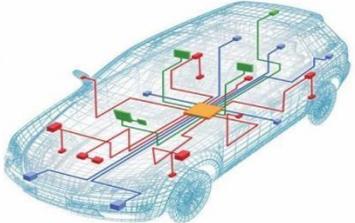




Crevavi IoT Profile

Introduction

An Indian MNC founded in 2011

Automotive	IoT/M2M	Building Automation
		
Automotive ECU Software	Edge, end nodes, gateways	Energy management

Global Footprint



Automotive software competencies



ICE Powertrain, Body & Chassis ECU
 IC Engine Management ECU
 Immobilizers
 Instrument Clusters
 Active Anti-roll ECU
 CAN, FlexRay, Ethernet



E-Mobility ECU
 HV Inverter for e-motor
 DC-DC converter
 On-board-Charger



AUTOSAR BSW
 Custom MCAL
 Multicore OS
 Bootloaders
 Complex Drivers



Cyber-security
 Immobilizer
 Secure boot
 Secure programming
 OEM specific security algorithms

Company strengths

- Product Innovation
- One-stop shop for end-to-end R&D solutions
- Diverse industry experience
- Focused on IP creation
- Systems and domain consultancy
- Global vendor network for HW
- Manufacturing for series production

IoT competencies



IoT/M2M Edge
 - Edge computing
 - Condition monitoring and remote diagnosis
 - Sensors and actuators



Robotics
 - Robotic Arm
 - Automated Guided Vehicle
 - Shop Floor Automation



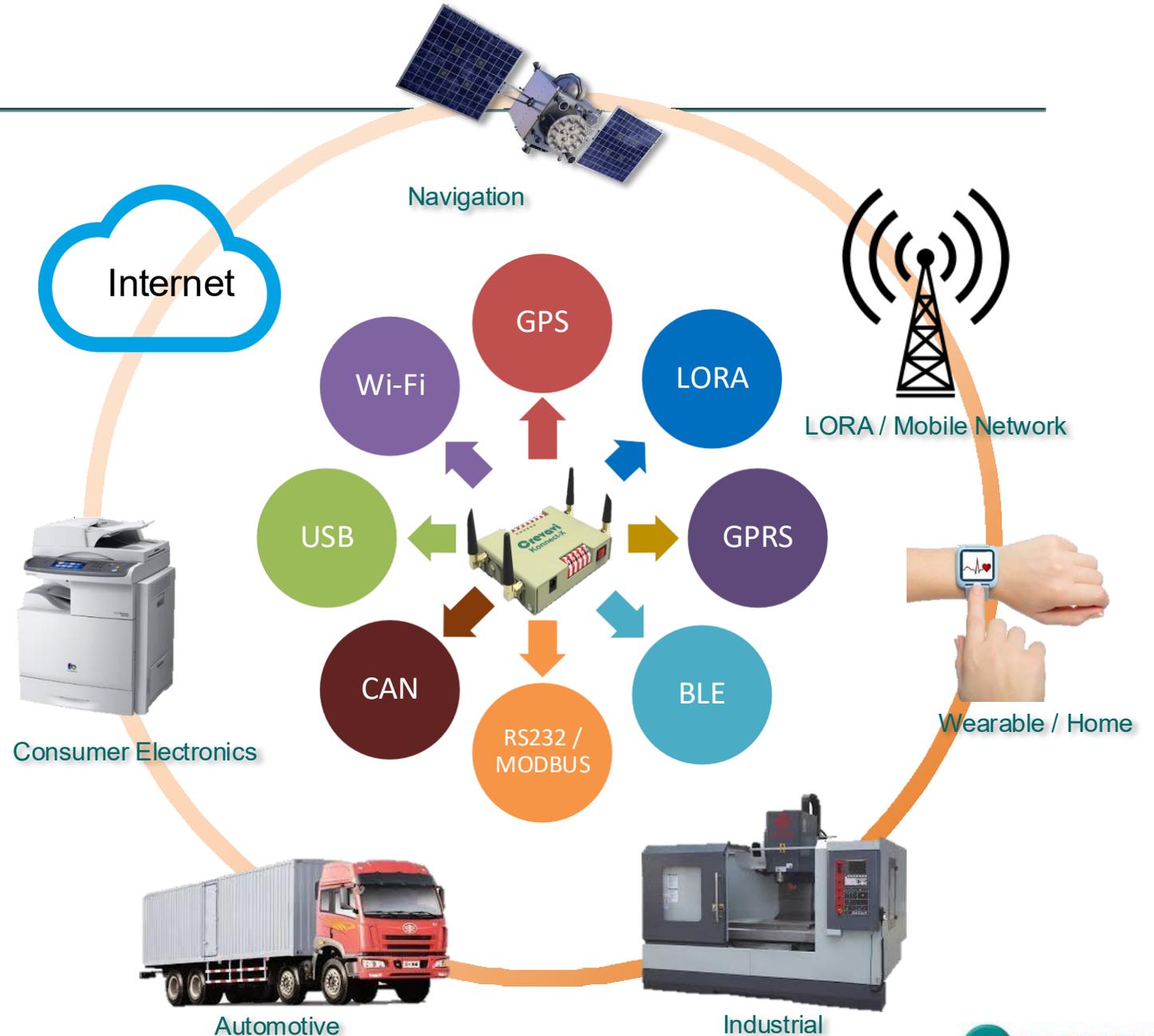
Cloud connectivity
 - AWS
 - SAP HANA
 - On-premises servers



