



Delivering SMART Sensing & Connectivity Solutions Globally  
for  
Industry 4.0

Visit us @  
[www.anvationlabs.com](http://www.anvationlabs.com)

Connect with us @  
[buildwithus@anvationlabs.com](mailto:buildwithus@anvationlabs.com)

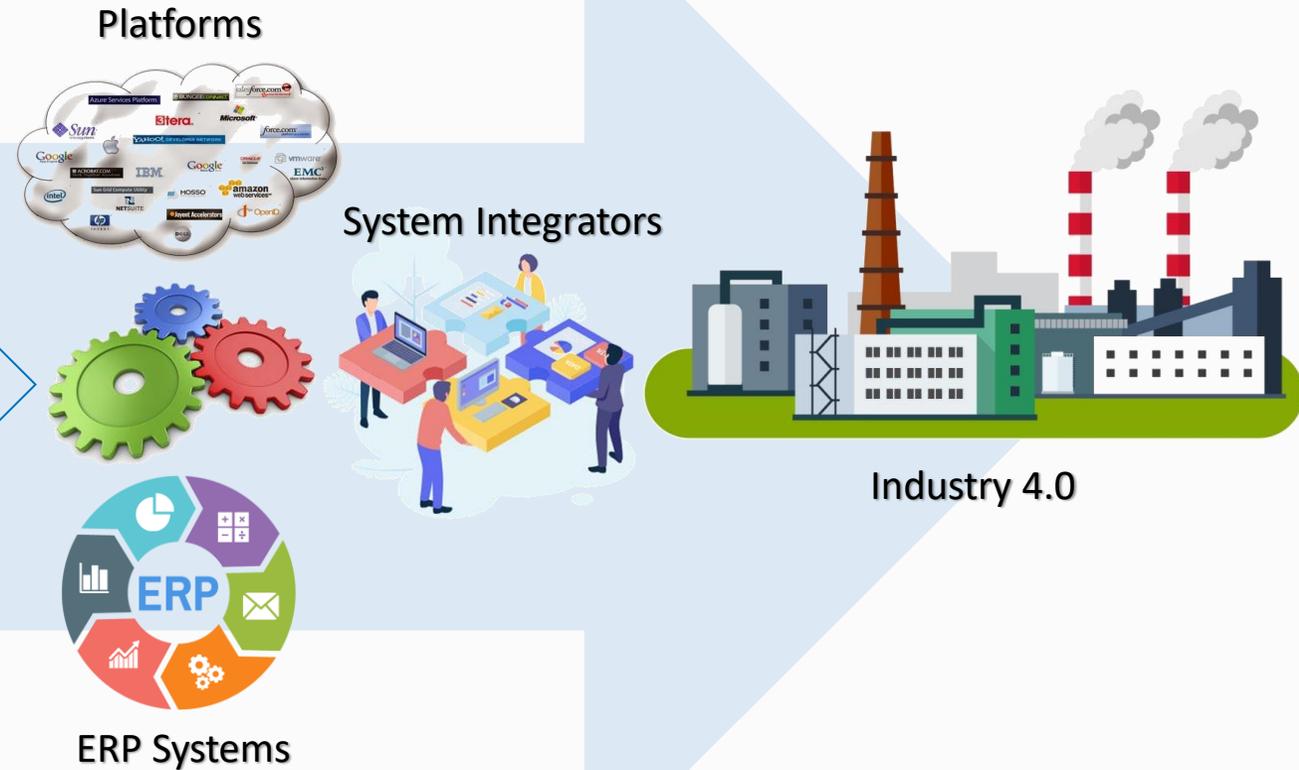
# Anvation Labs – Overview

## A SMART Sensing & Connectivity Company

- Industry specific Solutions
- AI / ML driven intelligent libraries & API
- Custom Design Services for Specific Applications
- R&D on next gen tech for Industry 4.0



Custom SMART Sensing & Connectivity Solutions



# Anvation Labs – Quick Facts

~90% Start-ups and Mid-Tier clients chose Cloud Platform based on the API integration provided by us

~70% of our designed solutions have gone into production or are planned to go soon

Achieved a BOM savings of up to 55% by helping with the right SKU and platform leading to **savings of ~\$25M overall**



Global Delivery of  
**SMART Connected & Sensing Solutions**

TTM Reduction  
**Driving the Design Cycle from an Early Stage**

Cost Savings  
**Enabling right choices for SKU / Platforms**



**Ministry of Defence recognized Promising start-up in strategic electronics**

**Reduced Time to Market by ~20%** by being early in the design cycle

Helped **2 of our Fortune 100** clients chose devices outside their preferred Vendor List

