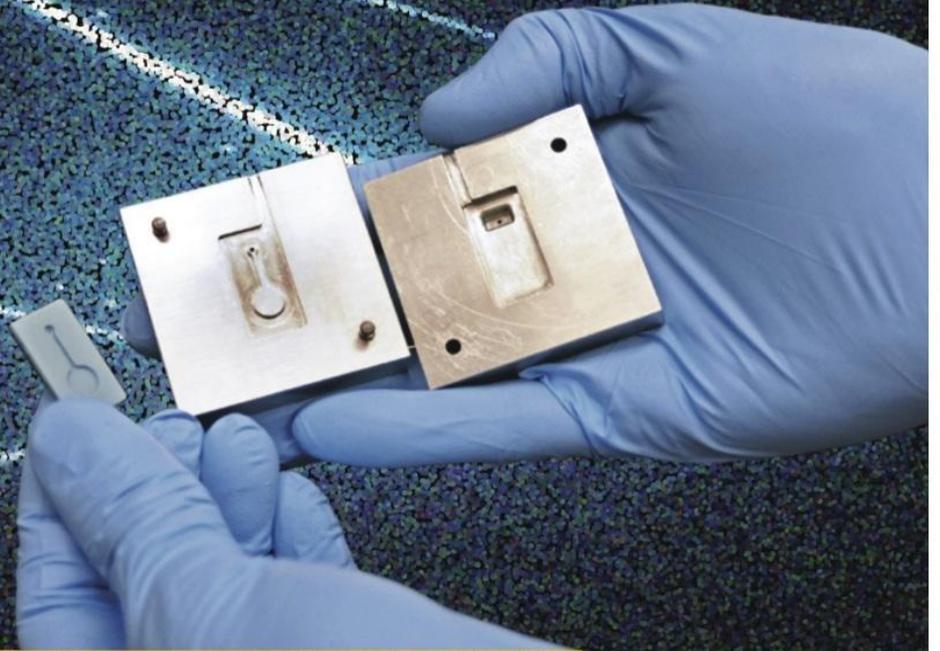# The Focus on Tiny Machine Learning (TinyML)

Industry-University Workshop on **Sensors and Machine Learning**

SENS | MACH 2019
WHERE SENSORS AND ALGORITHMS COME TOGETHER

October 22, 2019

Integrated Design of Embedded Sensors and Algorithms for Mobile Analytics

- Cloud
- Big Data
- Network

Templates

Big Data

SenSIP ASU

Sensor: homegeneous or heterogeneous sensor devices → Signal Processing: denoising sensor-level fusion → Feature Vector: extraction, feature-level fusion → Matching → Scores and Score Fusion → Decision: decision and decision fusion

Learn the Latest on Hardware and Algorithms for Sensor Systems and Applications

---

Co-located with
SEMI MSEC 2019

semi | MEMS & SENSORS INDUSTRY GROUP

TINY ML

Call for Participation: Industry – University Meeting
Sensors and Machine Learning - Focus on Tiny Machine Learning (TinyML)
Industry-University Event, October 22, 2019, 11am-5pm
R&D Presentations, Industry Panel, Short Course on Machine Learning
Marriott Coronado Island Resort & Spa (San Diego)
 2000 2nd St, Coronado, CA 92118

A focus on Tiny Machine Learning (TinyML[TM])

TinyML is trademark of the TinyML foundation.

sensmach.asu.edu

Non Profit Industry-University event sponsored in part by ASU and the SenSIP I/UCRC.
Sensors & Machine Learning Workshop – 2019

Marriott Coronado Island Resort & Spa

An Industry-University workshop on Sensors and Machine Learning will be held October 22, 2019, 11am -5 PM. The event will be co-located with MSEC 2019 at Marriott Coronado Island Resort & Spa

SENS|MACH 2019 Program Highlights – A Focus on Tiny ML
Industry/University Talks: Tiny ML Technologies and Opportunities
Panel**:** End to Edge with ML and TinyM
on Machine Learning for Industry Engineers and Managers working in Sensor Applications

