



INEVITABLE
ELECTRONICS

2024

Inevitable Group

Introduction

We're an Indigenous Product Design Engineering Services organization focused on *Make-In-India* and delivering Products & Services to our esteemed clients through cutting-edge technologies from Ideating a Concept to PoC to Design to Manufacturing.

Incepted in 2014, the Company has 70+ employees having vast experience in relevant industry/ domain, completing numerous global assignments till date successfully.



Overview

One-Stop-Solution for Embedded Electronics development

Founded in 2014

~ 70 employees
with average
experience of 5 yrs

Pan India presence
Lucknow, Delhi,
Bengaluru



Our Offerings

Engineering Services

- HARDWARE
- FPGA/RTL
- EMBEDDED FW AND SW
- MECHANICAL ID
- TESTING & CERTIFICATIONS

Manufacturing Services

- PCB ASSEMBLY
- PRODUCT ASSEMBLY
- MECHANICAL ASSEMBLY

Solutions & Products

- IOT & AUTOMATION
- AUTOMOTIVE
- MEDICAL & HEALTHCARE
- INDUSTRIAL SECURITY
- DEFENSE & SPACE



Engineering Services

○ Hardware

- Schematics / Circuit Design
- PCB Design
- Multi layer, Flex / Rigid
- SI, PI & Thermal Analysis
- MIL Grade, Industrial, Consumer, Medical, Automotive
- Component selection
- BOM procurement
- Manufacturing and Assembly

FPGA

- FPGA Design
- RTL Development
- Test bench creation
- Design migration
- Synthesis, P&R
- Performance tuning
- Area Optimization
- IP Validation with FPGA

Engineering Services

Embedded FW & SW

- Firmware, Middleware
- Device Driver
- BSP
- OS Porting & Customizations
- Embedded Applications

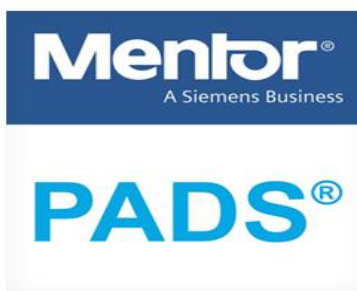
Mechanical

- Product Design
- 3D Modelling
- Industrial & Ruggedized Designs
- Thermal Analysis