Customers in **7 different countries** across the globe

# Solutions Offering

---

Asset Tracking, Navigation & Safety

---

---

Preventive & Predictive Maintenance

---

---

Energy Management

---



## Manufacturing

- Beverage Factories
- PCB Manufacturers

## Infrastructure

- Commercial Complexes
- Water Boards

## Logistics

- Cargo Warehouses
- Aerospace Industries

# Services Offerings

End to End Product  
Design Ownership



A' la Carte Selection  
of Services



Mass Production  
with EMS Partners



---

**Scoping & Feasibility Studies**

---

**Quick Technology PoCs (IoT Devices, Solutions)**

---

**System (Hardware, Cloud, Integration) Testing**

---

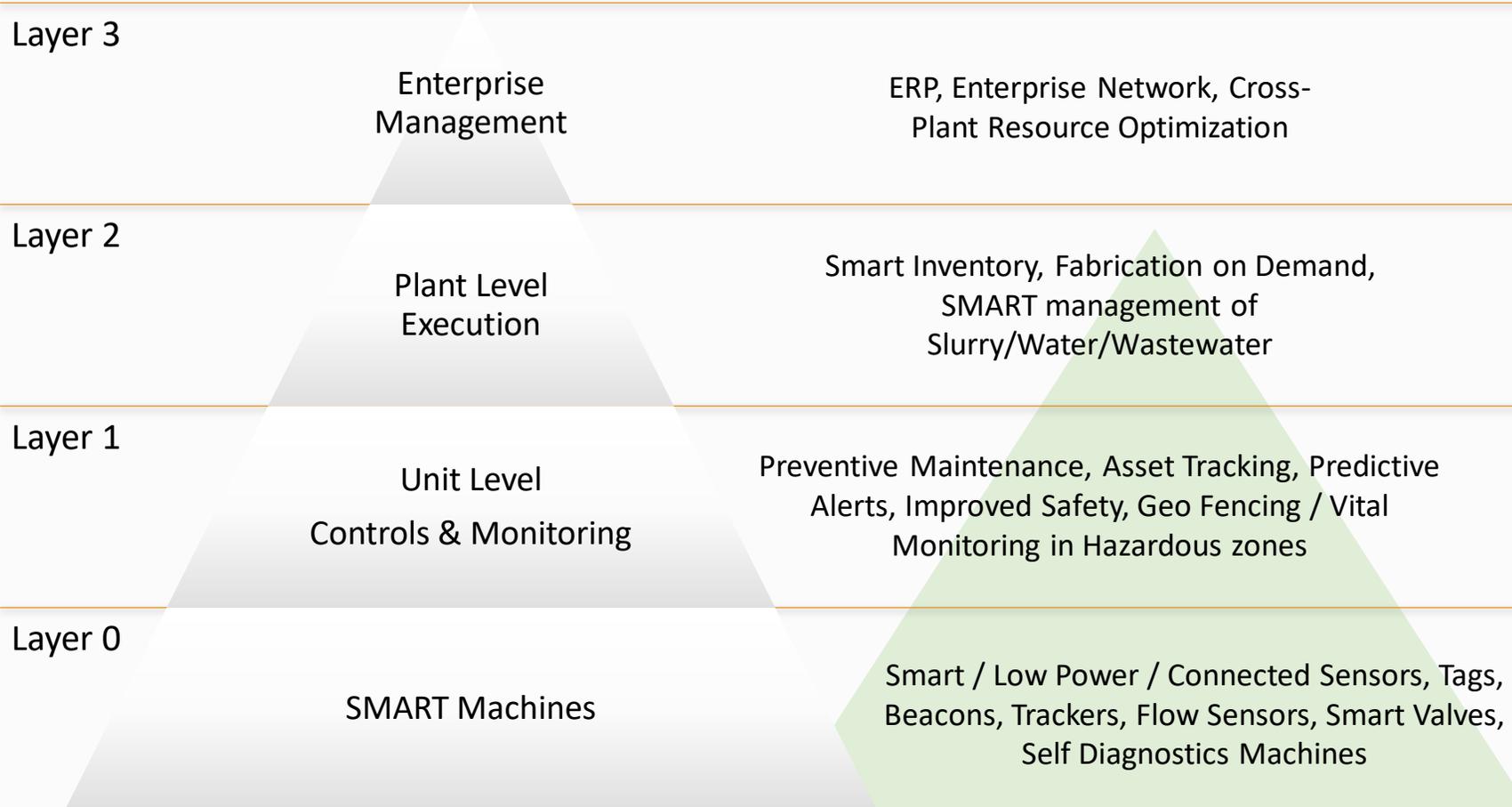
**Production ready designs**

---

**Pre-compliance & Product Certification**

On/Off-site Co-  
Development

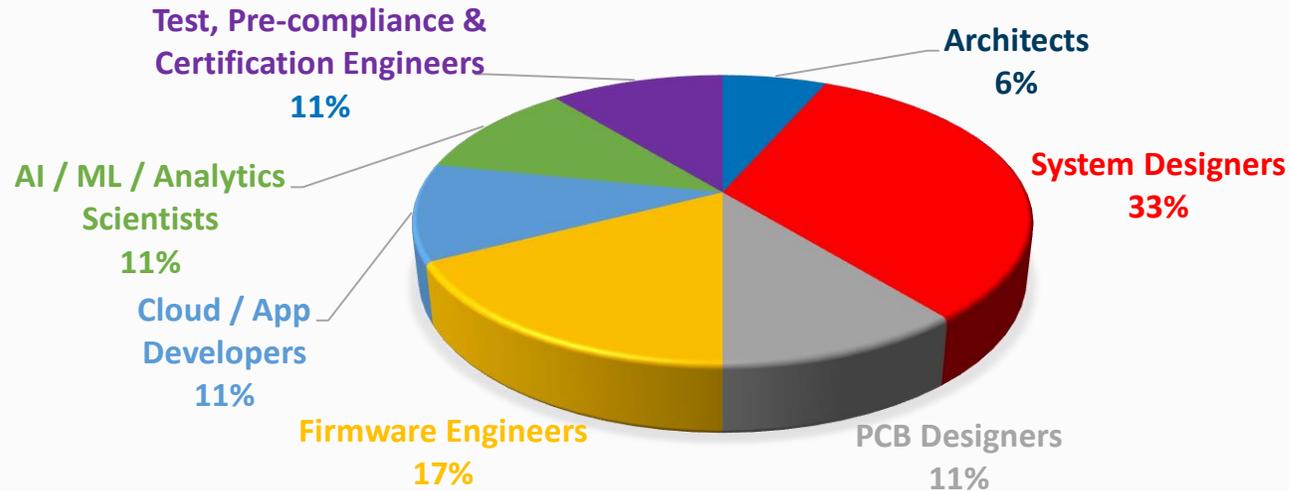
# Industry 4.0 Layers & Elements – Anvation Labs Positioning



