

ASU SenSIP

Phase 2 site of the NSF Net-Centric I/UCRC



The mission of the SenSIP (Sensor, Signal and Information Processing) Industry Consortium is to perform use-inspired research and train students in sensor and information systems, digital signal and image processing, wireless communications, networks, and machine learning.

Speech, Image and Video Processing

Machine Learning

Computational Cameras

5G+

Sensor Networks

Internet of Things (IoT)

DSP

Quantum Computing

Health & COVID-19 Monitoring

Communications

PV Monitoring

Big Data

Pattern Recognition

ASU is #1 in the U.S. for Innovation



<http://sensip.asu.edu>

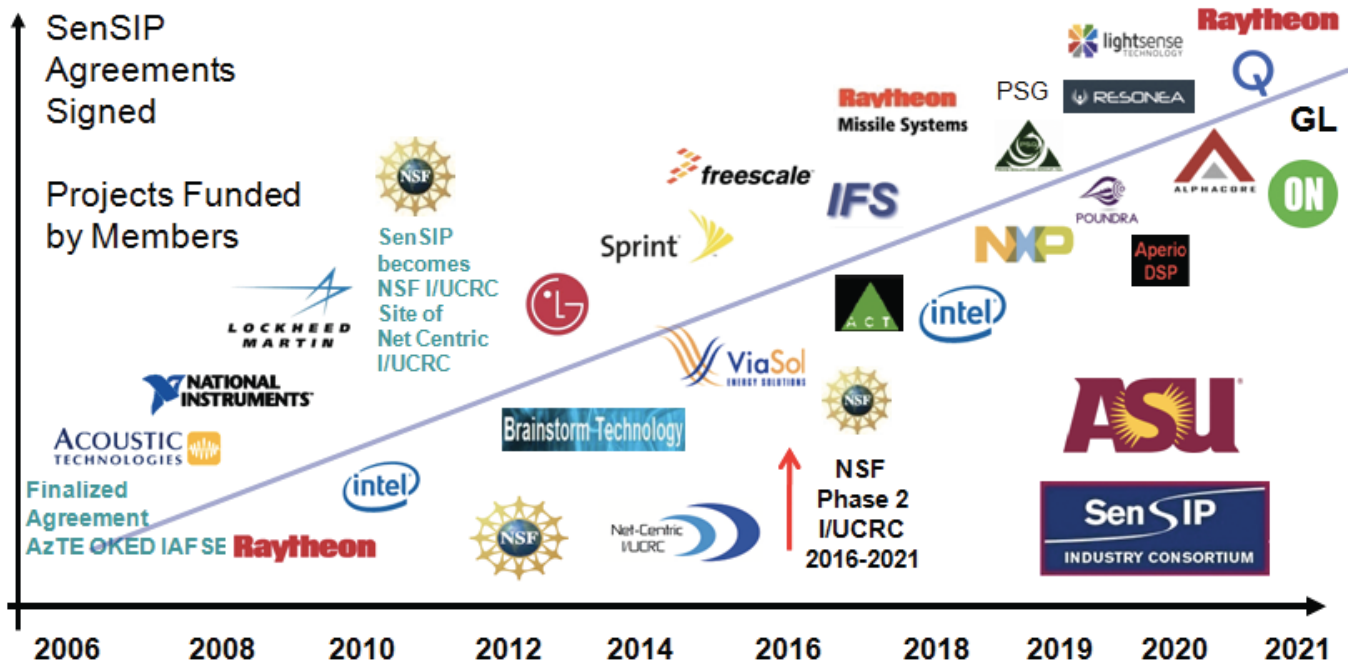
SenSIP connects Industry with University Faculty & Students

Become a Member of SenSIP Industry Consortium and NSF I/UCRC.

