Smart Sensor Developers' Kit

R&D100 Award Winner for 2002

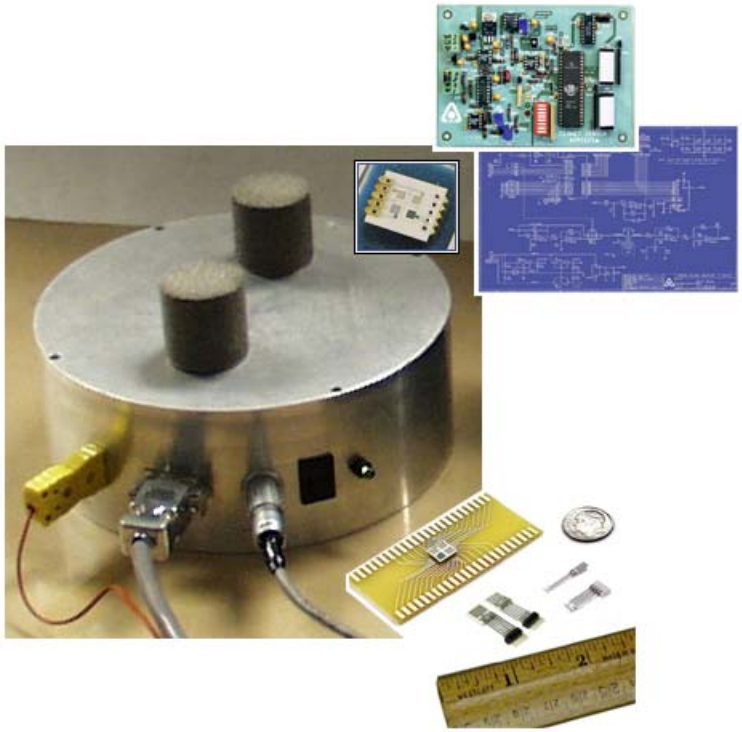
Developers

Michael Vogt (ANL)

Laura Skubal (ANL)

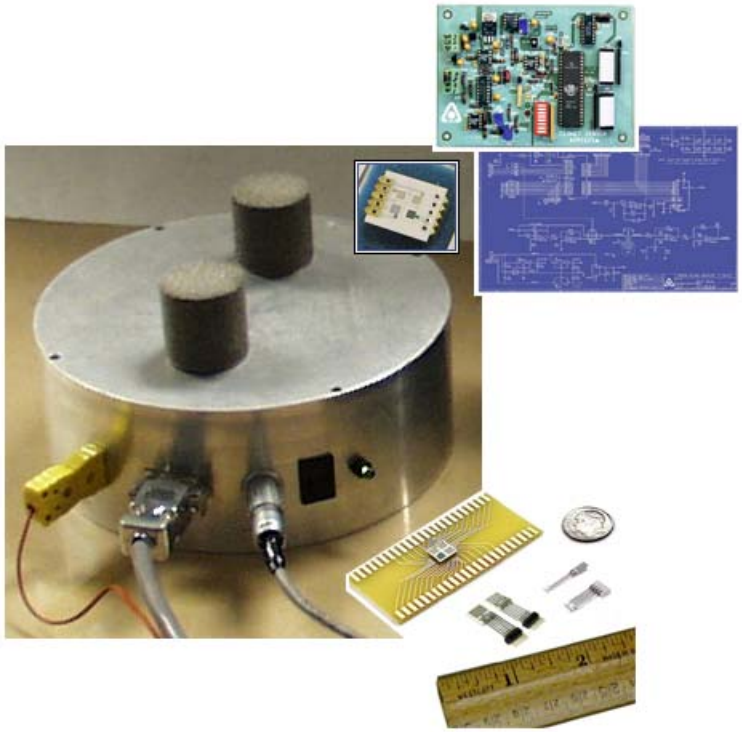
Erika Shoemaker (ANL)

John Ziegler (GA)