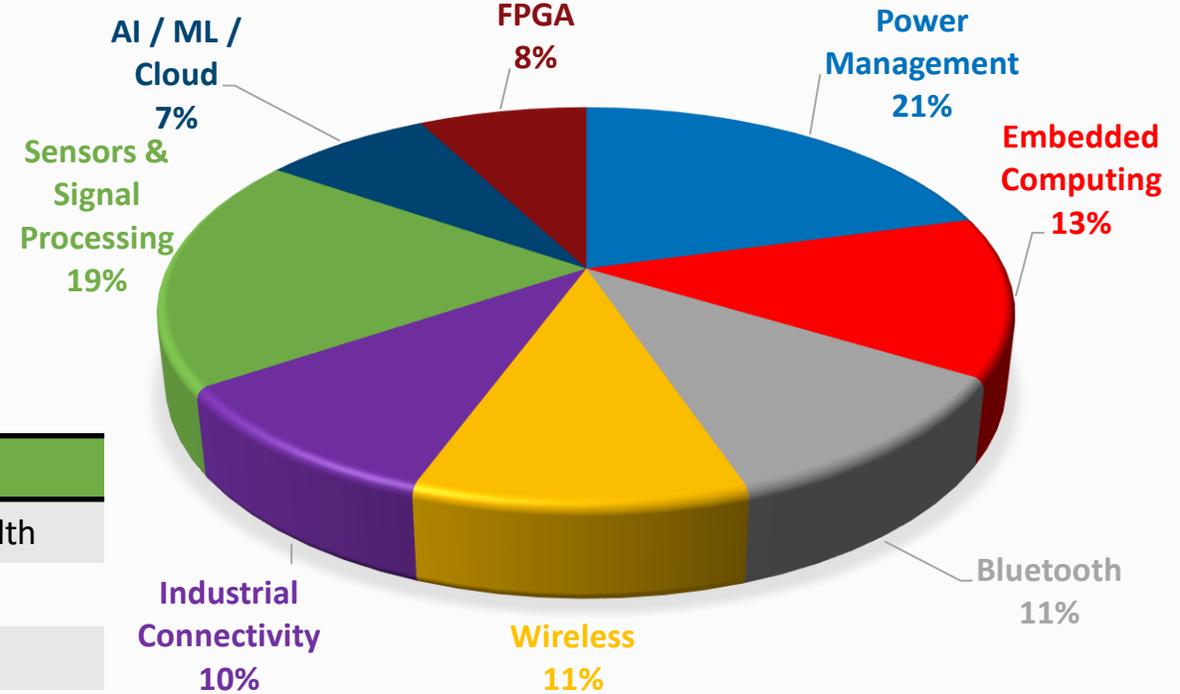
**Anvation Labs**  
 Delivering SMART Sensing & Connectivity Solutions

# Design Services Capabilities

## PEOPLE DISTRIBUTION



## TECHNOLOGY EXPERTISE DISTRIBUTION



Custom Applications	IoT Sensor Designs
Preventive Maintenance	V, I, PF, Vibration, Temperature, Equipment Health
Energy Management	Energy, PF, Equipment Usage Hours
Agriculture Farm Monitoring	Moisture, Water Quality, Temperature
Remote Vital Monitoring	SpO2, RR, PR, T, ECG, BP, Fall
Targeted Marketing	Item Category, Volume, Sales Pattern
SMART Fashion Assistant	Colour, Texture, Size
SMART Footwear Assistant	Foot Gait, Colour, Shape