Hardware Toolchain

OrCAD
cā dence®



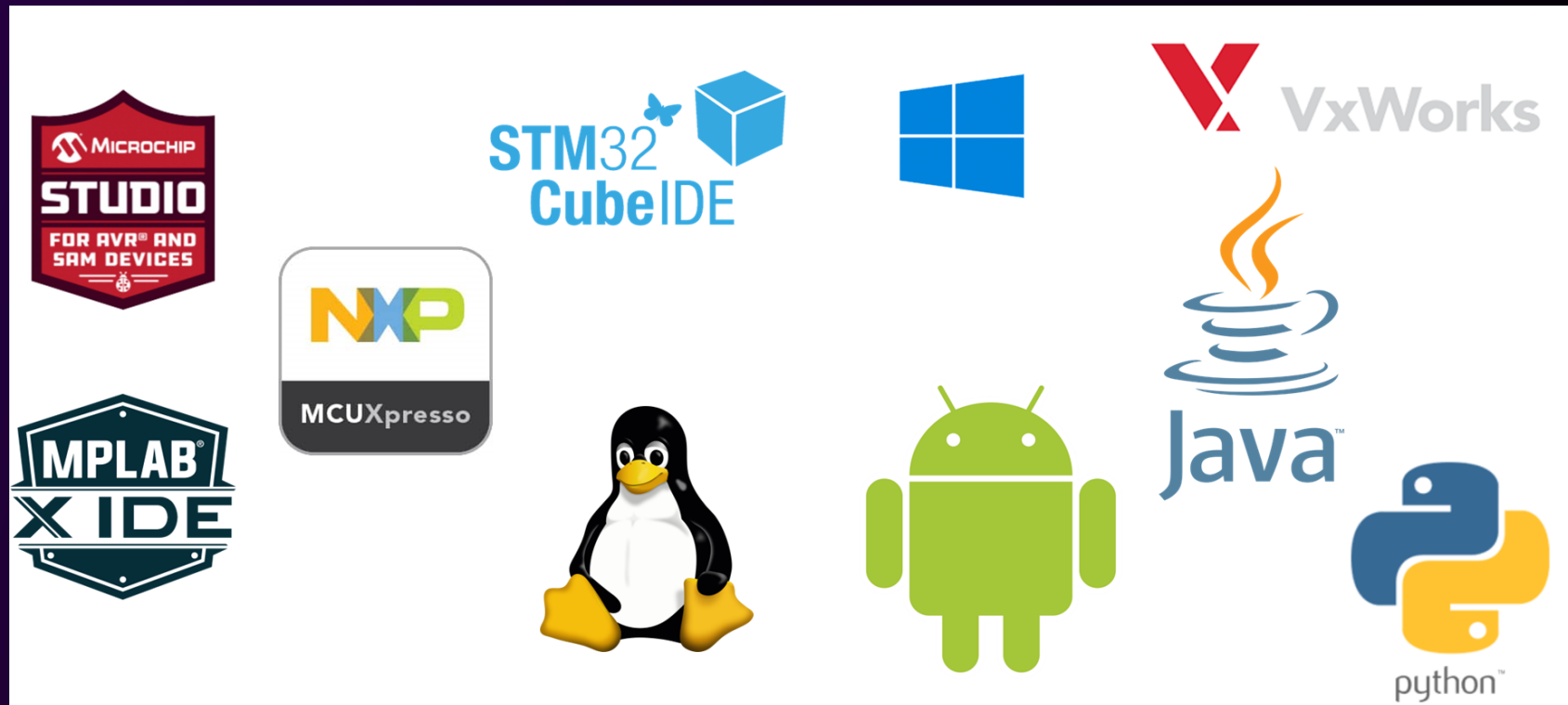
Altium®
Designer



FPGA Toolchain



Firmware-Software Toolchain



Success Stories



Defense R & D



Video processing system

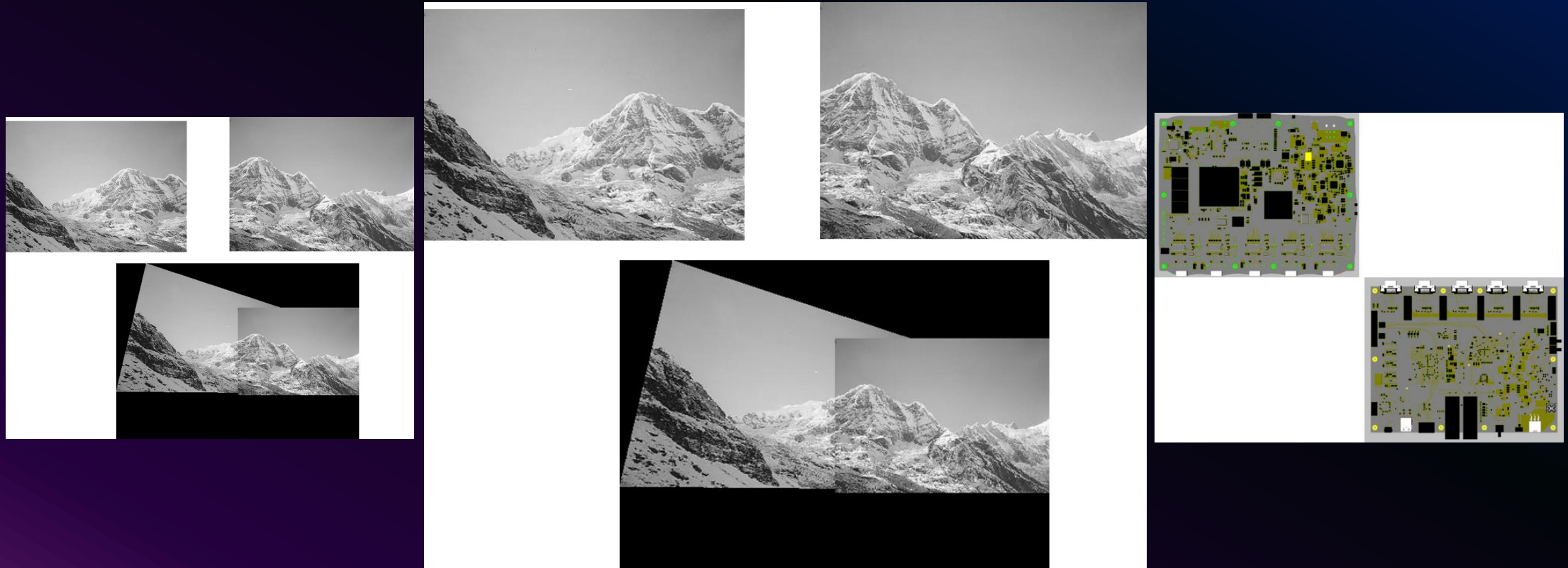
Algorithms

- Optical deblur correction
- Fog/mist removal
- Rain removal
- Turbulence correction
- Automatic target detection
- Image Stitching Panoramic View

Salient Features

- 16 Layer High Tg PCB
- AMD-Xilinx Zynq MPSOC (7EV) and Kintex (Companion) FPGA based design
- USB 3.0, 10G-Ethernet interfaces
