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Microsoft's Agent Lightning: The Open-Source Framework That Trains and Optimizes AI Agents Automatically

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Microsoft quietly released a new open-source framework called **Agent Lightning**, and it's one of those "why didn't we have this earlier?" kind of tools.

If you've ever set up multi-agent systems (like LangChain, AutoGen, CrewAI, or others) and wished they could *learn* without requiring a complete rewrite, this is the one to consider.

Agent Lightning ⚡

What Is Agent Lightning?

In simple terms:
Agent Lightning is a **trainer** for AI agents.

You connect it to your existing setup, and it helps your agents **improve automatically** — by learning from their runs, prompts, and even mistakes. It's like giving your agents a gym membership and a personal coach.

What's wild is that it works with *almost any* framework — LangChain, OpenAI's Agent SDK, Autogen, Microsoft's framework, even a simple Python script. You don't need to remove existing code or start over.

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Why People Are Excited

Here's the short version:

- **Almost no code changes.** You can drop it in and go.

- **Works anywhere.** Whatever your agent framework is, it'll fit.

- **Optimizes one or many agents.** Great for teams or multi-agent systems.

- **Built-in algorithms.** Reinforcement Learning, Automatic Prompt Optimization (APO), Supervised Fine-Tuning — all ready to go.

In short: your agents can *now learn,* not just follow static instructions.

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How It Fits Into Real Code

Suppose you have a small summarizer agent that interacts with an LLM.

Usually, your code might look like this:

```python
def summarize(text):
    return model.generate(f"Summarize this:\n{text}")
```

With Agent Lightning, you add a couple of helper lines:

```python
from agentlightning import emit_event, LightningTrainer

def summarize(text):
    response = model.generate(f"Summarize this:\n{text}")
    emit_event("prompt", text)
    emit_event("response", response)
    return response
trainer = LightningTrainer(algorithm="apo")  # automatic prompt optimization
trainer.train(agent=summarize)
```

That's it.
The trainer silently monitors what your agent does, collects data, and starts

tweaking prompts or policies to enhance its performance.

No compli[...] [...] over time.

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A Brief Look Inside the Mechanism

Here's how it works in plain English:

1. You continue to run your agents as usual.

2. Agent Lightning captures every prompt, output, and tool call as "events."

3. These events are stored in a central **LightningStore**.

4. The algorithm (RL, APO, etc.) reads those events and figures out what to improve.

5. The **Trainer** applies the updates and keeps the loop running.

It's modular, clean, and flexible.

You can even develop your own algorithms if you're feeling adventurous.

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Getting Started

If you're using **Linux (Ubuntu 22.04 or newer)** and have **Python 3.10 or later**, you're all set. The GPU is optional — it is only needed if you plan to fine-tune models.

Install it with:

```
pip install --upgrade agentlightning
```

Want to live dangerously and get the nightly build?

```
pip ins
  --in
  --ex
  agentlightning
```

Remember — nightly builds might be buggy. Great features, but test first.

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Automatic Prompt Optimization (APO)

```
pip install agentlightning[apo]
```

Ensure your OpenAI SDK is up to date (version 2.0 or later).

VERL (Reinforcement Learning)

```
pip install agentlightning[verl]
```

And if you want to be extra safe with dependencies:

```
pip install torch==2.8.0 torchvision==0.23.0 --index-url https://download.pytor
pip install flash-attn --no-build-isolation
pip install vllm==0.10.2
pip install verl==0.5.0
```

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For Developers or Contributors

If you want to hack around with the source code:

```
git clone https://github.com/microsoft/agent-lightning
cd agent-lightning
uv sync --group dev
```

Microsoft's using **uv** now — it's a faster, safer alternative to pip.
You can add extras, GPU groups, or activate your environment as shown here:

```
source .venv/bin/activate
python your_script.py
```

And before contributing:

```
uv run pre-commit install
```

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The Big Picture

Here's what makes this interesting: Agent Lightning doesn't attempt to replace your agent system. It just quietly sits beside it—observing, learning, and improving.

Start small, keep your stack, and let it run. Over time, this distinguishes agents that *follow commands* from those that *adapt and improve.*

If Microsoft executes this well, it could set the standard for training agent-based systems — similar to PyTorch Lightning, but geared towards *intelligent behaviors* rather than models.

Repo: github.com/microsoft/agent-lightning

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