# Business Statistics

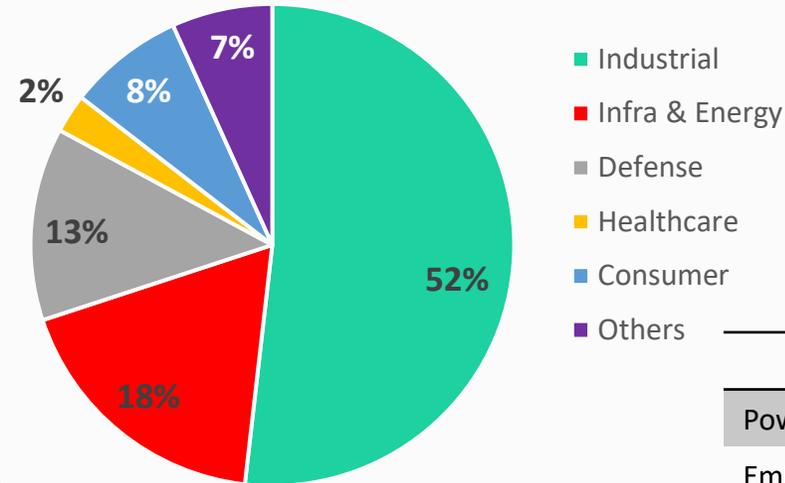
## Key Clients

Honeywell, Schneider, ABB, MoD (Gol), Philips, Bajaj, Havells, Orica

## Key Products Evaluated

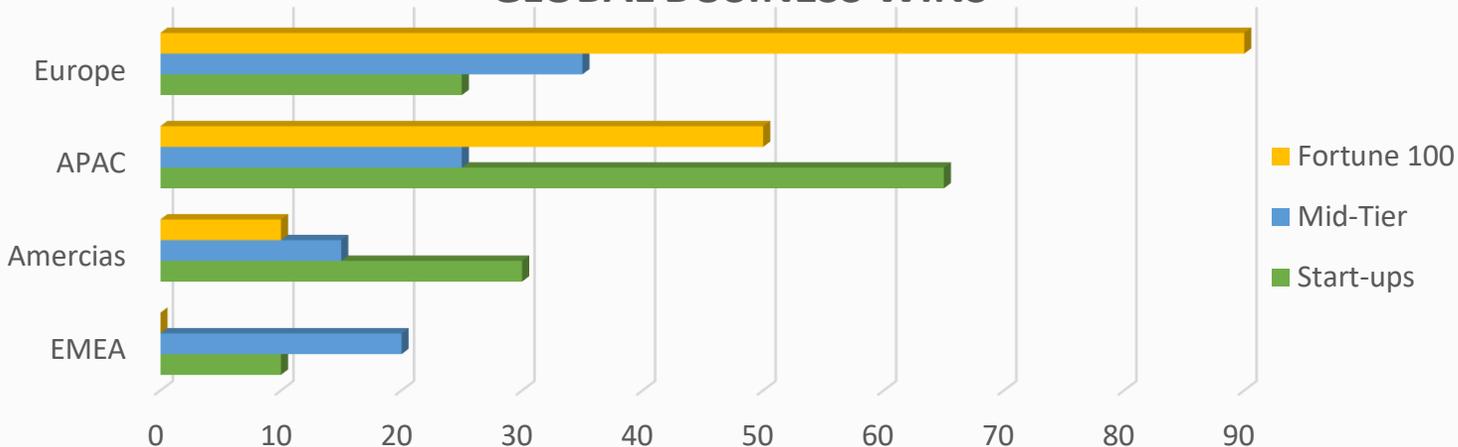
TI, ADI, ST, Silabs, MicroChip, Nordic, TeLink, Xilinx, Altera, Broadcom, Cypress, nVIDIA, Intel

## Business Value Delivered#: ~\$200M



#Business Value Estimation as per Customers Data over 3 Financial Years

## GLOBAL BUSINESS WINS



Technology Integrated	Share
Power Management	11%
Embedded Computing	21%
Bluetooth	16%
Wireless	9%
Industrial Connectivity	13%
Sensors & Signal Processing	10%
AI ML	5%
FPGA	4%
Cloud Computing & Storage	11%

% estimation based on the BOM value

# Exploring a win-win

Interoperability of devices, solutions, factories, people is the key



Multi-Dimensional Approach needed



## Application Specific Solutions

- Asset Tracking, Navigation & Safety
- Preventive & Predictive Maintenance
- Energy Monitoring & Management

## Design Services

- IoT Plug & Play Devices & Solutions
- Retrofit Devices / Solutions Migration
- RTOS Drivers

# Asset Tracking, Navigation & Safety



## Asset Tracking, Navigation & Safety



In / Out Tracking of Cargo

Indoor Asset Tracking & Navigation

Geo-Fencing of Hazardous Areas

Personal Vital Monitoring in Haz. Zones

# Potential Use Case – SMART Warehouse



# Pieces delivered by Anvation Labs

Piece	Off The Shelf Integration	Custom HW Design & Manufacturing	Firmware / Middleware	Azure Machine Learning Models	Azure Cloud Integration	System/Field Testing
BLE 5 Asset Tags		✓	✓		✓	✓
Scanners		✓	✓		✓	✓
Vital Monitoring	✓	✓	✓	✓	✓	✓
BLE Mesh to Wi-Fi Gateway	✓		✓		✓	✓
Geo-Fencing			✓		✓	✓
Tracking & Navigation			✓	✓	✓	✓

# What more can be done?

## Potential Use Cases

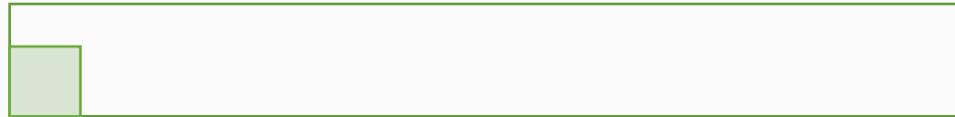


- Integrated Solution for Asset Tracking, Navigation & Safety
- Smart Inventory Management
- Warehouse Automation – Smart Robots