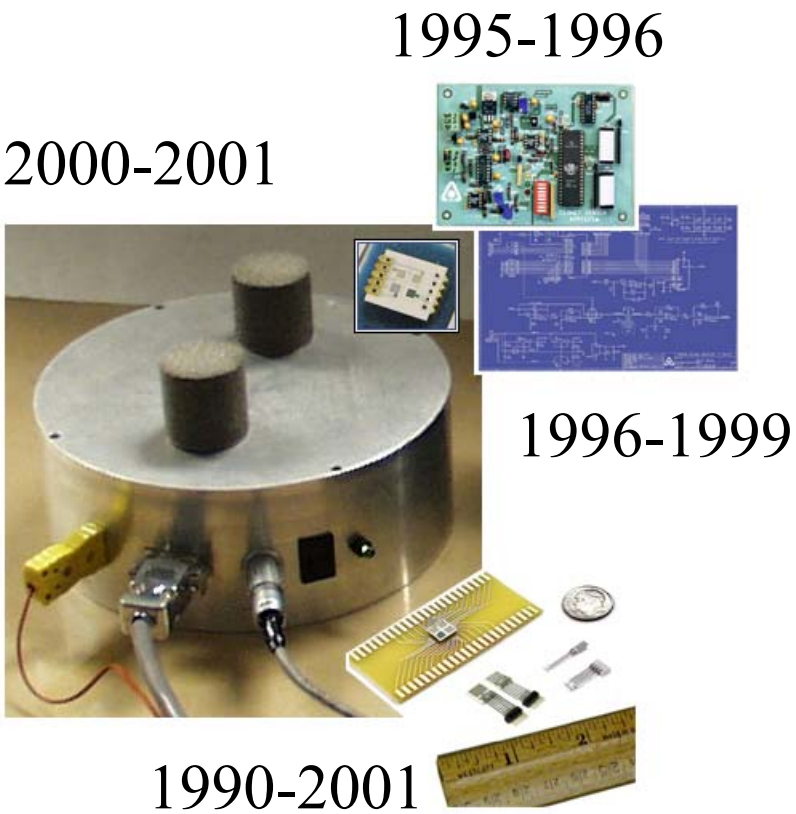
What it is

The smart sensor developer kit is a user-configurable, active-sensor, gas detection technology that can be incorporated into a wide range of instruments for a variety of applications. As such, this unique *enabling* technology can allow manufacturers to begin offering *wide-range, high-end gas detection and identification capabilities* even in consumer applications, such as fire detectors and termite sensors. *(this is PR verbage, please remember that)*



Background

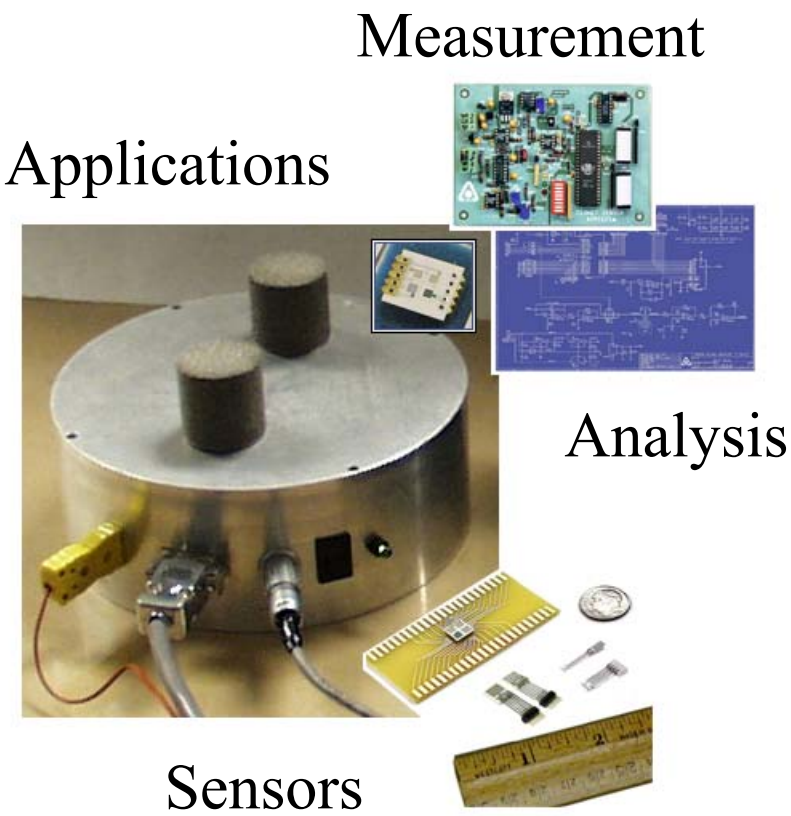
- **10+ year history at ANL**
- **Research at ANL had developed and tailored the cermet sensor technology for enough applications that it was *distilled* into a collection or "kit" of parts, each with its own role and type of flexibility**