AI and ML
 - Data Augmentation
 - Model Training using Convolutional Neural Networks
 - Model deployment

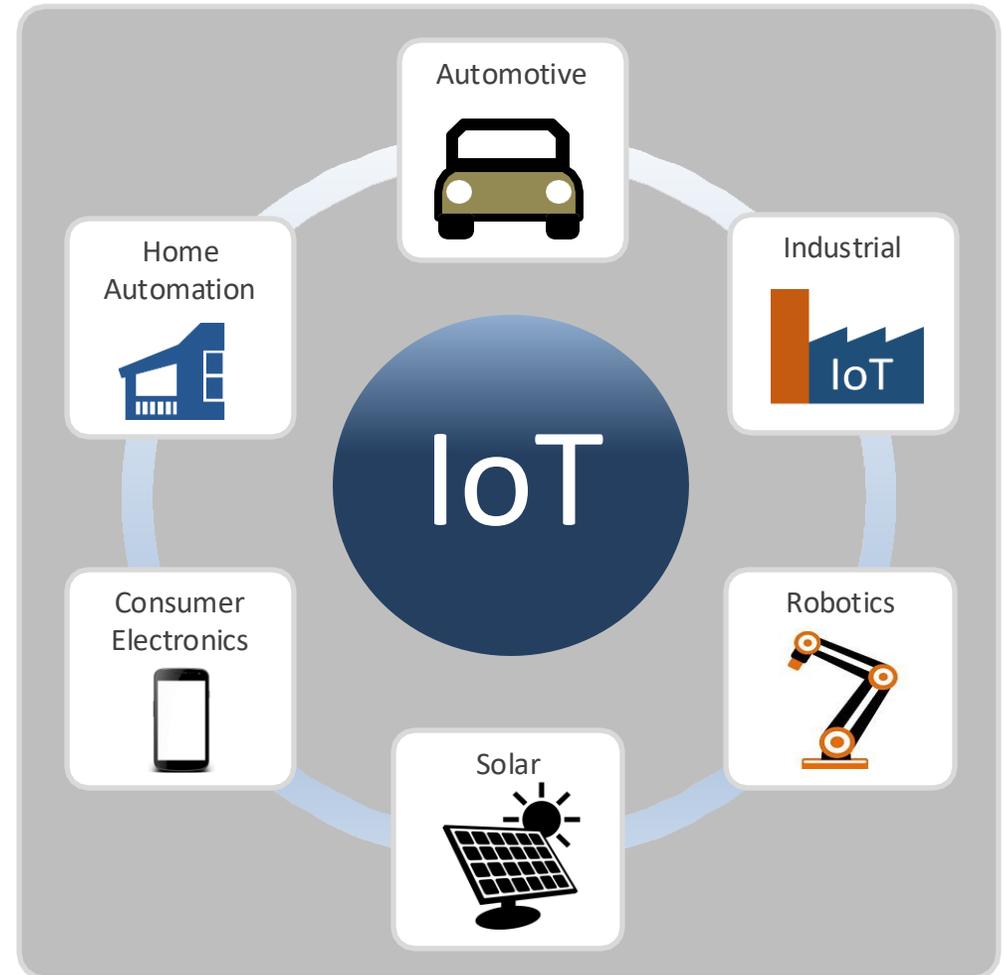
IoT Platform Capabilities

- **Edge/ Gateway Computing**
 - Microcontroller based processing
- **Upstream Communication**
 - GPRS, LTE, LTE CAT-M
 - Wi-Fi
 - LoRa
 - Bluetooth
 - GPS
- **Downstream Communication**
 - CAN
 - UART, Modbus
 - USB
 - Bluetooth
 - OBDII
 - Ethernet
- **Custom IOT Cloud platform**
 - Dashboard
 - Analytics