Benefits:

- Cost effective and reduced overhead research.
- Projects co-defined/co-advised by industry members and faculty.
- Consortium students spend time both at ASU and industry site.
- Privileged access to student portfolios; Student accessible only to consortium members.
- Industry members tap on SenSIP faculty expertise; ASU knowledge base in signal processing, communications, sensor networks, software and hardware, speech, video and machine learning.
- Access to algorithms/tools/documents useful to the industry community.
- The SenSIP consortium can create customized courses for the industry members.
- SenSIP faculty organize and give seminars on topics defined by industry members.
- One half day short course per year on topics covered by our faculty.
- SenSIP Website access available to industry members with repository of software tools.
- Conference reports from conference visits in target areas.
- Organize training workshops on sensors, DSP, communications.
- Membership in the industry advisory board where industry members defines research directions.
- Industry-friendly IP Arrangement. Royalty free non-exclusive IP rights on shared research.
- Recruiting advantage by developing relationships with students at an early stage.
- Program involves over twenty faculty with full research facilities.
- SenSIP Graduate training certificate in sensors and signal processing.
- Access to Workforce Training Programs NSF REU, RET, IRES and MedTech Ventures.

Industry Consortium (NSF I/UCRC) Membership History Phase 1 2007-2015 / Phase 2 / 2016-2021



SenSIP IP: More than 20 Patents and 40 New Disclosures

Research Areas

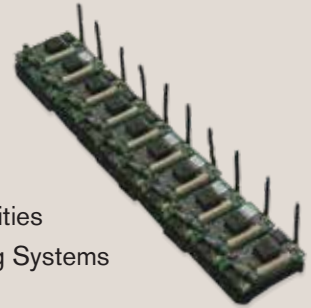
Security and Defense Applications

- Integrated Sensing Systems
- Sensor Networks
- Radar, Sonar, and Array Signal Processing
- Machine Learning for Sensor Arrays
- Waveform Design
- Video Exploitation
- Object Recognition
- Beamforming
- Surveillance



Image and Signal Processing

- Digital Signal Processing
- Microphone Arrays
- AI-enabled Sensors
- Low Power Algorithms
- DSP for Biosensing
- Data Mining
- Sensors for IoT and Smart Cities
- Autonomous Vehicle Sensing Systems



Sensors and Machine Learning

- Embedded Sensors and Machine learning
- Tiny or Edge Machine Learning
- Computational Camera Sensors
- Positive Unlabeled Learning
- Compressive Sensing
- Neural Networks
- Deep and Reinforced Learning
- Quantum Machine Learning



Wireless Systems

- Information Theory and Networks
- MIMO Systems
- Adaptive Antennas
- 5G+ Systems
- Network Security
- Machine Learning for MIMO
- Software Defined Radio



Deep Learning and Vision Research

- TinyML and Embedded Computer Vision
- Privacy-preserving visual health monitoring
- Intelligent cameras for the future
- CMOS Image Sensors
- Low Power Object Detection
- Surveillance Algorithms
- Pruned Deep Neural Networks



Algorithms, Hardware and Software Systems

- DSP Chips and FPGAs
- Java Systems and J-DSP
- MATLAB Testbeds
- Java, iOS and Android for controlling sensor networks
- Python & J-DSP Machine Learning
- Voice Analysis and Recognition
- Adaptive Noise and Echo Cancellation
- Machine Learning on Mobile Phones



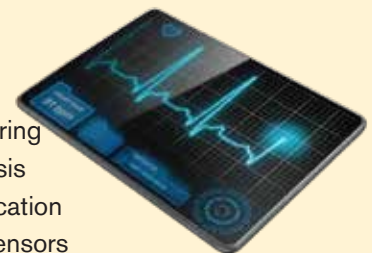
Energy and Sustainability

- Fault detection
- Panel Diagnostics
- Inverter Monitoring
- PV Array GUI
- Shading Prediction
- Machine Learning for Solar Energy Maximization
- Deep Learning for PV Fault Classification
- Deep Neural Nets for Connection Topology Optimization