# Preventive Maintenance

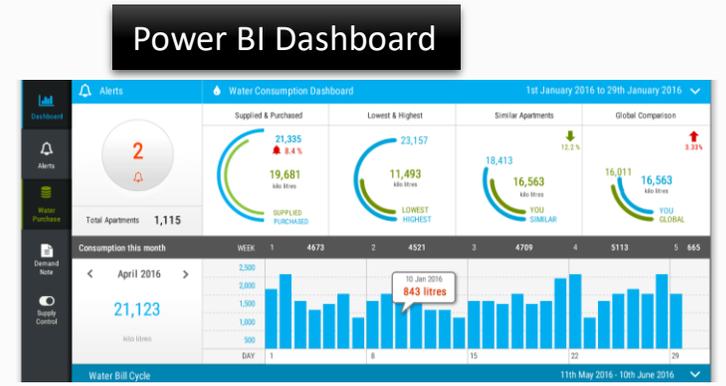
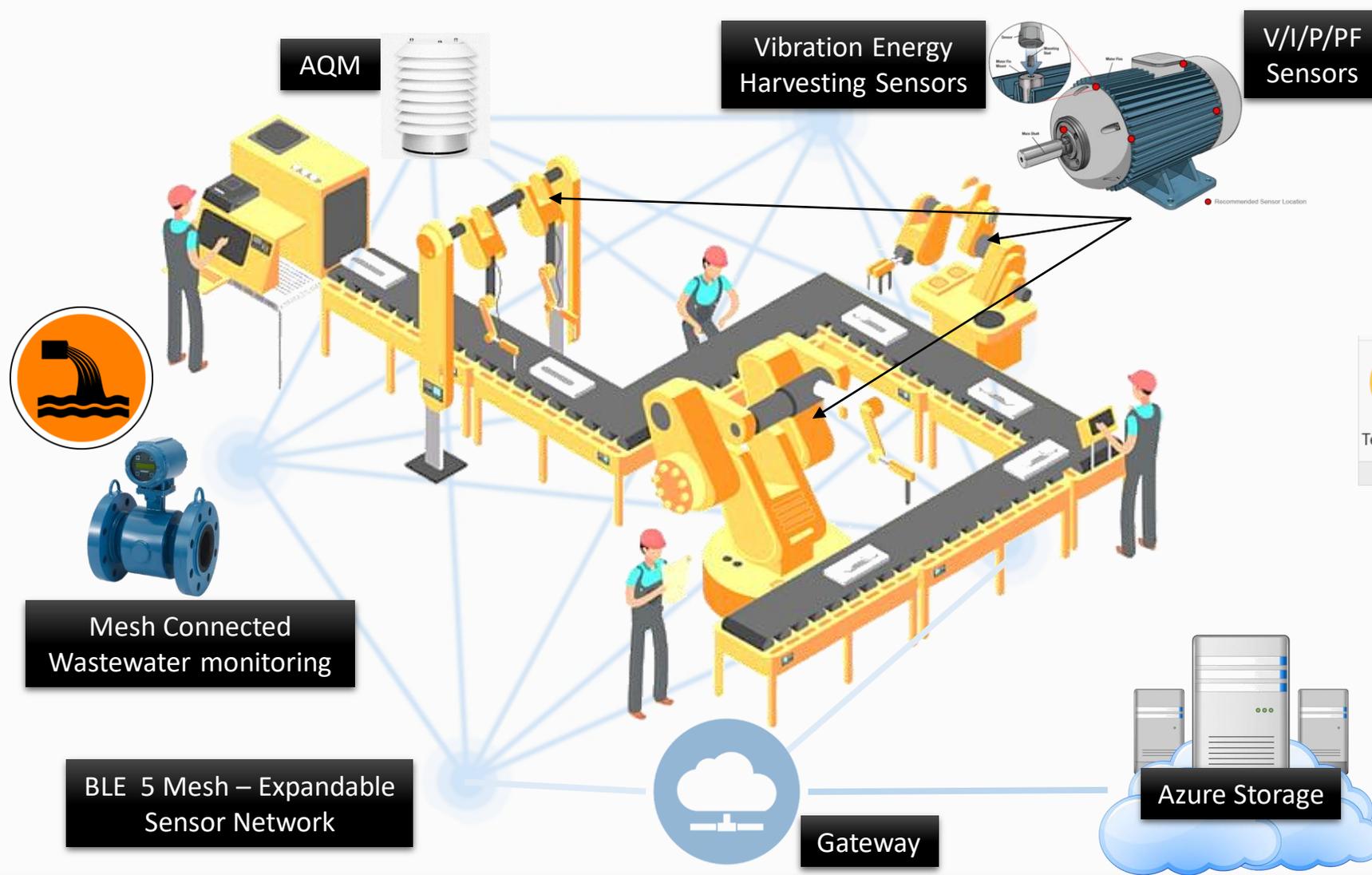


## Preventive Maintenance



- Motor Health Monitoring
- Water / Wastewater Monitoring
- Wireless Expandable Sensor Network
- Harvested Energy Powered Sensors

# Potential Use Case – SMART Factory



# Pieces delivered by Anvation Labs

Piece	Off The Shelf Integration	Custom HW Design & Manufacturing	Firmware / Middleware	Azure Machine Learning Models	Azure Integration	System/Field Testing
V / I / PF Sensors		✓	✓		✓	✓
Vibration Energy Harvested Sensors		✓	✓		✓	✓
Expandable Mesh Sensor Network		✓	✓		✓	✓
Wastewater Monitoring	✓	✓	✓		✓	✓
Motor Health Monitoring	✓		✓	✓	✓	✓
Air Quality Monitoring	✓	✓	✓	✓	✓	✓

# What more can be done?

## Potential Use Cases



- Smart Sensors / IoT Plug & Play
- Self Diagnostics
- Digital Twins

# Energy Management

A decorative background graphic on the right side of the slide. It features a faint, light gray map of the world. Overlaid on the map is a network of white lines connecting various points, resembling a globe with a digital or energy network. The lines are thin and the points are small circles.