Domain experience

- **R&D team with decades of diverse industry experience**
- Field tested industrial grade products
 - Industrial IoT (IIoT)
 - Telematics, Automotive Diagnostics
 - Building Automation
 - Condition monitoring of Industrial assets
 - Tag and trace /Lat-Long of remote assets
- **Customer Benefits**
 - End-to-end IoT solution provider
 - From Shop-floor to cloud
 - R&D team to custom design a IoT solution to meet target costs
 - Process knowhow to implement any IoT use case
 - Desired product competencies under one roof



IoT Success stories



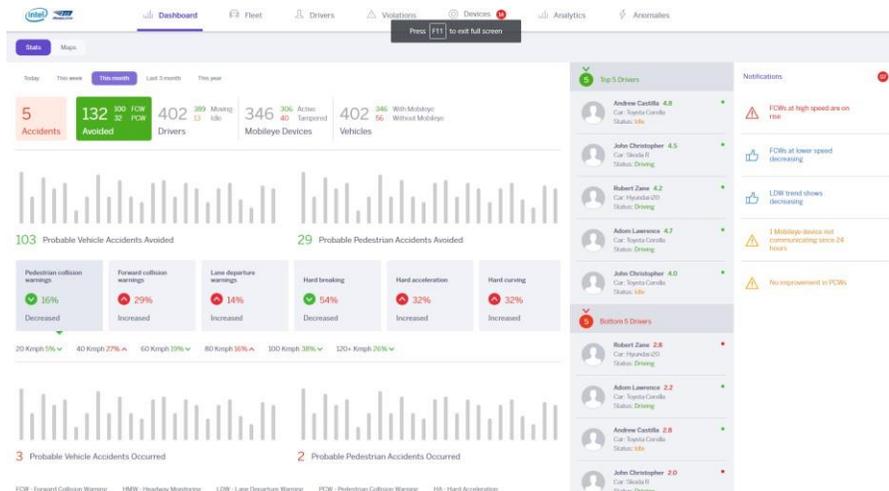
Telematics and ADAS platform with Intel



- Software platform co-developed with Intel
- Integrated OBDII, GSM and GPS communication on Linux based Intel Atom board
- Fleet Management System (FMS) on cloud
- Interface with ADAS processor for ADAS event recognition
- Connects to cloud via GPRS through a cellular modem
- Integrated GNSS for Navigation
- OBDII connection for vehicle FMS and Telematics

Benefits to customers:

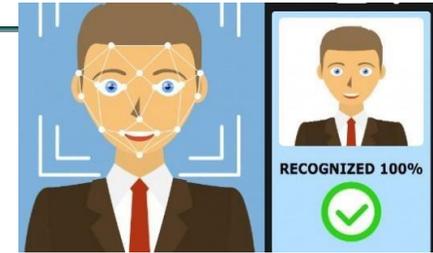
- Ready platform for FMS, Telematics and ADAS
- Retrofit and factory fit option