- Support for 5 LWIR cameras with CamLink interface
- Ruggedized Enclosure with circular connectors

Video processing system



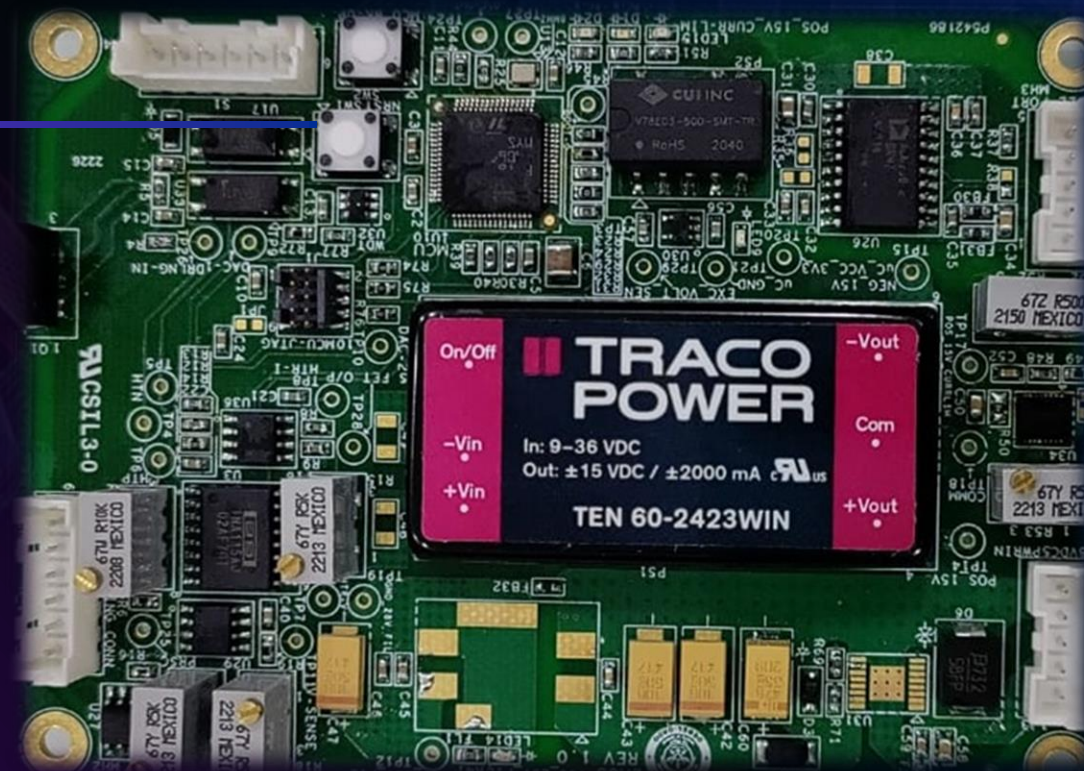
Video-Telemetry-Communication with AI

- Video Surveillance
- Scanning and monitoring
- Identifying the targets
- Telemetry & Command
- 2.4GHz and 900MHz
- Camera and AI processing engine for Drones
- Up to 2W transmit power
- Transmit system based on Artix FPGA
- Receive system based on Zynq 5EV MPSOC
- Jetson Xavier NX SOM module
- Flight controller over USB2.0