BioMedical Research and Mobile Health

- Health Monitoring
- BioInformatics
- Brain Dynamics
- Contact-less Vitals Monitoring
- Physiological Signal Analysis
- Immuno-signature Classification
- Flexible Sensors and Biosensors
- Voice Analysis for Lung Disease Detection
- COVID-19 Detection Research



Sensors and Machine Learning Research



Contact:

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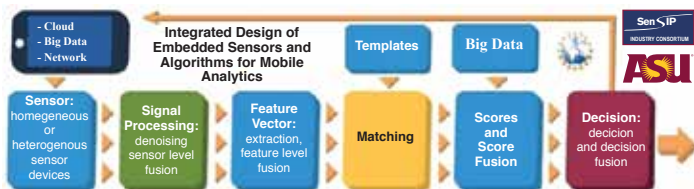
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Partner Universities



Integrated Algorithms and Sensors



Sponsored in part by NSF I/UCRC Awards 0934418 and 15400540 and by its industry members.

<http://sensip.asu.edu>

Industry Consortium Projects

- Echo Cancellation, Acoustic Technologies
- DSP Algorithms for Sensors, National Instruments
- Image Exploitation for Radar, Lockheed Martin
- Sensor Networks, LG, 5G Research, Sprint
- Sensors for Solar Panel Monitoring, Poundra
- MIMO Radar, Raytheon
- Machine Learning of Sensor Data, NXP
- Wireless Sensors for PV Systems, ACT
- Space Based Imaging, Alphacore
- Image Scene Analysis, Intel
- Machine Learning Radar, PSG
- Flexible Sensors and Algorithms for IoT Applications, NXP
- Machine Learning for MIMO SYSTEMS, SensMACH
- Machine Learning for Computational Cameras, Qualcomm
- Machine Learning for Power Adaptors, ON Semi
- COVID-19 Hotspot Estimation, NCSS
- Quantum Machine Learning Algorithms, NCSS

Federal and Industry Projects

- NSF: IGERT: Arts & Engineering Initiative on Experiential Media
- NSF EXP: DSP Algorithms for Silicon Ion-Channel Sensors
- NSF CCF, Biomedical Innovations Using Agile Sensing
- NSF FRP; Sensor Fusion for Net Centric Applications
- Global Engagement Project with the University of Cyprus KIOS Center
- NIH: Collaborative Grant, Wearable Nanosensor Array
- NSF: Co-Exploration of Scalable Software Defined Radio
- British Council & Imperial College Project: Sensor Localization
- DARPA Project on Radar Spectrum Allocation
- NSF GOALI Project on Solar Panel Monitoring
- NIH Project on Speech and Hearing
- ONR Project on Machine Learning
- NSF International Collaboration with ITESM on sensors
- NSF Phase 2 I/UCRC - ASU SenSIP site 2016-21
- NSF CPS on Machine Learning for PV Arrays 2016-2021
- AFOSR STTR 2020 on Radar Systems
- NSF SenSIP REU Site 2017-2022 on Sensors and ML
- NSF SenSIP IRES, 2019-2023 on ML for PV Arrays
- NSF SenSIP RET 2020-2023 on Machine Learning Algorithms
- NSF COVID-19 Rapid, 2020-2022 on Hotspot Detection
- NSF MRI 2020-2023 on AI for Solar Energy
- NSF IRES with Dublin City U., ML & IoT, 2021-2024

Recent Accomplishments

- 20 patents / 40 disclosures last 7 years
- NSF REU Site - 40 Students trained in Sensors
- Major NSF Cyber-Physical Grant on Solar Energy
- 5G LTE dedicated SenSIP Facility
- Synergies with MedTech Ventures
- 18 kW /104 Panel Solar Array at MTW
- SenSIP Graduate Certificate on Sensors
- Industry Short Course in Machine Learning
- MOUs signed with 5 international institutions
- Research Experiences for Teachers in ML
- Four NSF workforce development programs



Sensors & Machine Learning