

OVAL: Open Virtual Assistant Lab

A Stanford University Industrial Affiliates Program

OVAL Mission To advance virtual assistant technology and create an industrial ecosystem that protects consumer privacy and promotes open competition.

- Conduct fundamental research in virtual assistant technology
- Create and evangelize open standards
- Develop product-quality infrastructures
- Assist in product development on our infrastructure

Team The team consists of faculty from Computer Science and Law and their research groups.

Michael Bernstein	Human-Computer Interaction (NSF Career)
Dan Boneh	Security (NAE, ACM Fellow, Godel prize)
Jen King	Director of Consumer Privacy, Law School
Monica Lam (PI)	Programming Systems, AI (NAE, ACM Fellow)
Fei-fei Li	AI (ACM Fellow)
James Landay	Crowdsourcing (ACM Fellow, CHI Academy)
Chris Manning	NLP, AI (ACM, AAAI, ACL Fellow)
David Mazières	Blockchain Technology (NSF Career)
Chris Ré	Knowledge Bases, AI (MacArthur Fellow)

Research Goals

- To create an open, non-proprietary linguistic web.
- To accelerate and democratize natural language interface technology via open collaboration.
- To protect privacy with interoperable virtual assistants that can run on users' devices.

Research

- **Natural language programming.** A new virtual assistant architecture where a neural semantic parser directly translates natural language into a custom high-level programming language (ThingTalk) for assistants. Users can use natural language to automate workflows by composing functions from different domains.
- **Thingpedia.** A WORA (Write-Once-and-Run-Anywhere) platform of skills that can be run on any virtual assistants; these skill can be automatically made available to Alexa and Google Assistant if desired. Thingpedia skills are interoperable to support natural language programming. By minimizing redundant effort, lowering the barrier of entry for new assistants, and hence removing dependency on a small number of proprietary assistants, Thingpedia can flourish to contain as many skills as there are web pages.
- **LUInet (Linguistic User Interface network).** An open-source neural semantic parser that translates natural language into formal languages. All the training data are also publicly available. Companies can incorporate LUInet in their own virtual assistants, websites, apps, and and voice services.

- **Genie.** A tool that lets non-ML-experts extend Thingpedia and Thingtalk, and craft training data to extend LUIInet with sentences in their domains. By empowering companies to create and own interfaces for their domains, LUIInet can become more knowledgeable than any proprietary models. This democratizes AI and accelerates AI development.
- **Almond.** The first open-source, social virtual assistant that can be run on local devices to protect privacy. Users can tell their assistant who, what, when, where, and how can their data can be shared, all without disclosing their data to a third party.
- **A virtual assistant communication protocol.** A general, secure protocol based on remote ThingTalk programs to enable interoperability of virtual assistants. This supports federation of assistants, similar to email, rather than centralized monopolies.
- **Blockchain-based technology for audits of third-party sharing.** We use communicating virtual assistants to enforce user-specified sharing contracts across institutes; these contracts are made revocable and auditable through efficient blockchain technology based on federated Byzantine agreements.

Engagement

Our goal of creating an ecosystem based on open virtual assistants depends on the participation of industry. Corporate engagement includes:

- Participation in annual retreats, workshops, and seminars
- Contribution to the open-source research
- Contribution to the open standards
- Engagement on research directions
- Access to research results and open source software

Funding

OVAL is supported by unrestricted funding from partner companies that each contribute \$500K per year plus additional support from the National Science Foundation. Partner memberships are auto-renewed annually for five years, but companies can opt out in any given year. OVAL is a Stanford University industrial affiliates program and is subject to university policies for such programs including openness in research, publication and broad sharing of results, and faculty freedom to pursue research topics and methodology of their choice. See Stanford University Policies Affecting Industrial Affiliates Program Memberships for details.

IP

The Open Virtual Assistant Lab Researchers will use and develop open-source software, and it is the intention of all Open Virtual Assistant Lab Program researchers that any software released will be released under an open source model, such as BSD. The Program is open to all Stanford faculty who share this goal.

Information

For further information please see the OVAL website: <https://oval.cs.stanford.edu>, and a New York Times article "Stanford Team Aims at Alexa and Siri with a Privacy-Minded Alternative". Or, please contact Monica Lam, the Faculty Lab Director, lam@cs.stanford.edu.