Nanosensor-Cellphone Integration for Extended Chemical Sensing Network

Jing Li, Ph.D.
Principal Investigator
NASA Ames Research Center

Developed in partnership with the U.S. Department of Homeland Security Science & Technology Directorate.
What is it?
An integrated sensing system!

NASA Nano sensor chips (chemical detection)
Smartphones (acquire and transmit sensor data)
3G or Wi-Fi
Internet server (standardized and encrypted data packets)
Information process and control centers

DHS S&T Cell-All
DHS
NC4
EOC
NASA Cell-All
Mission Control
**NASA Nanosensor Technology**

- 5 US patents and 14 publications

- **Nanosensor** – low power, small size, high sensitivity, highly integrated system
  - NASA engineering – Nanosensors are space qualified, quick turn around prototyping

DHS funded to develop cellphone sensors for early warning of a hazardous event.

Using pattern matching algorithms, the data is converted into a unique response pattern

Government agencies leverage resources to develop technology for their own missions as well as to benefit the public.

DHS S&T Cell-All

NASA has invested 8 years to develop this nanosensor technology.
Sensor-Phone Integration

Chemical detection
Temperature
Pressure
Humidity
GPS

Hardware (sensing module):
- Gas sampling
- Data acquisition
- Data storage

Software (App):
- Data processing
- Data transmission
- Command exchange
- Embedded intelligence

Features:
- Self alert
- Network alert

Nanosensors:
- Sensitivity: ppm-ppb
- Power: µW –mW
- Response: seconds
- One button operation
- No consumables

Chlorine 1.5ppm
Call 911
Ignore

DHS S&T Cell-All

NASA Supported Small Business:
Dr. George Yu, VARIABLE TECHNOLOGIES
Extended Sensing Network

Chemical info:
- ID & Concentration
- Temperature
- Pressure
- Humidity
- GPS location

Web Portal + Internet Server

NASA Cell-All Mission Control

DHS S&T Cell-All

NASA Supported Small Business:
Dr. George Yu, VARIABLE TECHNOLOGIES