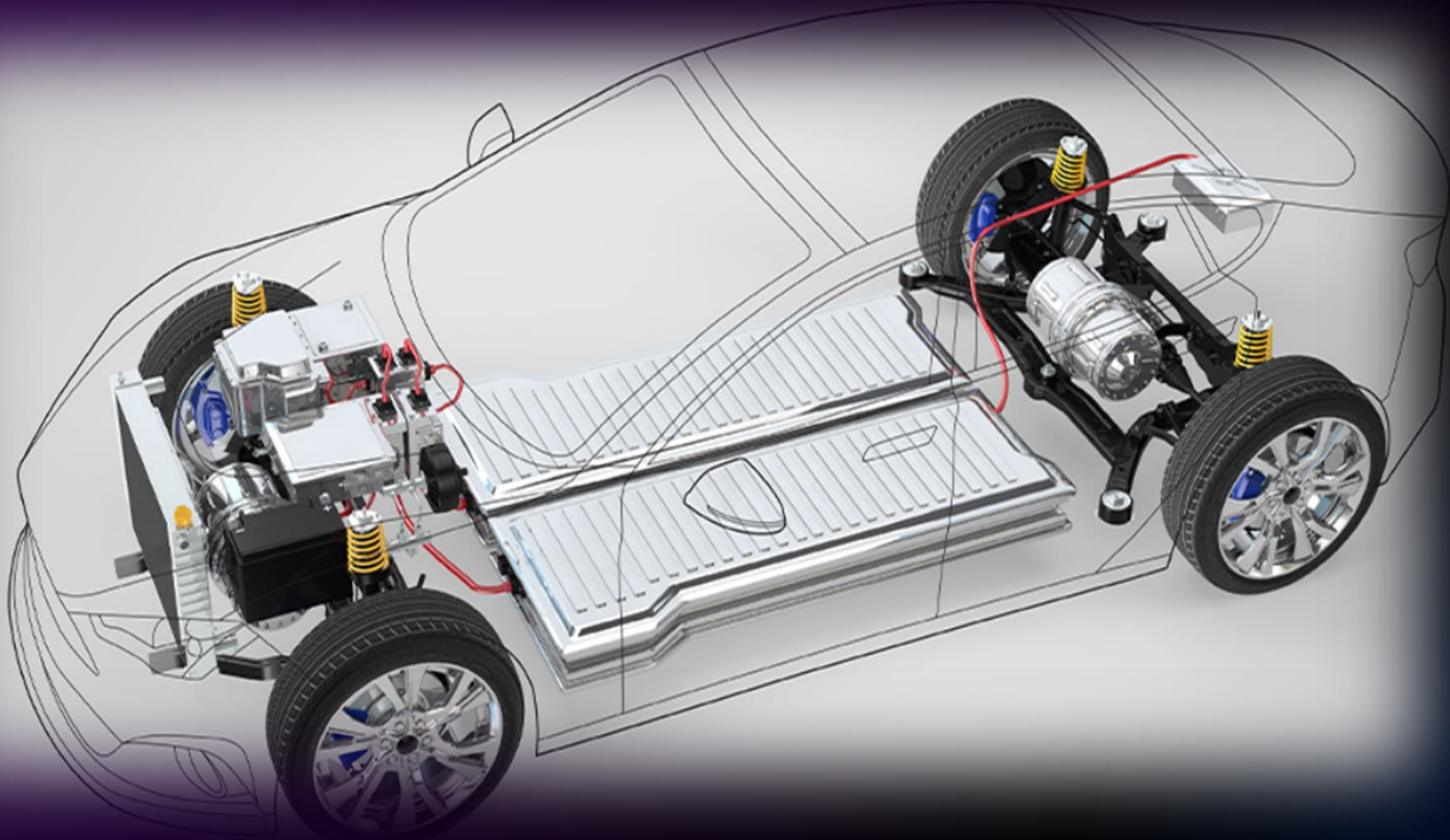


Amperometric Oxygen Sensor

- Provides sensor excitation voltage and measure sensor current and correlate it with the oxygen concentration.
- Provides sensor operating temperature by driving and controlling the temperature of the screen-printed Pt-heater.
- Transmit Oxygen concentration to the host.
- Down-converts & distributes 28VDC Power Supply to carry out above functions.