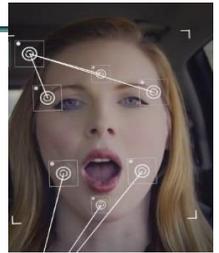
Predictive Vehicle health



ADAS Events



Driver Authentication



Driver Monitoring



Driver monitoring & Authentication & Event recording



Mobileye CAS



Car Dashcam with event Recording



Rear Parking Camera



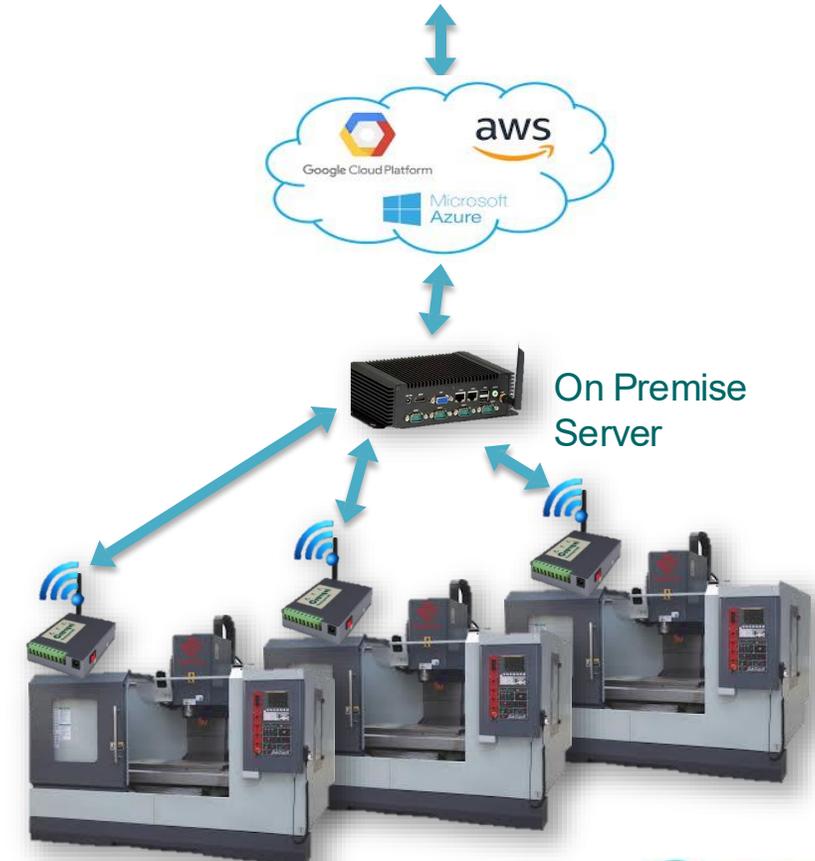
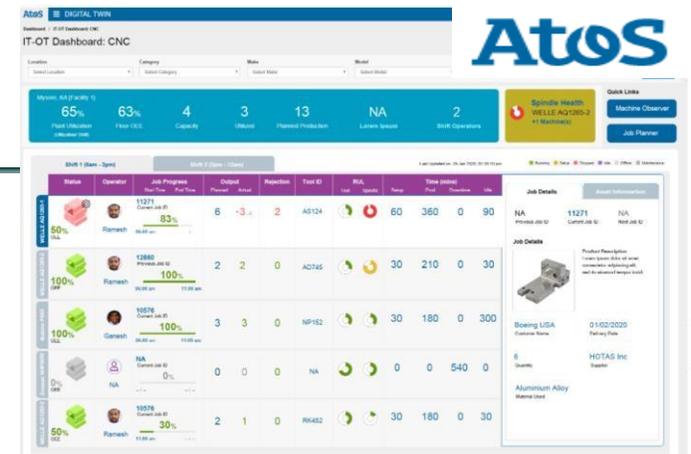
Centralized Processing Unit

1. Multiple Camera inputs
2. GPS & Accelerometer
3. 3G/4G/WIFI
4. CAS Events
5. Vehicle OBD



FactOnNet: Industrial Automation Platform

- **Condition and usage monitoring of CNC Machines and Digital Twin in Cloud**
 - Populate process parameters like Spindle RPM, Torque, Hydraulic oil temperature, cycle-time to AWS cloud
 - On-premise server communication via S7 / OPC UA with CNC machines
 - Cloud triggered alerts when process parameters go beyond limits
 - Predictive maintenance of spindle / other key parts and OEE measurement
- **Scalable platform to monitor all industrial machines**
 - Air Compressors, Chillers, Generators, smart meters, Circuit breakers
 - Provide 360 degree view of entire manufacturing process
- **Customer Benefits**
 - End-to-end solution from shop-floor to cloud
 - Single point solution provider from edge to cloud
 - Edge/Fog computing to reduce data costs, implement high end device security and device agent
 - At scale deployment and customization to meet desired total cost of ownership
 - Integration of all factory IT processes with OT to give 360 degree view of operations



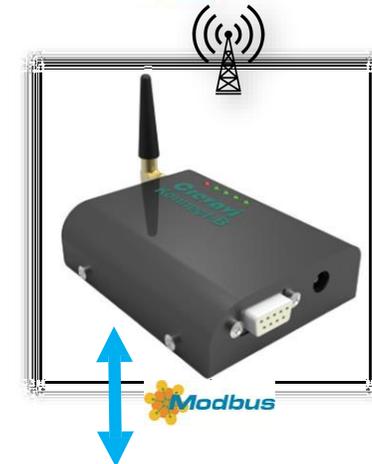
Condition monitoring of industrial asset

