

# **LEARNINGS FROM OPO & SYNTHETIC SENSORS**

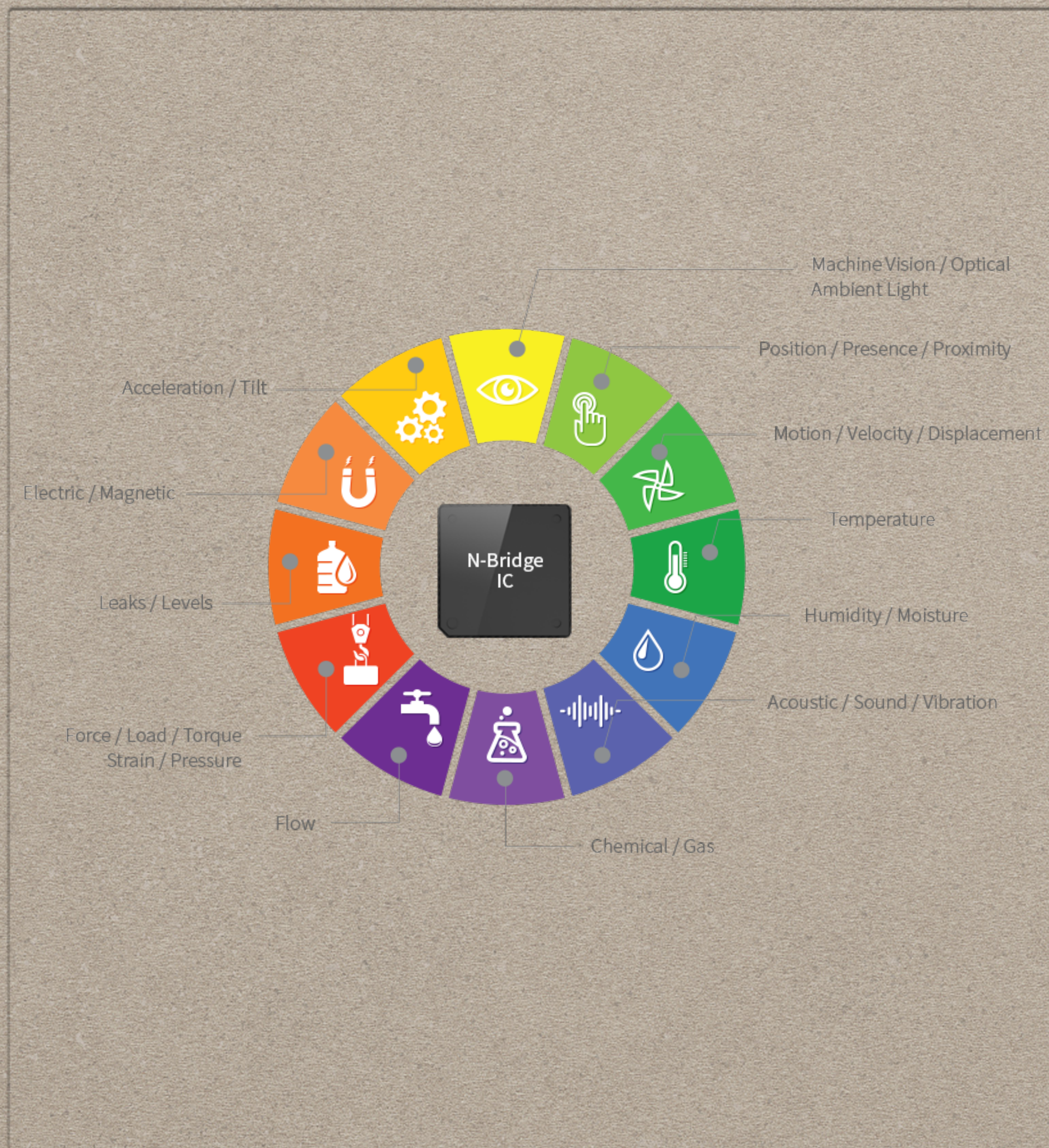
SENSING!!



