming language theory. I've written interpreters for custom languages, worked in type-rich and functional languages (e.g. Agda, Lean, Lisp, and Haskell), and I've proved systems formally sound and complete.

As for NLP: I've always had natural language in mind as the perfect domain for combining learning and reasoning. I've taken graduate courses on classical (compositional) semantics, as well as distributional (vector) semantics. I have also used the NLTK and Word2Vec Python packages in independent projects for these classes. And although I don't yet have experience with Large Language Models (LLMs), I do have a strong interest in working with transformers. (In fact, I'm currently thinking through how to extend my formally sound neuro-symbolic translation to deal with attention!)

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