“Kit” Components

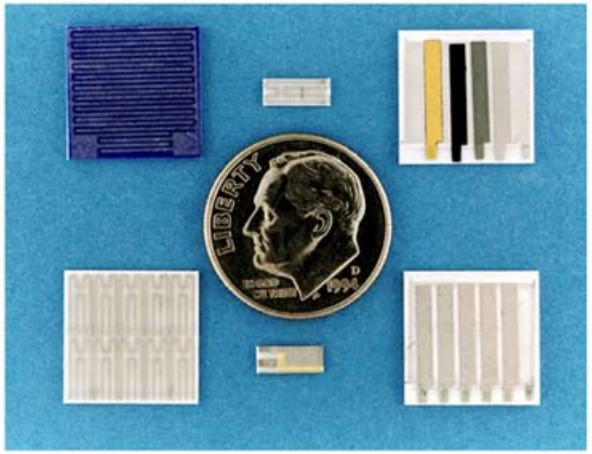
Kit serves as the heart of a “smart” gas sensor application and includes…

- Specialized cermet microsensor elements
- Programmable electronics
- Flexible analysis

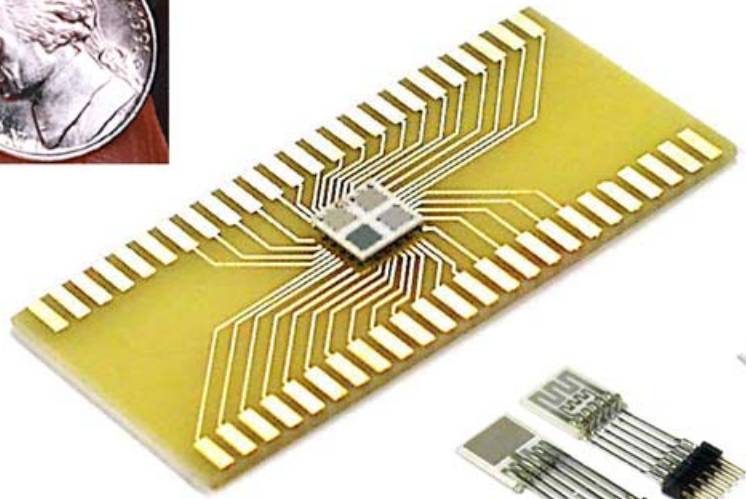


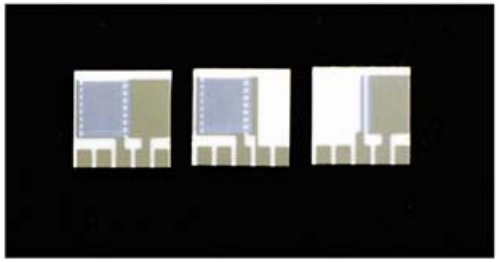
Microsensors and Arrays

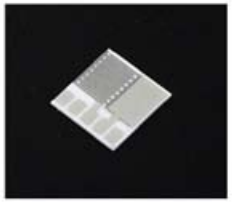
Smart Sensor Developer's Kit (SSDK)



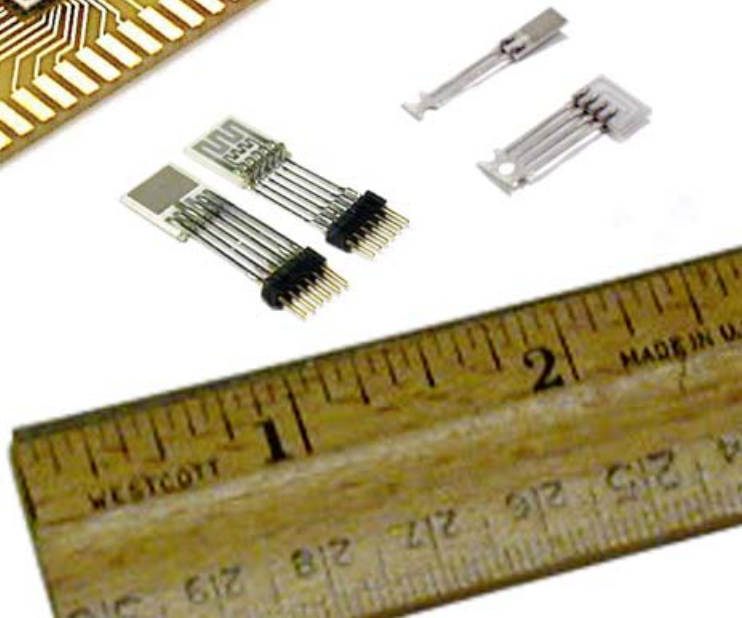
Electrocatalytic devices (voltage-excited)







Photocatalytic devices (light-excited)