# **MULTIMODAL SENSING**

**WHAT DO YOU IMAGINE  
WHEN I SAY SENSING?**





IMG SRC: [http://www.3alogics.com/img\\_up/shop\\_pds/threealogics/design/img/img\\_iot03\\_1.png](http://www.3alogics.com/img_up/shop_pds/threealogics/design/img/img_iot03_1.png)



IMG SRC: <https://i2.wp.com/utilisurvey.com/site300/wp-content/uploads/2016/06/RF-Signal-Blue-300x200.png>



# Monnit IoT Sensors Map

A sensors guide to help navigate the "Internet of Things" / IoT

temperature

TEMPERATURE

TEMPERATURE LEADED PROBE

DUCT TEMPERATURE

RTD LOW TEMPERATURE

RTD HIGH TEMPERATURE

QUAD TEMPERATURE

WATER TEMPERATURE

air quality

HUMIDITY

AIR FLOW DETECTION

CARBON MONOXIDE

position / occupancy

OPEN / CLOSED

MAGNET DETECTION

MOTION DETECTION

water

WATER DETECTION

WATER DETECTION PLUS

WATER ROPE

LIQUID LEVEL

WATER TEMPERATURE

light

LIGHT DETECTION

LIGHT METER

pressure

PRESSURE METER (50 PSIG)

PRESSURE METER (300 PSIG)

pulse

PULSE COUNTER (1-INPVT)

PULSE COUNTER (4-INPVT)

auto

VEHICLE COUNTER

VEHICLE DETECTION

accelerometer / vibration

TILT

IMPACT DETECTION

G-FORCE SNAPSHOT

G-FORCE MAX & AVE

VIBRATION METER

ACTIVITY VIBRATION COUNTER

ACTIVITY DETECTION

ACTIVITY TIMER

miscellaneous

ASSET

BUTTON PRESS

COMPASS

FLEX

GRANS PER POUND

SEAT OCCUPANCY

voltage - ac/dc

VOLTAGE METER (0-600 VAC/VDC)

voltage - ac

VOLTAGE DETECTION (24-500)

AC CURRENT METER (20 AMP)

AC CURRENT METER (150 AMP)

voltage - dc

VOLT DETECTION (1 - 50V)

VOLT METER (0 - 1.2V)

VOLT METER (0 - 5V)

VOLT METER (0 - 10V)

VOLT METER (0 - 50V)

low voltage

mA CURRENT METER (0 - 1mA)

mA CURRENT METER (0 - 30mA)

DRY CONTACT

RESISTANCE

1000' / 10-yr. / Secure

Wireless Range / Battery Life / Bank Grade Encryption

GOLD TEXT indicates wireless sensors that are available in both Monnit Commercial & ALTA Enterprise grades

28 ALTA Advanced Sensors  
52 Monnit Standard Sensors

### IoT Sensing in any Flavor You Like

- **Wireless Performance**
  - Long Range (250 ft. +)
  - Super Long Range (1000 ft. +)
- **Power Source**
  - AA Batteries (10-yr. life)
  - Coin Cell (5-yr.)
  - Industrial 3.6V Lithium (10-yr.)
  - Line Power (w/ AA Battery Backup)
  - Solar Power (w/ Lithium Backup)
- **Casing / Enclosure**
  - Indoor
  - Outdoor / Industrial / NEMA Rated
- **Gateway**
  - Cellular, Ethernet, USB, WiFi or Serial Modbus

IoT Starter Kits available

Ask about Monnit's IoT vantage Partner Program (Reseller, Integrator, OEM / White Label)

Get IoT Started  
Leverage Data,  
Protect Resources &  
Save Money.

801-561-5555  
info@monnit.com

**Note:** Links in this map lead to AA battery-powered product web pages. If available in both ALTA Advanced & Monnit Standard versions - the link will lead to the ALTA product version.

Additional power, performance, enclosure and accessory options are available for each sensor type.

IMG SRC: <https://monnit.azureedge.net/content/documents/infographic/Monnit-IoT-Sensors-Map.jpg>



# **ADVANTAGES AND DISADVANTAGES OF MULTIMODAL SENSING**



# OPO: A WEARABLE SENSOR FOR CAPTURING HIGH-FIDELITY FACE-TO-FACE INTERACTIONS

- Captures Face to Face interactions (suggested in title)
- Is it a hack? Is it absolutely needed? It is multimodal approach!!
- Parameters for localization and distance estimation, Eg. RSSI, ToA, AoA, TDoA, etc.



# OS CONCEPTS DEALT WITH OPS

- Over TinyOS.
- Must deal with broadcast.
- Communication and Collision
- Discovery and Synchronization.
- Always-On (Low power mode).



# EXPERIMENTS AND ANALYSIS



# **SYNTHETIC SENSORS**







# **MACHINE LEARNING AND THE CLOUD**



# **MULTIPLE ORDER SYNTHETIC SENSORS?**



**OS IMPLICATIONS??**



**IS IT TRUE PLUG AND PLAY?**



**REDISCOVER MULTIMODAL SENSING?**



**THANK YOU!!**