## Energy Management



- Remote Appliance Control & Energy Monitoring
- Single Phase Energy metering
- Preventive Maintenance with 3-ph Energy Monitoring
- Connected Smart Devices / Nodes – Building Automation

# Remote Appliance Control & Energy Monitoring

## Highlights

- Timeline:** 16 weeks
- Budget Range:** < USD 50k
- Overall Business Value:** ~USD 500k
- Certifications:** CE Safety & EMC
- Industry:** Consumer
- Application:** Remote Metering, Remote Appliance Management



Underlying Smart IoT Plug

## Key Features

$V_{RMS}$ ,  $I_{RMS}$ ,  $P_{RMS}$ , PF measurement

Cloud monitoring & Control

Appliance control up to 15A

User level access / authentication

## Key Care About / Challenges

- Wide range of Appliance Control
- Reliability with unclean Mains Supply
- Security – against different IoT attacks
- Power off retention

## Technology Involved

- Single Phase Energy Measurement from 0 to 3kW
- Surge/Transient Protection
- DSP based filters
- 2.4GHz WiFi based cloud connectivity

## Anvation Labs Responsibility

- System & Circuit Design & Simulations
- PCB Design & Layout, Board Bring Up
- FW Architecture Design & Development
- Functional & Field Testing
- Azure MQTT Library & API for Dashboard Integration

# Single Phase Multi-COM Smart Energy Meter

## Highlights

**Timeline:** 22 weeks

**Budget Range:** < USD 250k

**Overall Business Value:** ~USD 1.5M

**Certifications:** IS 16444, CE Safety & EMC

**Industry:** Energy Sector

**Application:** Energy Metering



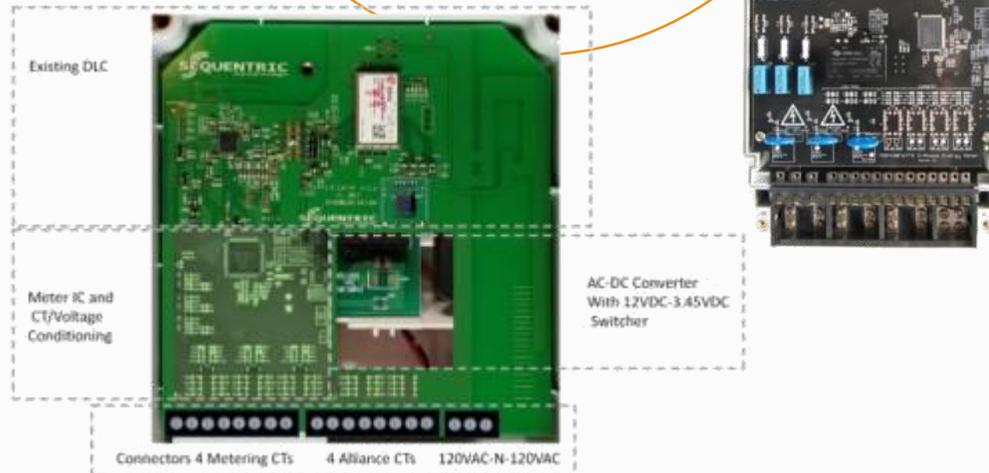
## Key Features

Multi Protocol Communication

ZigBee Connectivity with enhanced security

LTE based cloud connectivity

Live Status over App



## Key Care About / Challenges

- 1-Ph AC Dynamic PF Calculation
- Wide Load Range Metering
- Secure remote protocol for data collection
- Tamper detection

## Technology Involved

- IoT: Zigbee, LTE, BLE, Data security
- Digital Filters: LPF, HPF and Notch Filter
- $V_{rms}$ ,  $I_{rms}$ , P, PF measurements
- Zigbee & IS 16444 compliance

## Anvation Labs Responsibility

- System & Circuit Design & Simulations
- PCB Design & Layout, Board Bring Up
- FW Architecture Design & Development
- Unit, Integration Testing & Pre-compliance
- Azure Cloud APIs & Dashboard Integration

# Preventive Maintenance with 3 Phase Energy Monitoring

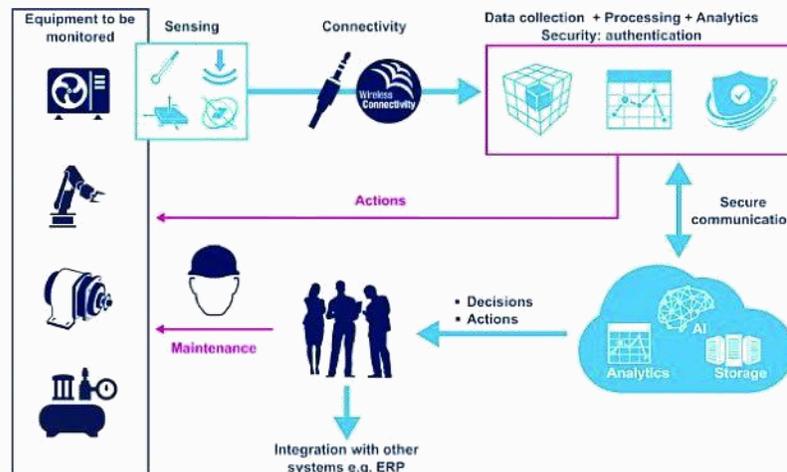
## Highlights

- Timeline:** PoC (12 weeks)
- Budget Range:** < USD 75k
- Overall Business Value:** ~USD 650k
- Certifications:** NA
- Industry:** Tea Factories
- Application:** Preventive/Predictive Maintenance for Manufacturing Plants, Factories, Assembly Lines etc.



