

OpenGateway: an Open-Source Gateway for Cross-Domain Agents in Complex Collaborative Tasks

Zian Wang, Tianshuo Hu, Yihao Chen, Hao Dong,
Junqi Li, Bingsong Wu, Yawen Wang, Xiaohui Xie, Yong Cui

Emal: [xiexiaohui, cuiyong}@tsinghua.edu.cn](mailto:{xiexiaohui, cuiyong}@tsinghua.edu.cn)

GitHub: <https://github.com/anAtheist987/OpenGateway>

Why We Need an Agent Gateway

DDoS Defense



Multiple agents collaborate across mitigation devices to enable real-time DDoS defense.

Network

Management

Network Device

Collaboration

Real-time

Response

Conference Traveling



Multiple agents collaborate across MIS, approval workflows and other public platforms to support end-to-end travel coordination.

Across Multiple
MIS

Workflow Continuity

Smart Factory



Multiple agents collaborate across PLCs, vision systems, robotic arms, and WMS for coordinated smart factory operations.

Hardware

Heterogeneity

Protocol

Translation



Gap of Existing Solutions in Meeting Needs

I. Focus on User-Centered AI Access

Pro: strong channel routing and session isolation



Con: external exposure and weak authentication



 **OpenRouter**

Pro: flexible multi-model access
Con: limited support for A2A coordination

II. Focus on General Cloud Environment



 **Higress**

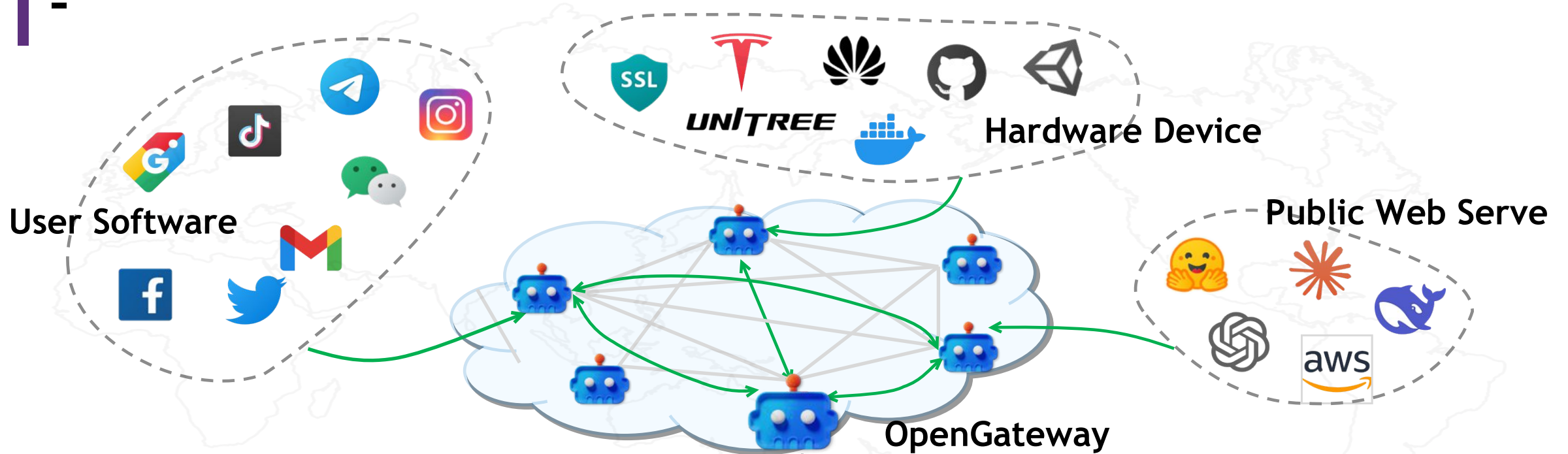
Pro: unified governance of agents, traffic, tools, and model access

Con: higher adoption and operational complexity

 **SOLO.IO**

Pro: MCP support, flexibility, and control
Con: more control-oriented than collaboration-oriented