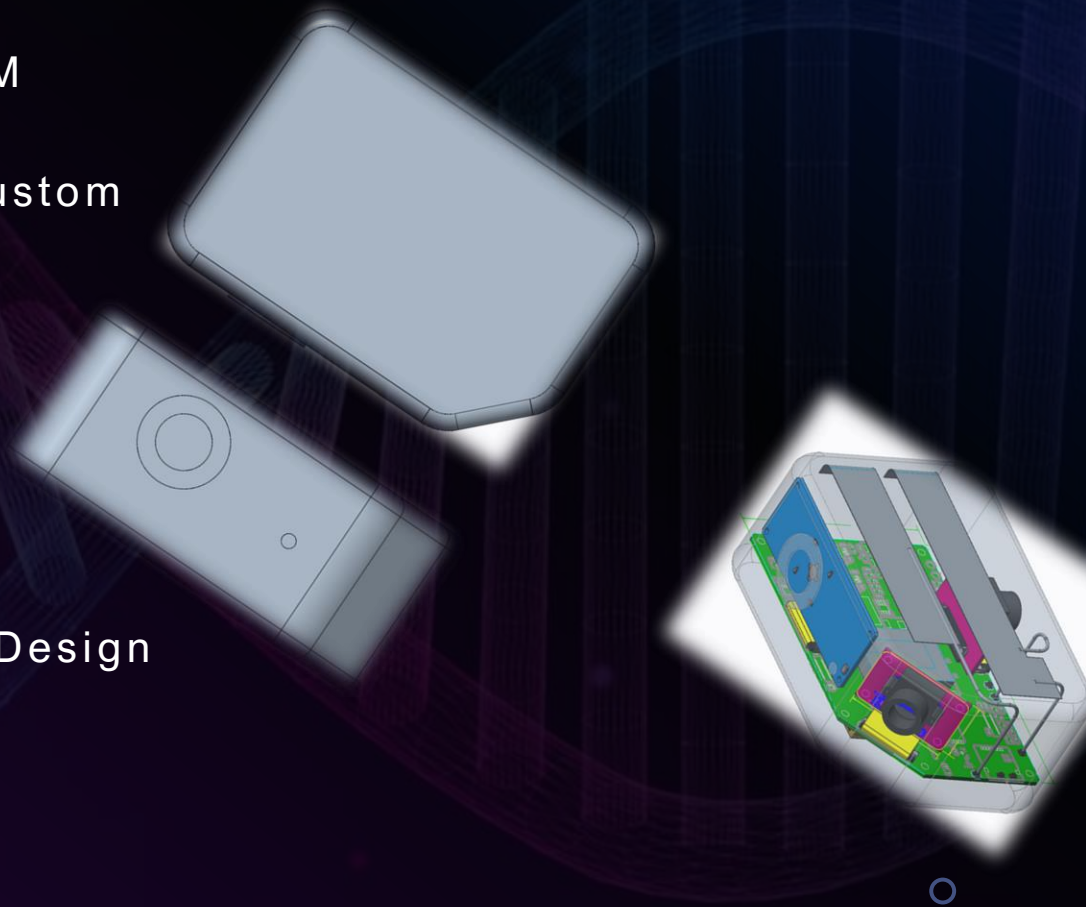


Automotive



Dash Cam

- Developed around the low power, six core ARM Processor (RK3399) with LPDDR3
- MIPI CSI based camera interfaces (x2) with custom lens
- Sensors like Accelerometer, Gyroscope, Magnetometer
- GPS with UDR
- 4G LTE MODEM (Cat 4), Wi-Fi, BT/BLE
- Operates on 12VDC power input
- 12 Layer High Tg PCB with Custom Industrial Design
- ADAS Level 1 capable
- Edge processing with AI/ML capabilities
- Driver Scoring and Monitoring
- Driver Alert System