- **Real-time remote monitoring of compressor parameters**

- Live demonstration to visiting Bosch IoT CEO
- Modbus interface to read Compressor parameters
 - voltage, current, pressure, temperature of the machines
- Parameters sent to SAP HANA cloud via GPRS (HTTPS) via cellular modem

- **Customer Benefits**

- Custom-designed IoT end node to fit onto any machine
- End-to-end IoT solution from edge to cloud
- Scalable HW to meet target BOM cost
- Custom security and device agent on IoT device
- Edge/Fog computing to implement business logic on IoT device



Cold storage (Reefer Truck) monitoring

- **Custom-designed platform**

- BLE nodes to measure temperature and humidity
 - Placed inside the Reefer
- On-vehicle interface to Crevavi IoT gateway
 - receives the temperature & humidity data from all sensors over BLE
 - GPS sensor in IoT device will continuously keep track of location
 - Location and sensor data is sent to cloud at regular intervals
- Cloud platform to display sensors' and GPS data in real-time

- **Customer Benefits**

- Custom-designed IoT/Gateway and BLE nodes to meet target use-case
- Scalable platform to meet target BOM cost
- On device security, computing to implement business-logic
- Optional interface to OBDII port for Vehicle diagnostics/Telematics



Asset Tag and Trace & Geo fencing

- Custom-built
 - Bluetooth (BLE) Beacons/tags
 - Readers/Gateways to read beacon signals and to communicate to cloud
 - Can be retrofit on high-value assets
 - Triangulation for indoor positioning
 - Customizable form-factor, firmware, security algorithm, device agent
- Geo fencing as per warehouse perimeter
- Cloud interface to gateways
- Custom IoT cloud platform to implement desired business logic/use-case

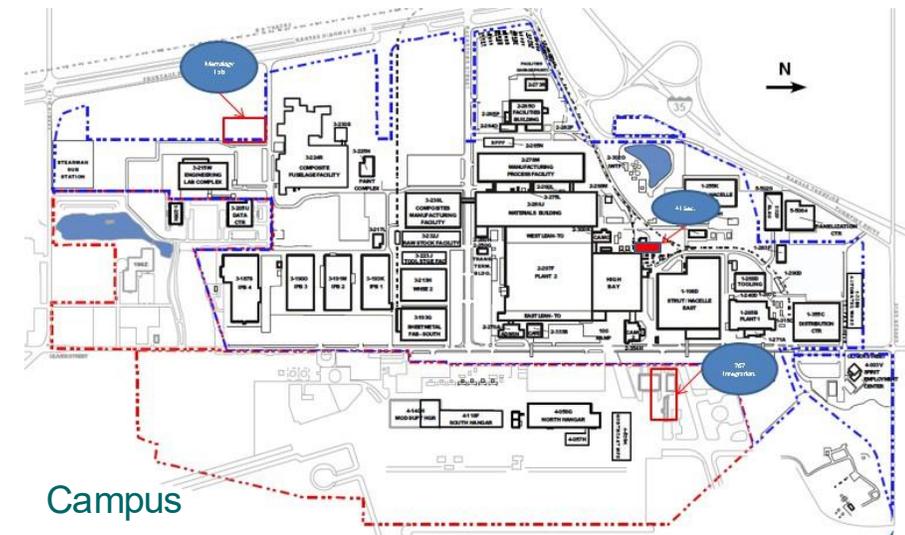


High value asset



Tag

Crevavi BLE Tag/Beacon form-factors



Campus



Smart Devices for Building Automation

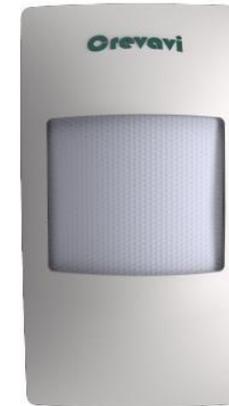
- Custom-designed smart switch, PIR and LDR sensors
 - Bluetooth(BLE)/WiFi based Smart Switch
 - To remotely control electrical appliances, detect object/light
 - Integrated relays to turn ON/OFF switches
 - Can be retro-fit onto existing switch-boards
 - Smart Switch control via mobile app
 - Optional remote control via cloud
- Customer benefits
 - Field tested devices to withstand power fluctuations in India
 - Building/Home/Factory automation at frugal cost
 - Integration of custom device agent/security algorithm
 - Made in India products with warranty