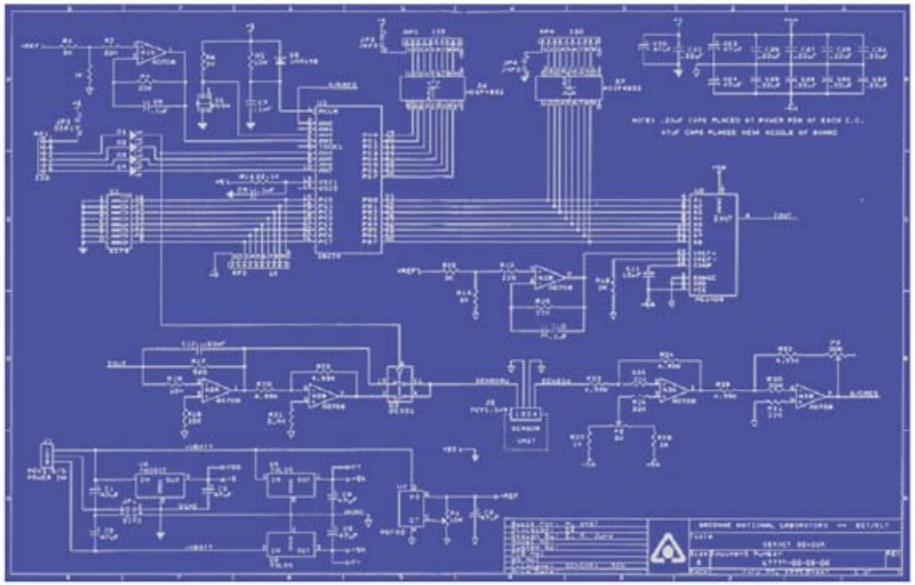


All devices shown to same scale

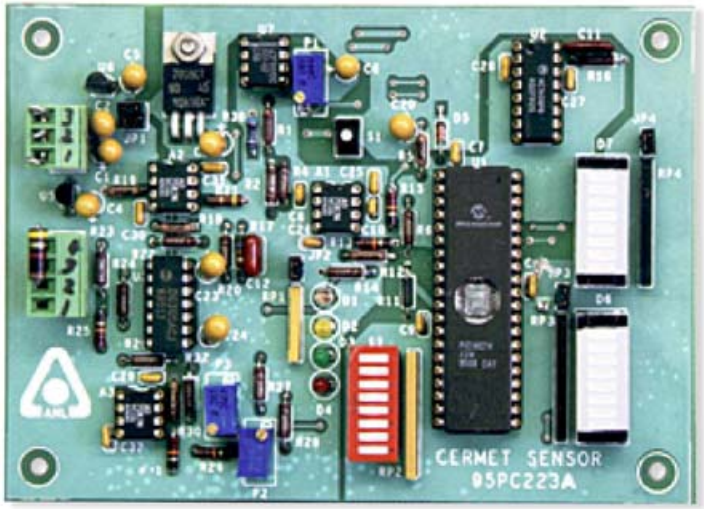
Electronics Support

Smart Sensor Developer's Kit (SSDK)