## Key Features

- Centralized dashboard
- Preventive Alarms – Overload, Overheating
- Anomaly prediction – for planned maintenance
- IoT based – fully automated



## Key Care About / Challenges

- 3-Ph AC Dynamic PF Calculation
- Wide Load Range
- AI based vibration pattern analysis for anomaly detection
- ML based Predictive Maintenance Model

## Technology Involved

- IoT: 4-20mA, BLE, Wi-Fi
- Digital Filters: LPF, HPF and Notch Filter
- Sensors: Vibration, Temperature, Voltage, Current, PF
- ML Modeling, AI Algorithms
- Thermographic analysis,  $V_{rms}$ ,  $I_{rms}$

## Anvation Labs Responsibility

- System & Circuit Design & Simulations
- PCB Design & Layout, Board Bring Up
- FW Architecture Design & Development
- Functional Testing
- Azure Cloud API, Demo App & Dashboard Integration

# Connected Smart Devices / Nodes – Building Automation

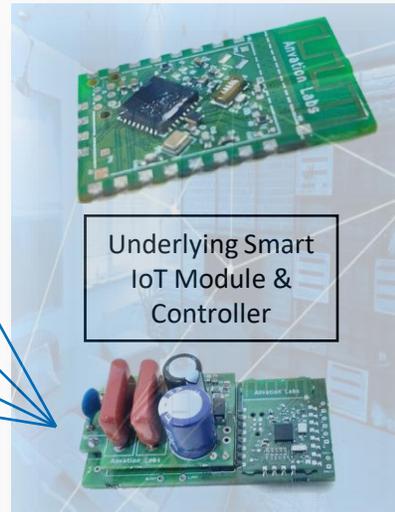


## Highlights

- Timeline:** 18 months
- Budget Range:** < USD 500k
- Overall Business Value:** ~USD 4M
- Certifications:** CE Safety & EMC, BIS
- Industry:** Consumer, Infrastructure
- Application:** Smart Homes, Street Lighting, Connected Buildings

## Key features

- Internet / Gateway less connectivity
- Connected Lights, Sensors, AC, Vents
- BLE 5.0 Secure Mesh
- App Based Control / Monitoring
- Optional Remote Control / Monitoring with Gateway



## Key Care About / Challenges

- Internet / Gateway Less Operation
- Dynamic configuration management
- Self Healing Network
- Hybrid Node Architecture

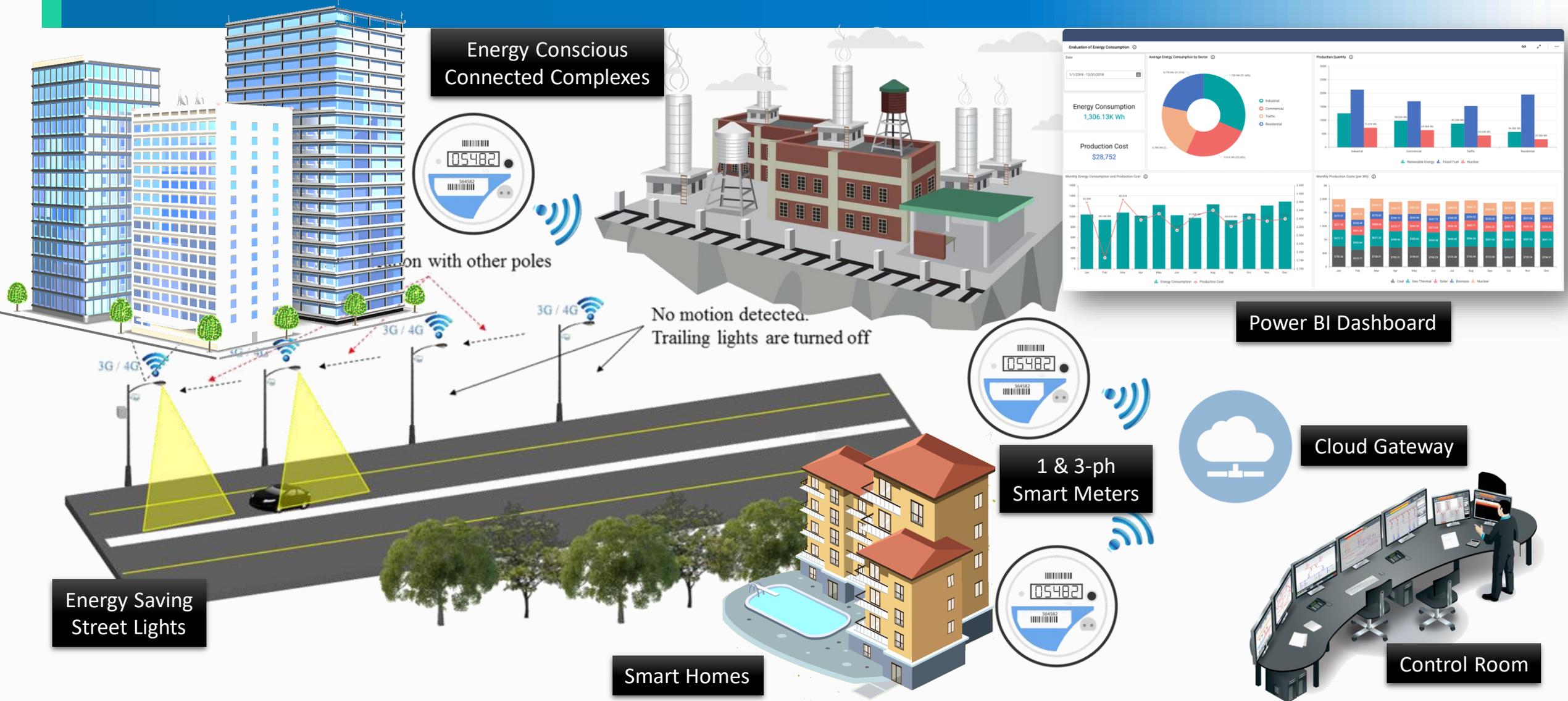
## Technology Involved

- BLE 5 Mesh
- AWS IoT: Remote Control / Monitoring
- Local / Central Dashboards
- AC Controllers, Sensors