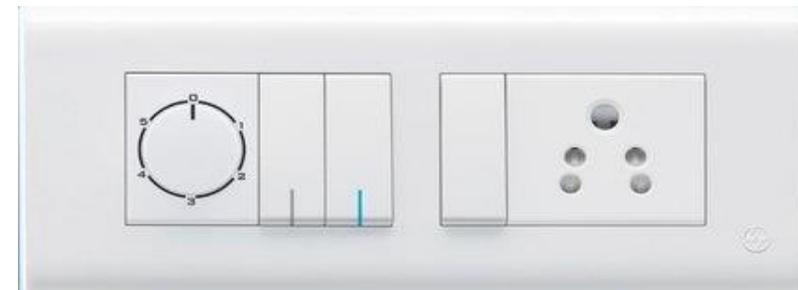
PIR



LDR



Smart Switch



Panic button/SoS/Emergency button

- **Custom-designed IoT enabled button**

- GPS & GPRS based device for raising panic alerts, alarms, triggering SoS and emergency requests
- Cloud connection configurable via mobile app
- Location, vehicle & driver details sent regularly to cloud

- **Customer Benefits**

- Integrated IoT enabled button with desired application
- End-to-end solution from IoT node till cloud platform
- Optional integration of Siren, other security features



Case Studies – Power Segment



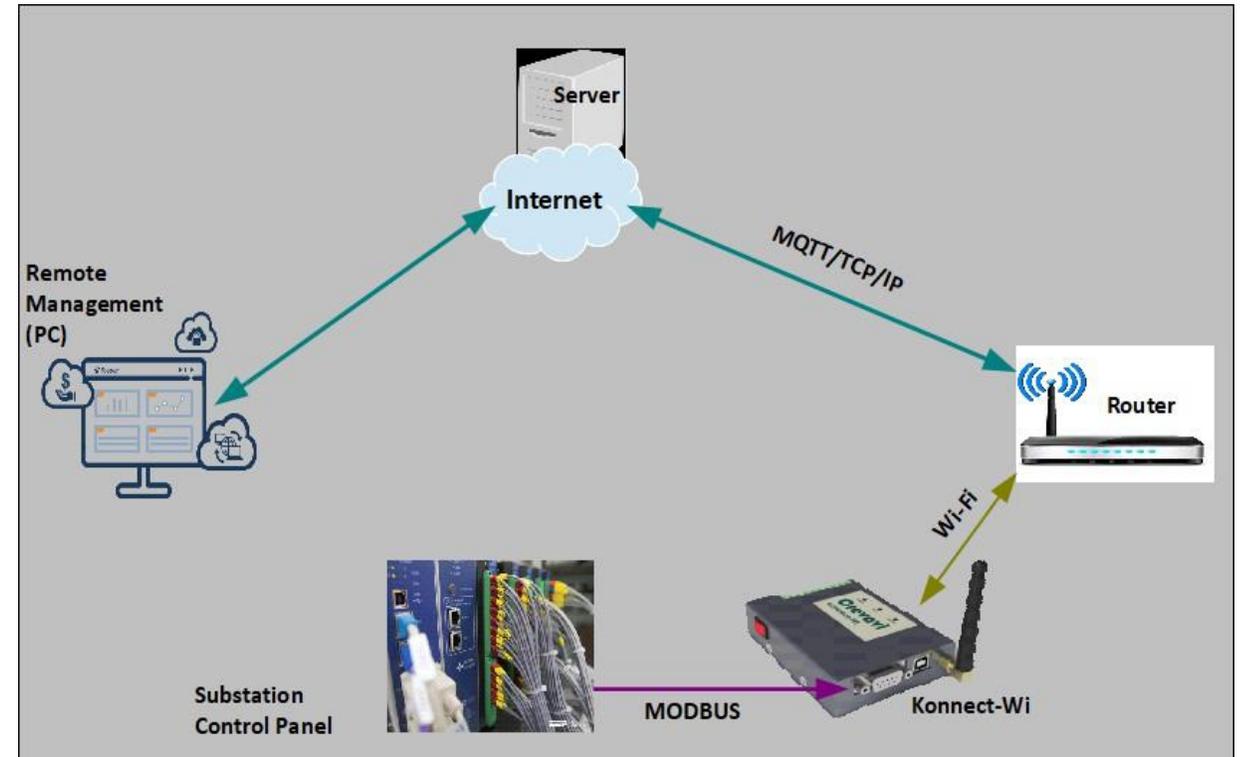
Power Substation Monitoring & Control

- **Solution Overview**

- GPRS based IoT device
- MODBUS RTU communication to fetch electrical parameters to monitor power quality from the control panel / SCADA through IEC 61850
- Track changes in all electrical parameters, circuit breakers, Isolators & Relay status to identify the faults and suggest recovery tips to maintain the power quality
- Remote monitoring of electrical parameters from cloud