Overview of OpenGateway



Heterogeneous Connectivity

Automatic protocol translation and agent capability discovery

Task Orchestration

Complex task decomposition and dynamic routing

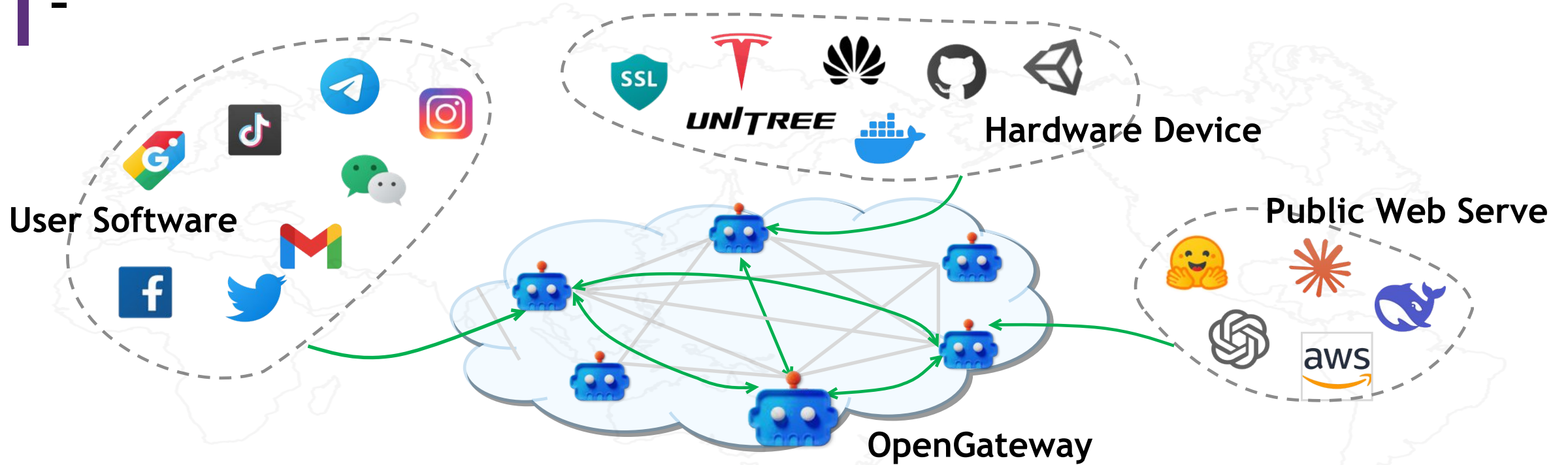
Working Memory

Historical state reuse and states maintain

Security Assurance

Sensitive data isolation and agent authentication

Overview of OpenGateway



Heterogeneous Connectivity

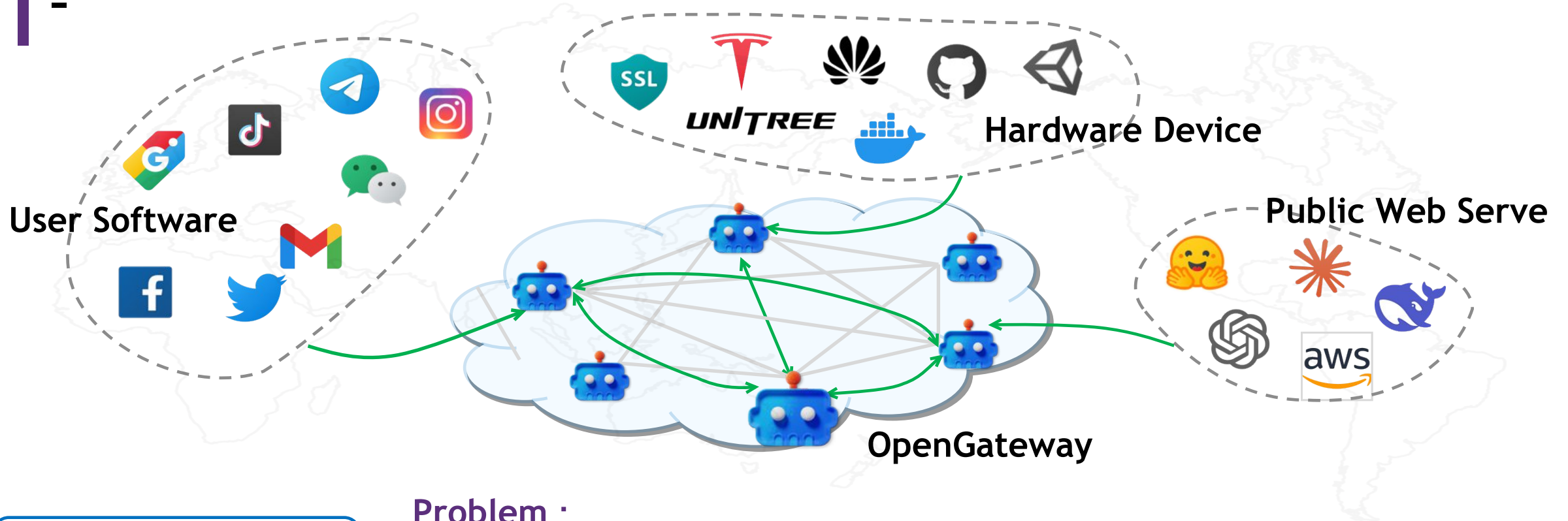
Problem :

