**Please provide a lay abstract for your proposed research. This will be used to inform a non-specialist audience.**

Artificial Intelligence (AI) is transforming industries, from healthcare to entertainment, by enabling complex tasks like image processing and real-time data analysis. However, AI models require powerful hardware to run efficiently. AMD's VERSAL architecture is one such hardware solution, using a system called Network-on-Chip (NoC) to connect different parts of the chip that perform AI tasks. As AI models become more complex, ensuring that data moves quickly and efficiently within this network is a big challenge. If the NoC is not optimized, it can lead to slow performance and high energy consumption, making AI applications less effective and more costly to operate.

This research aims to develop tools to make the NoC in AI accelerators like AMD VERSAL work more efficiently. By finding the best way to configure this network that can reduce delays and cut down on energy use. This means AI systems can work faster and use less power, which is crucial for applications that need to process large amounts of data in real time, like video editing or interactive media. In collaboration with AMD and using their advanced technology, this project will help make AI systems more sustainable and cost-effective. This work is important not just for tech companies but also for industries that rely on AI to improve services, reduce costs, and make smarter decisions. By optimizing the way AI hardware functions, we can help make advanced technologies more accessible and efficient for everyone.