

# Universal Intelligent Systems by 2030

Carl Hewitt with John Perry

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<https://historicalsociety.stanford.edu/publications/perry-john-r>

Apple, Facebook, and Microsoft project that by 2030, electronic glasses will have replaced smartphones. Electronic glasses will robustly integrate information under contention in real-time using abstract reasoning about information from sensors in the glasses, from the Internet, and from the systems own internal storage. Intelligent Systems using electronic glasses will advance current smartphone systems as follows:

- Educable in incorporating and using additional abstractions, although by 2030 not yet be great at formulating genuinely new abstractions.
- Self-informative in understanding their own capabilities and limitations.
- Discourse with humans.

Intelligent Systems will be even more transformative than the smartphones revolution:

- Globally (military, economic, technological)
- Domestically (administration, health, education, commerce, communities, and surveillance)

All aspects of society could become completely dependent on Intelligent Systems, making cyberresilience absolutely necessary. Cyberresilience requires inherently secure abstractions that can be used to prove technical specifications.

## Carl Hewitt

Carl Hewitt is an MIT emeritus professor. Together with his colleagues and students, he is known for the Actors Abstraction, which is more general than the Church/Turing theory of computation. Unlike the von Neumann architecture, the Actors Abstraction is inherently secure. Actors Theory (that characterizes the Actor Abstraction up to a unique isomorphism) provides foundations for proving technical specifications of practical computer systems. Practical frameworks for Actors have been developed by Apple, Erlang Solutions, Lightbend, Microsoft, and others. Very large systems have been deployed.

Hewitt is also known for Actors Theory providing greater resilience against cyberattacks on foundations:

- The very existence of the [Gödel 1931] paradoxical proposition *I'mUnprovable* could be a potential source of cyberattacks in foundational theories. Actor Theory prevents construction of the proposition using restrictions on orders of propositions.
- Actor Theory resolves the [Church 1935] paradoxical proposition *MyTheoremsAreEnumerable* that Church stated meant the end of mathematical logic. The solution to the paradox is to make the definition of a theorem be a proposition whose proof can be algorithmically checked to be correct. In this way, *MyStringTheoremsOfAnOrderAreEnumerable* can be proved to be a foundational logically undecidable proposition. The proposition cannot be proved because of the diagonal argument in [Church 1935] and it cannot be disproved because it is true in the unique up to unique isomorphism model of Actor Theory.

## John Perry

John Richard Perry is Henry Waldgrave Stuart Professor of Philosophy Emeritus at Stanford University and Distinguished Professor of Philosophy Emeritus at the University of California, Riverside. He has made significant contributions to philosophy in the fields of philosophy of language, metaphysics, and philosophy of mind. He is known primarily for his work on situation semantics (together with Jon Barwise), reflexivity, indexicality, personal identity, and self-knowledge.

Perry is a founder of the Center for the Study of Language and Information (CSLI), an independent research center at Stanford University with philosophers, computer scientists, linguists, and psychologists from Stanford, SRI International, and Xerox PARC. It strives to study all forms of information and improve how humans and computers acquire and process it.