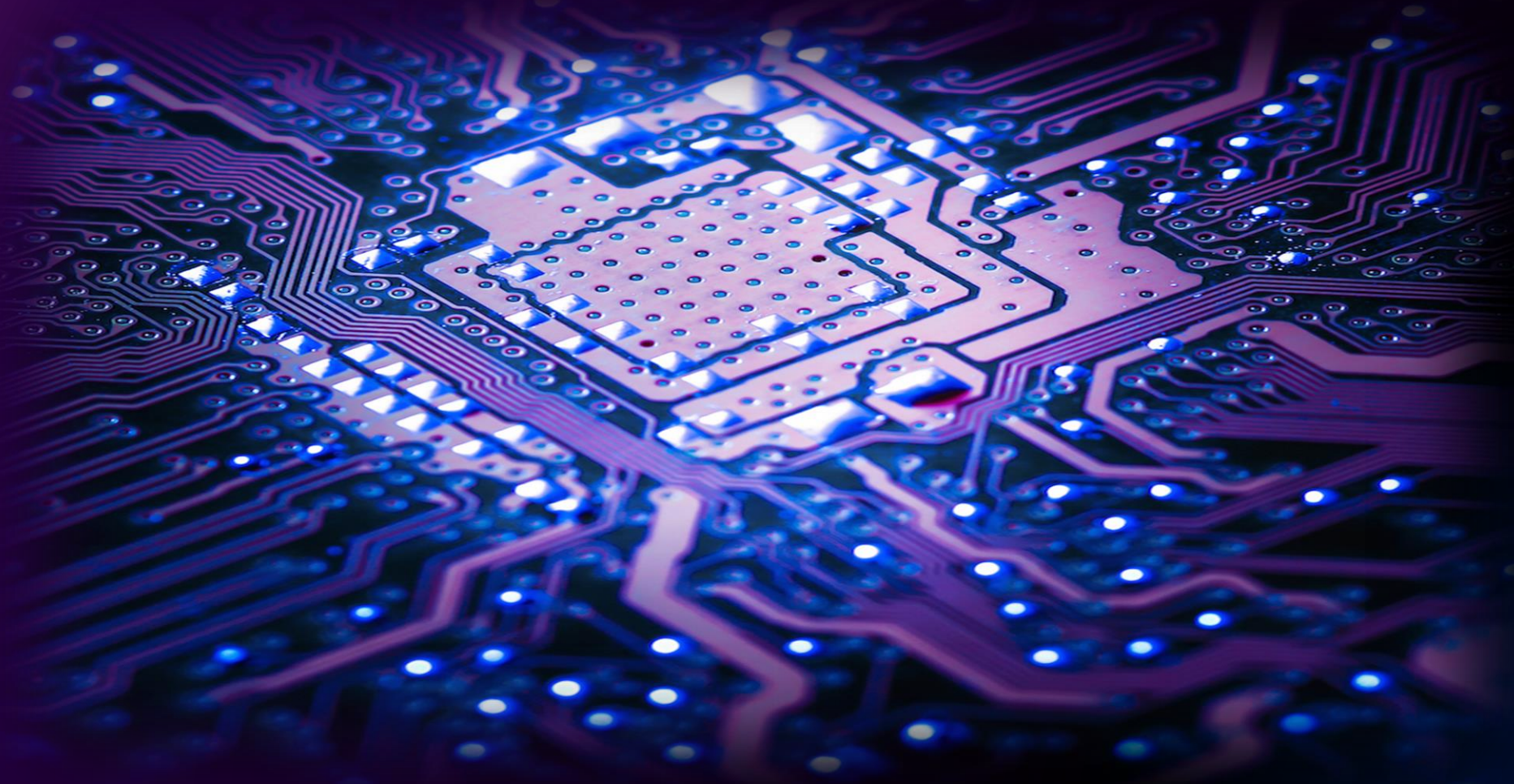


Tyre Pressure Monitoring System

- Developed around a low power, TPMS sensor from NXP
- Pressure, Temperature and Accelerometer sensors
- Pressure range 10 to 1300kPa; Accuracy $\pm 1,5\%$
- Temperature range -40 to +120°C
- Rotation detection
- 550mAH Lithium Battery
- RF (433MHz) and LF interface with ECU
- Robust Mechanical Design