- **Customer Benefits**

- Experienced R&D Team with
 - o Power Electronics knowhow
 - o High Voltage engineering
 - o PLC Communication protocols
 - o SCADA communication



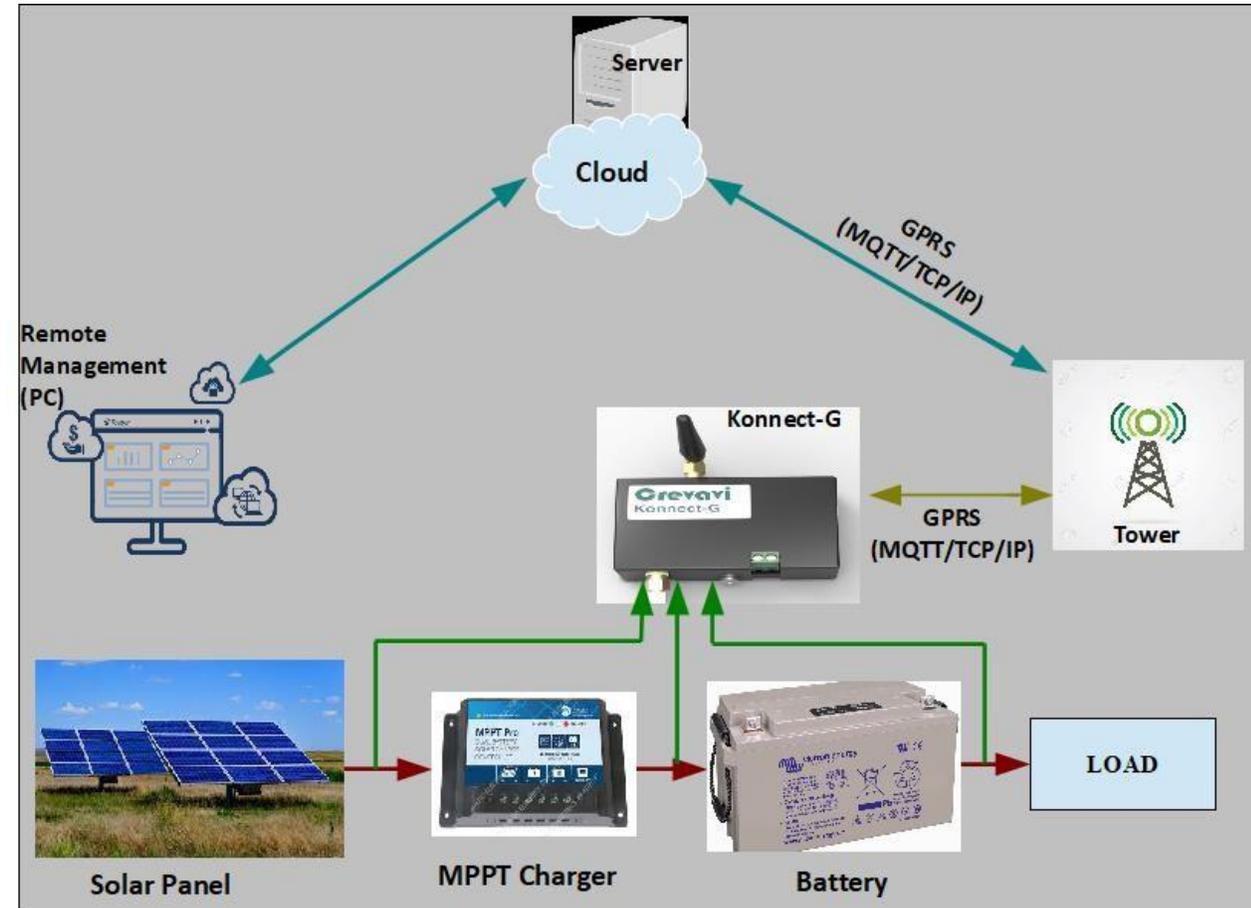
Remote monitoring of Solar farm

- **Solution overview:**

- GPRS based, condition monitoring of solar panel, MPPT charger & Battery
- Retrofitting of custom sensors to measure power
- Cloud communication through MQTT
- Condition monitoring, Predictive maintenance of Solar plant equipment