Schematics



DIP microcontroller electronics

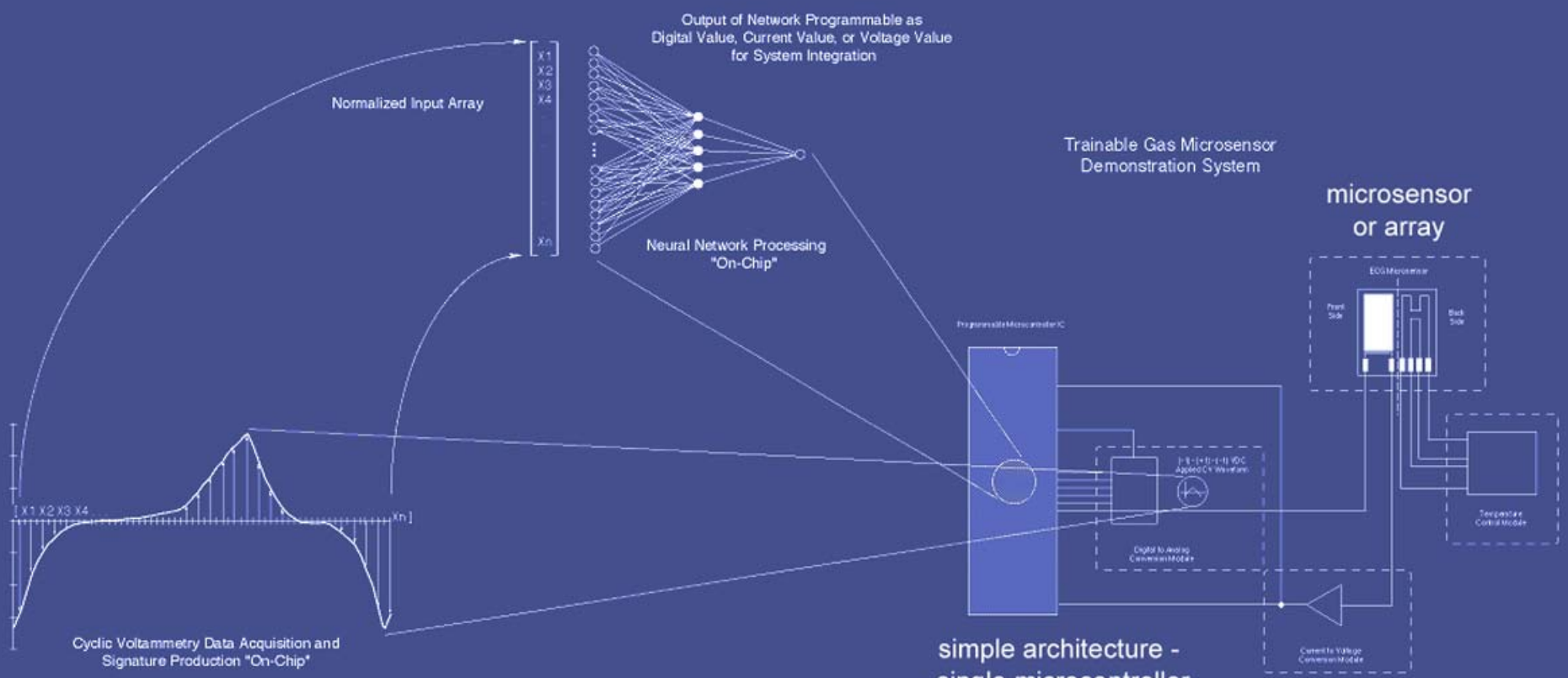


SOIC microcontroller electronics

Both devices shown to same scale

Theory Of Operation

Smart Sensor Developer's Kit (SSDK)



voltammetric "signature" of analyte contains information for identification *and* quantification

simple architecture - single microcontroller executes measurement *and* analysis code

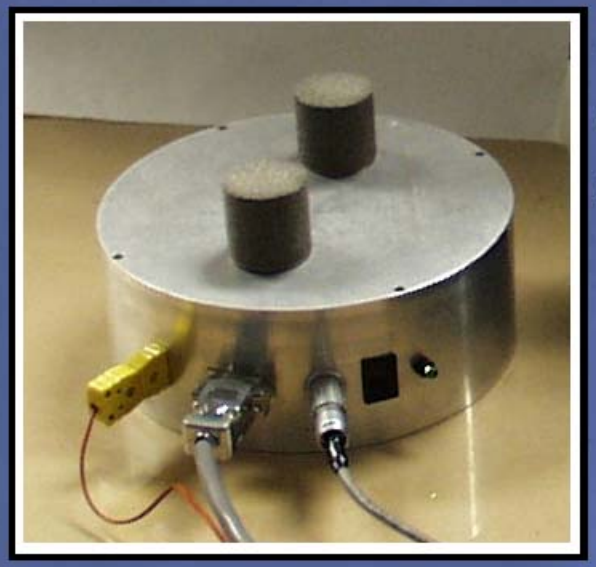
Demonstrated Application

Intelligent fire-detection funded by General Atomics

- **Sponsored high temperature components and systems development, then adopted the results for an intelligent fire detector. That detector was successfully demonstrated to the US Navy (DCARM program) in live fire-detection testing aboard the EX-USS Shadwell**

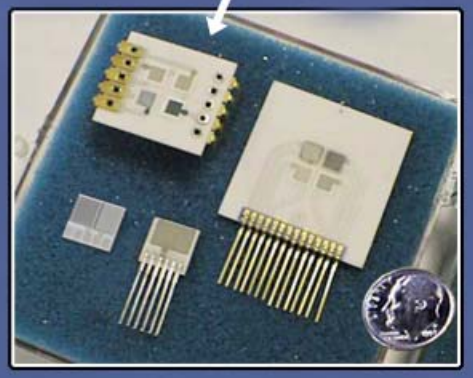
General Atomics Corp.

Smart Fire Detector



Outside of case shown slightly smaller

SOI fire detector shown at same scale as microsensors



Current Developments

Insect Pest Infestation Detection funded by RSC/Terminix

- **Developing a instrument and methodology to detect termites by their characteristic off-gassing. Field tests have already been successful**

Air Pollutant Monitoring funded by US Army SERDP

- **Developing a network of inexpensive emissions monitors and a strategy for deployment and measurement of emissions from DoD operations**