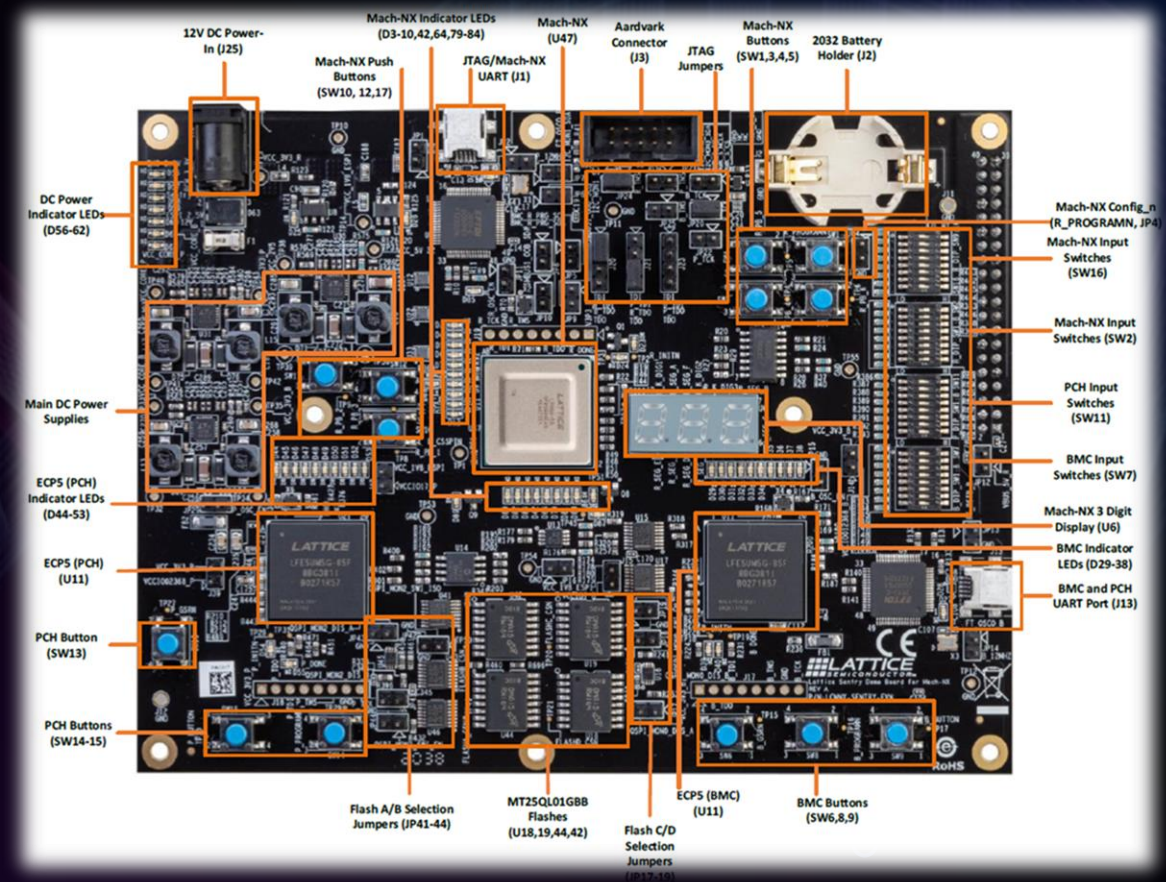
Reference Platforms



Reference Platform for Lattice Semiconductor

The Lattice Sentry Demo Board for Mach-NX is a single-board, system-level demo environment for the Lattice Platform Firmware Resiliency (PFR) system security solution. The demo board includes three main devices:

- Mach-NX LFMNX-50-5FBG484C
- ECP5™ LFE5U-85F-8BG381C (BCM)
- ECP5™ LFE5U-85F-8BG381C (PCH)
- Lattice security solution PFR demo support
- PFR system-level behavior validation
- USB connection for UART communication to PFR firmware
- Flexible expansion Raspberry Pi header
- Lattice Diamond® programming support
- Lattice Propel SDK, builder, and PFR interface support



Smart System On Module

Smart SoM is an Android based smart module community development platform. It is built on a 4G Android smart module developed on the Qualcomm QCM2290 platform. Smart SoM offers additional amazing features, which provides a more creative edge to the developers and enthusiasts in the domain of IOT.