## Anvation Labs Responsibility

- System & Circuit Design
- HW & FW Architecture Design & Development
- Android & Cloud Library
- Unit, Functional & Integration, RF Testing
- Azure Cloud APIs, Demo App, Dashboard Integration

# Potential Use Case – SMART City



# Pieces delivered by Anvation Labs

Piece	Off The Shelf Integration	Custom HW Design & Manufacturing	Firmware / Middleware	Azure Machine Learning Models	Azure Integration	System/Field Testing
1ph – Smart Metering		✓	✓		✓	✓
Remote Control & Monitoring		✓	✓	✓	✓	✓
3ph – Smart Monitoring	✓	✓	✓	✓	✓	✓
Building Automation		✓	✓		✓	✓
Sensor Integration	✓	✓	✓	✓	✓	✓

# What more can be done?

## Potential Use Cases



IoT Plug and Play certified Smart Meters

Smart City Energy Management

Intelligent Buildings and Complexes

# Services Offerings



# SMART Sensing / Connectivity Services (TBD)

## IoT Devices

Vibration Energy Harvesting Sensors

Mesh Connected LED Controllers

Mesh Connected Sensors

BLE Mesh to Cloud Gateway

Remote Vital monitoring Device

## Retrofit Enhancements

RTOS Applications development

MQTT Library

Edge Firmware

AI / ML driven decision making applications



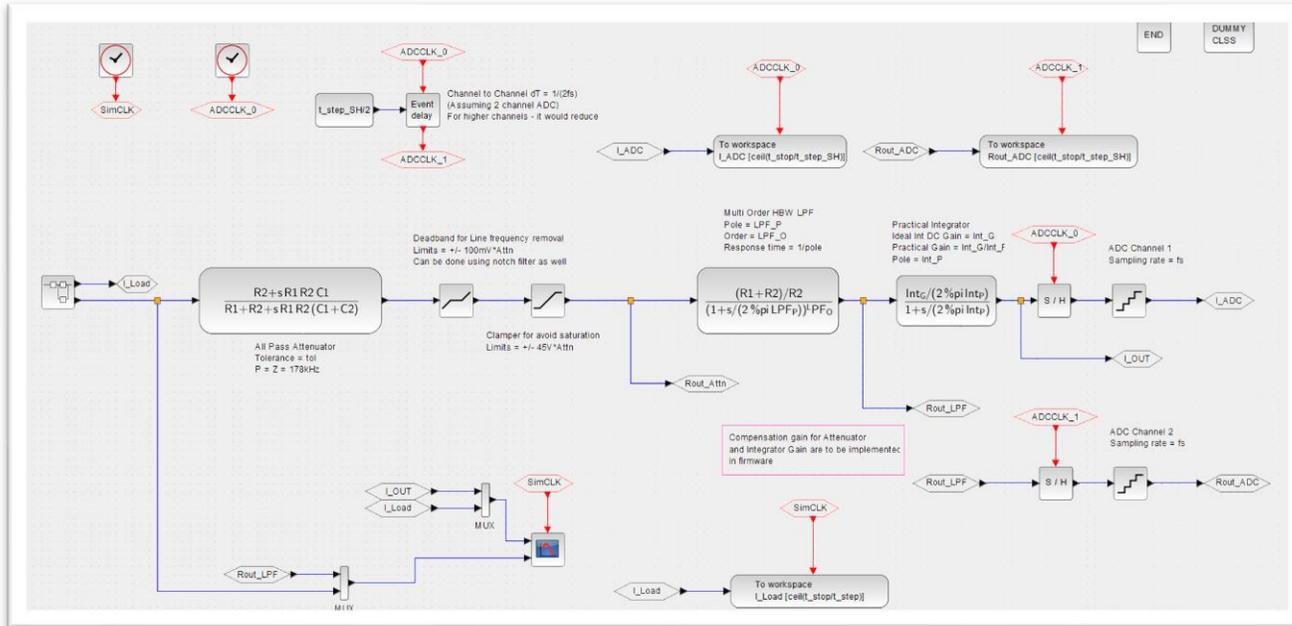
## Manufacturing

- Beverage Factory
- Aerospace Manufacturer
- PCB Manufacturing Facility

## Infrastructure / Logistics

- Commercial Complex
- Warehouse
- Water Boards

# Sample Offerings



Quick Technology PoC of a Long Range RFID Reader for a Canadian Security Firm



Feasibility study & Block Level Simulation for an Ultra Fast ( $<1\mu s$ ) High Current ( $> 5kA$ ) short circuit system for a French Industrial Giant

# Delivering Industry 4.0 Solutions Globally . . . Together



## Thank You

---

Get in touch

[buildwithus@anvationlabs.com](mailto:buildwithus@anvationlabs.com)

Visit us @

[www.anvationlabs.com](http://www.anvationlabs.com)