

# **LEARNINGS FROM OPO & SYNTHETIC SENSORS**

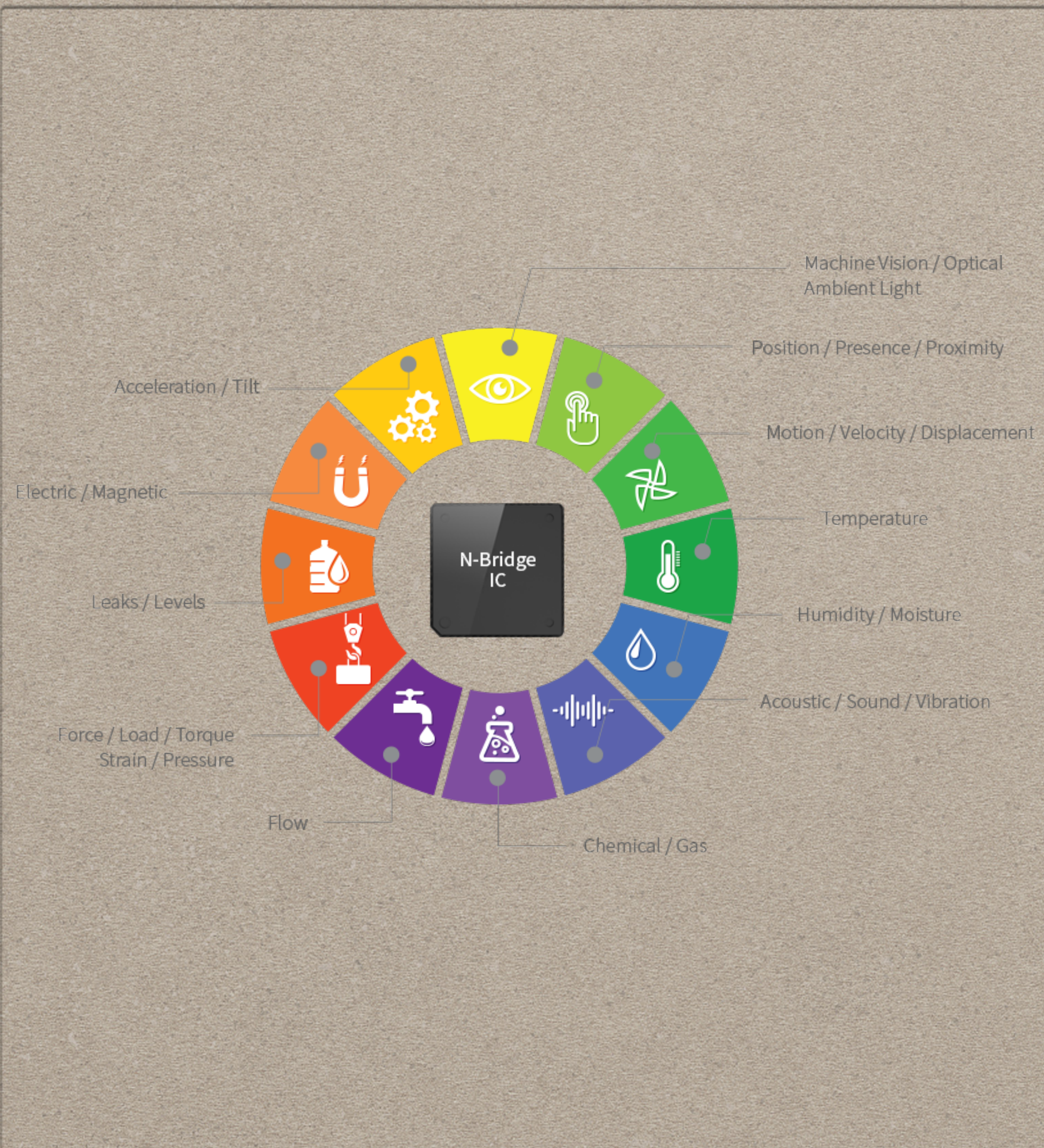
SENSING!!



# **MULTIMODAL SENSING**

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





IMG SRC: [http://www.3alogs.com/img\\_up/shop\\_pds/threealogs/design/img/img\\_iot03\\_1.png](http://www.3alogs.com/img_up/shop_pds/threealogs/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

 Click any sensor name for IoT sensor info.

### 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-INPUT)
- PULSE COUNTER (4-INPUT)

### 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
- GRAMS PER POUND
- SEAT OCCUPANCY

 IoT Starter Kits available

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

- ### 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



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


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### voltage - ac/dc




- VOLTAGE METER (0-600 VAC/VDC)

### voltage - ac



- VOLTAGE DETECTION (0-500)
- 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

**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.

# MONNIT.



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



# **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!!**