- **Customer Benefits:**

- End-to-end IoT solution with own cloud platform
- Rugged Industrial design, 24x7 operation
- High-end security
- Optional Retro-fit of custom sensors, actuators



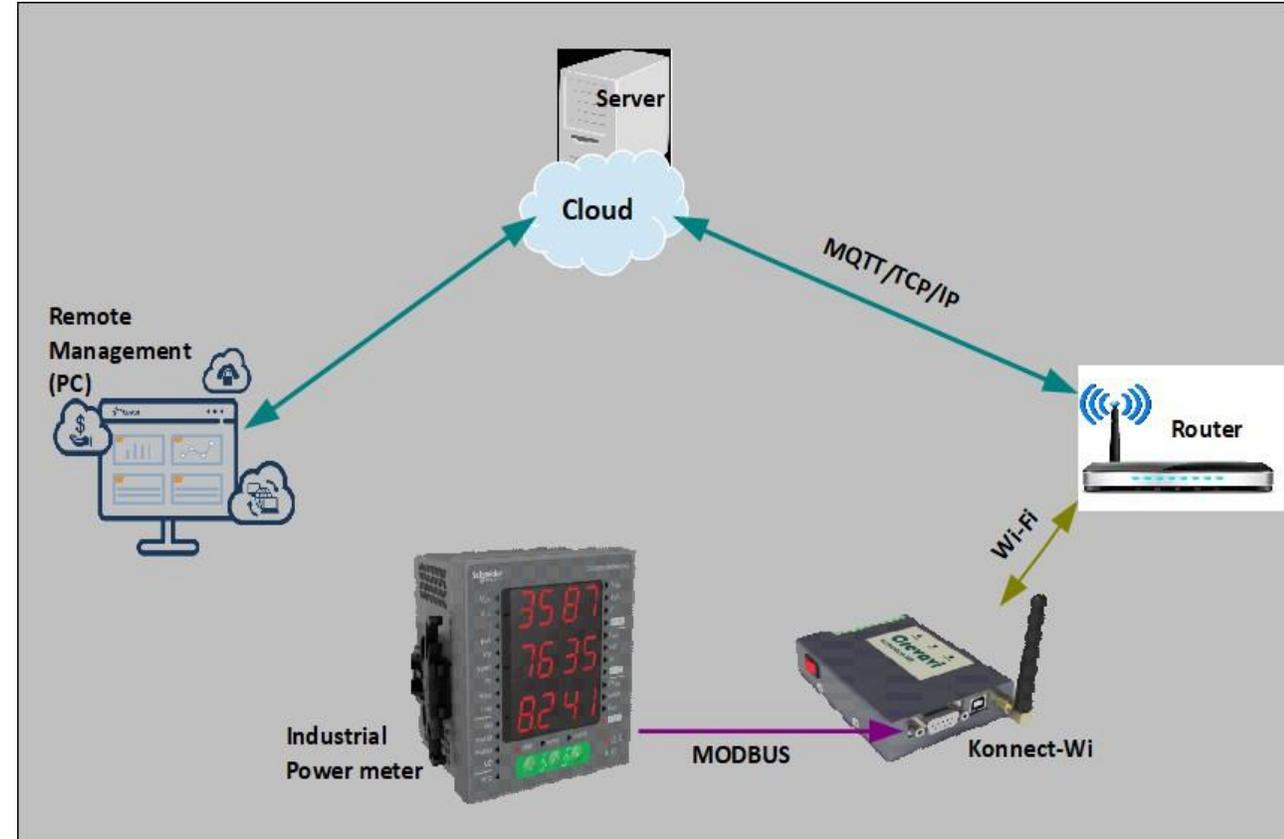
IoT based Smart meter

- **Solution Overview:**

- WiFi based IoT connected to Smart Energy meter via MODBUS
- Cloud communication via WiFi through local router
- Monitor energy in buildings, homes and factories

- **Customer Benefits:**

- Edge processing to reduce recurring cellular data costs
- Cloud platform to reduce cloud subscription costs
- Rugged Industrial design for high reliability to withstand high power fluctuations and current surges
- High-end IoT device security
- Can meet custom certification



Thank you for your time

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