Inconsistent protocols and interfaces hinder connectivity among heterogeneous tools and agents.

Our Approach :

1. Capability-based registration: endpoint discovery and capability indexing
2. Self-correcting MCP translation: LLM-driven repair of schemas and

Overview of OpenGateway



**Task
Orchestration**

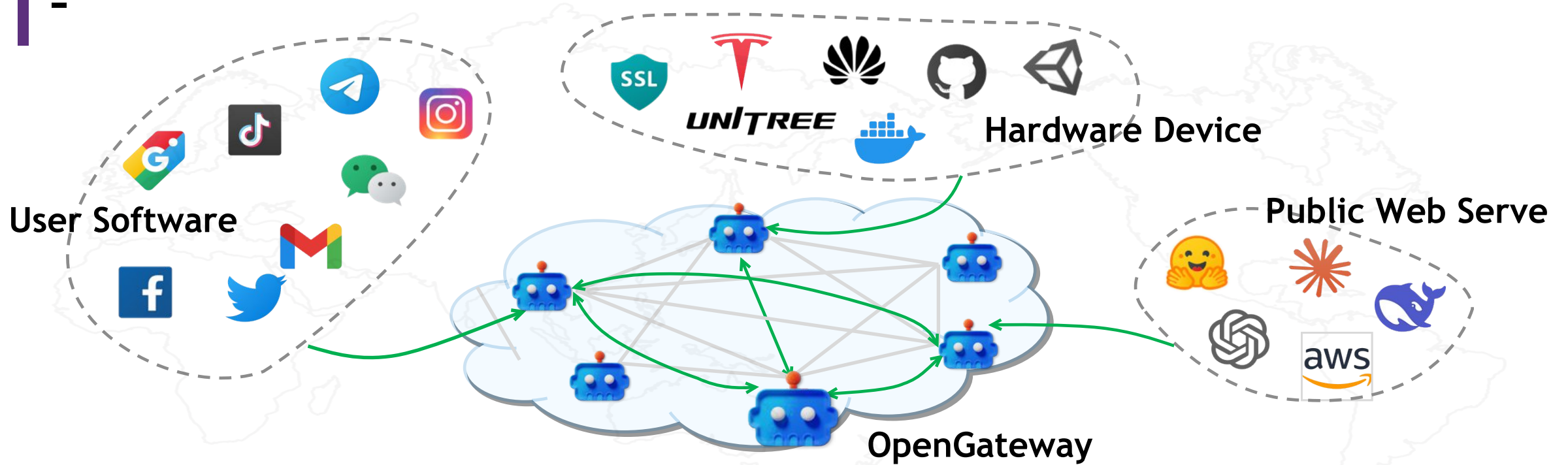
Problem :

Dependencies, tool constraints, and intermediate uncertainty make one-shot generation unstable in long-horizon tasks.