Limited Seating Available - Registration is free but required.
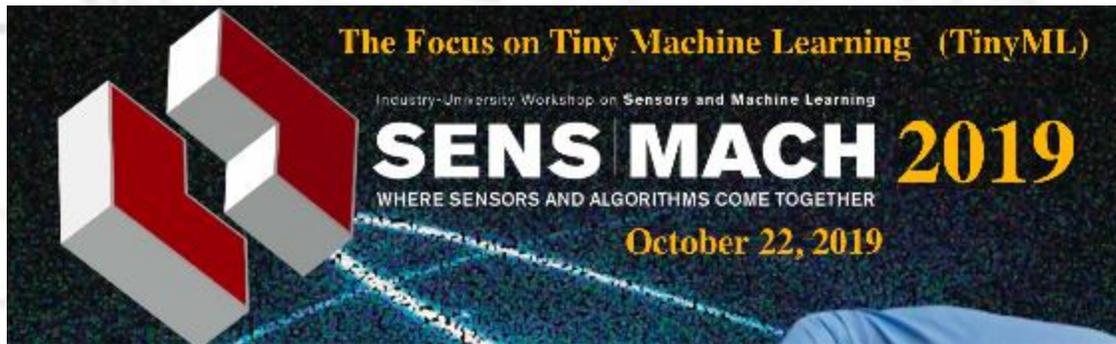
Presentations – Details on Next Page

Panel

Organizations Participating in SENSMACH 2019 Include:

sensmach.asu.edu

The Focus on Tiny Machine Learning (TinyML)

Industry-University Workshop on **Sensors and Machine Learning**

SENS MACH 2019

WHERE SENSORS AND ALGORITHMS COME TOGETHER

October 22, 2019

SensMACH Industry-University Workshop

Preliminary Agenda

Training Session - A Primer on Machine Learning

11:00am - 12:15pm	A Primer on Machine Learning for Engineers and Managers

Lunch – Poster Session

SensMACH Seminars

1:00pm – 1:05pm	Introduction and Objectives, Stephen Whalley
1:05pm – 1:30pm	Recent Progress on Tiny ML Technologies and Opportunities, Evgeny Gousev
1:30pm - 1:50pm	Ultra-low power AI Voice and Audio recognition: Challenges and Opportunities, Mouna Elkhatib, AONdevices
1:50pm - 2:10pm	Machine Learning for MIMO Communications Systems, Ahmed Alkhateb
2:10pm - 2:30pm	Object Detection @ 1 mW: Enabling Always-On Computer Vision at the Edge, Ravi Sivalingam, Qualcomm
2:30pm - 2:50pm	Embedded Sensors and Machine Learning, Mike Stanley, NXP
2:50pm - 3:10pm	**Break & Networking - Poster Sessions**
3:10pm – 3:30pm	Always-on Artificial Intelligence for Battery Powered Devices, David Garrett, Syntiant Corp.
3:30pm – 3:50pm	Neuromorphic computing on the edge: micropower event-driven learning machines, Gert Cauwenberghs, UC San Diego
3:50pm – 4:10pm	Tensai: Flexible And Programmable Architecture To Meet The Evolving Needs Of Intelligent Low Power Edge Devices, Hari Shankar, ETA Compute
4:10pm – 4:30pm	Sensors and Machine Learning for Solar Energy Applications, A. Spanias, ASU SenSIP
4:30pm – 5:00pm	**Panel / Q & A Session**: End to Edge with ML and TinyML – Session Summary Moderated by Stephen Whalley

Adjourn

REGISTRATION REQUIRED - LIMITED SPACE

REGISTER FOR SENAMACH 2019 HERE

**(Note that registration for MSEC 2019 is separate)**

sensmach.asu.edu

Training Session for Students and Industry

Short Course: A Primer on Machine Learning for Industry Engineers and Managers

Description of Course: This tutorial provides an introduction to the principles and applications of machine learning algorithms, software and applications.   The tutorial begins with an introduction to the basics of pattern matching, feature extraction, and supervised and unsupervised learning. The lecture then covers basic methods such as the k-means, support vector machines, neural nets and deep learning. The coverage is at at high level for beginners featuring functional block diagrams, qualitative descriptions, and software examples. The course connects algorithms with sensor applications including health monitoring, IoT, and security applications.

