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SciML is an open source software organization created to unify the packages for scientific machine learning. This includes the development of modular scientific simulation support software, such as differential equation solvers, along with the methodologies for inverse problems and automated model discovery. By providing a diverse set of tools with a common interface, we provide a modular, easily-extendable, and highly performant ecosystem for handling a wide variety of scientific simulations.

## USE CASE

Pumas-AI: Accelerated clinical trial analysis through faster pharmacometric calculations.

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CMU+MIT+Citrine ACED: Automated discovery of improved battery materials with surrogates of scientific simulations.

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CalTech+MIT CLIMA: A new climate model for fast uncertainty quantification and ML-assisted predictions.

## PLANNED FEATURES

- + Automated symbolic reduction of differential equation models for faster simulation and more accurate solving. Many equations are not easy to solve in the intuitive way that scientists write them down. This will automatically change the equations at a compiler level to better numerical forms before hitting the numerical solvers, making it so the user gets all of the benefits of domain-specific numerical knowledge without the effort.
- + Quantified global uncertainties in differential equation solvers. All common solvers only give estimates of local error, but users want to know the answer to the real question "how much error should I expect in the solution of this equation?". These new methods in `GlobalDiffEq.jl` give this answer.
- + A unified and differentiable interface for global and local optimization. Allow using any global or local optimizer as a layer in a neural network, and more.

## PROJECT NEEDS

Website Redesign	20 hours of dev time
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GPU CI Hardware	\$20,000
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Adjoint Implementations	20 hours of dev time
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For more information on SciML, including our governance structure and project roadmap, please visit

<https://sciml.ai/>

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