Our Approach :

1. Replanning with intermediate feedback
2. Routing by vectorized agent profile

Overview of OpenGateway



**Working
Memory**

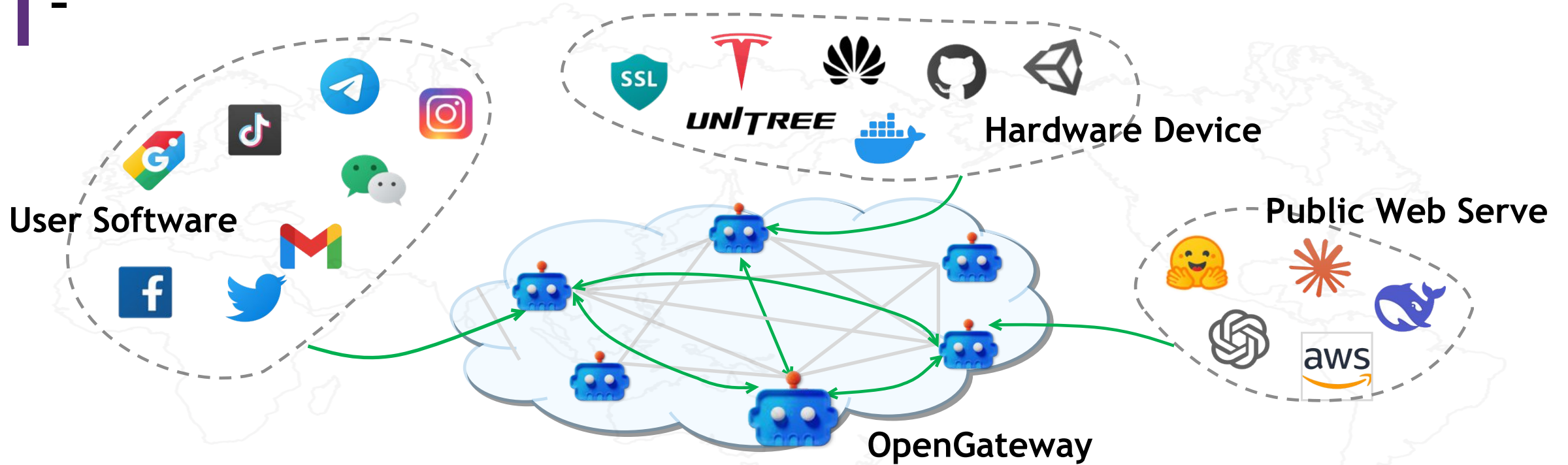
Problem :

Long-horizon execution creates more 'mental' clutter than the system can clean, leading to circular logic and lost focus.

Our Approach :

1. Zoned memory manages dynamic state updates
2. KV Cache reuse saves redundant computation

Overview of OpenGateway



Security Assurance

Problem :

Risks emerge from untrusted inputs, over-permissioned actions, memory contamination, and multi-step execution trajectories.

Our Approach :

1. Pre-execution capability assessment (*with heartbeat monitoring during execution*)
2. Sensitive information grading and rewriting

Deployment Features & Value

Deployment Mode

deployed on edge servers and oriented to cross-domain ToB service

Data Privacy

support personalized information security levels

Computing Demand

at least 9B-parameter large language model

Token Savings

approx. 30%-60% LLM token savings

Model Selection

support local model deployment & external API access

Complex Tasks

identify task difficulty and automate decomposition



Open Source Code & Community

- u **Ready to Use** : Task Orchestration & Working Memory
- u **Coming Soon** : Agent Registration, Automatic Cross-Protocol Translation, etc.
- u **Join Us:** Try <https://github.com/anAtheist987/OpenGateway> now !
- u **Active IETF Draft** : <https://www.ietf.org/archive/id/draft-agent-gw-01.html>



We welcome your feedback and comment!
We are also looking for collaboration!
Thank You!

Zian Wang, Tianshuo Hu, Yihao Chen, Hao Dong,
Junqi Li, Bingsong Wu, Yawen Wang, Xiaohui Xie, Yong Cui

{xiexiaohui, cuiyong}@tsinghua.edu.cn

GitHub: <https://github.com/anAtheist987/OpenGateway>

IETF 125 Shenzhen