Topics: Qualitative Overview, What is machine learning?, Use in Sensors and Big Data, Algorithms and Software, Beginings from Vector Quantization and Cell Phones, Feature Extraction, K-means, Adaptive Neural Nets, Support Vector Machines, Bayesian Methods, Deep Learning, Embedding machine learning on sensor boards, Applications; IoT, health monitoring, security; smart campus, smart cities; social implications, software tools

Who Should Attend: The tutorial is designed for students, engineers and managers who need to understand the basics of machine learning and their utility in various sensor applications. The tutorial should be of particular interest to engineers and managers who need to prepare for projects that involve learning algorithms for sensors.
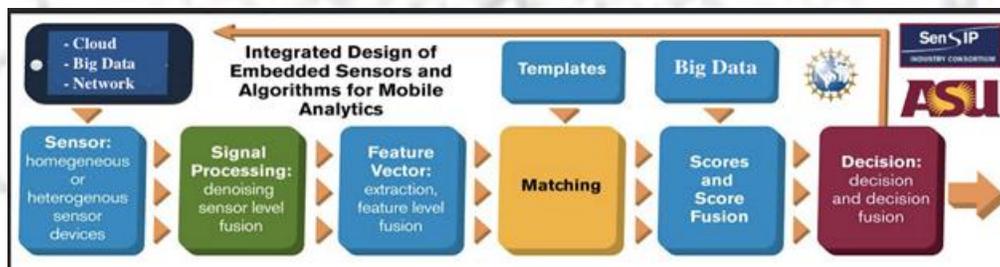
| | **Sensors** | **Machine Learning** | **IoT** |
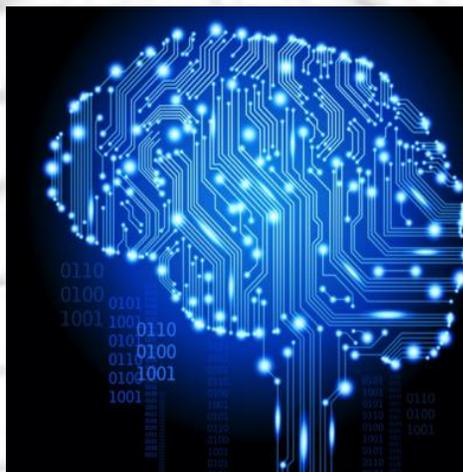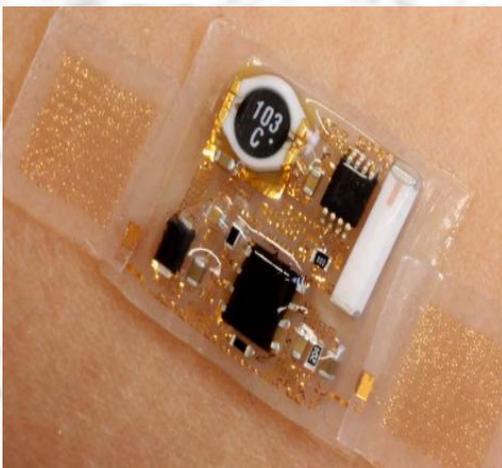
SENSMACH VENUE – Marriott Coronado Island Resort & Spa

Marriott Coronado Island Resort & Spa
2000 2nd St, Coronado, CA 92118

Meeting Room

Organizing Committee:
Evgeni Gousev, Qualcomm
Stephen Whalley, Microtech Ventures
Andreas Spanias, ASU SenSIP Center

Local Arrangements: Robina Sayed

sensmach.asu.edu