Salient Features

- 4-lane MIPI DSI (up to 1680*720 @60fps)
- 2x ISP (13 MP + 13 MP or 25 MP) at 30 fps
- Support recording and playback of 1080P videos at 30 fps
- Support global multi network mode (LTE Cat 4)
- Integrates Android OS, Wi-Fi, Bluetooth and GNSS into one module

Applications

- Single Board Computers & POS (Point of Sale)
- Audio/Video Communication Equipment
- Media Platforms
- Industrial Mobile/Tablet community
- IOT & Sensor Integrations



4G Tracker

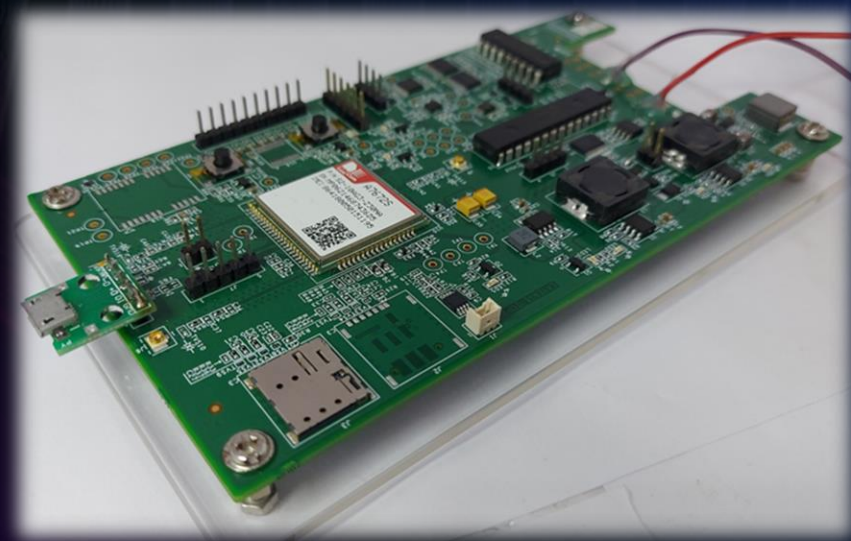
4G Tracker is a Free RTOS based smart module community development platform offered by Inevitable. It is built on a SIMCOM SIM7672x series platform. 4G Tracker offers additional amazing features, which provides a more creative edge to the developers and enthusiasts in the Automotive domain. Its major functionality is to fetch parameters of the connected device, facilitate critical on-board diagnostics, analysis and feedback via voice alerts.

Salient Features

- Support global multi network mode (LTE Cat 4)
- Integrates Threadx Free RTOS, Bluetooth and GNSS into one module
- Integrate GNSS function, supports rapid accurate positioning under different environment

Applications

- Automotive cluster
- Telematics
- Vehicle Diagnostics



LoRa Modules



- **+27dBm** / **+18dBm** Transmit Power
- -143dBm Rx Sensitivity
- LoRa WAN™ Protocol Stack
- ATSAMR35J18A (Cortex-M0) Microcontroller
- Compact form factor
- RoHS compliant
- Operating Voltage – 3.3V typical (2.5V to 3.6V)
- Operating Temperature Range – -40°C to +85°C
- Bit Rate up to 300 kbps (FSK modulation)
- Supports up to 10 GPIOs (Digital and Analog)
- Operational frequency bands – 433MHz and 868MHz



SIGBlu

The SIGBlu70/71 module offers BLE solutions for embedded applications. It conforms to the Bluetooth 5 core specification to enhance the throughput and security for the IoT applications. It also supports beacon technology to enhance the user experience for the IoT applications and enables users to control the cloud and receive data without opening the application through a smartphone.

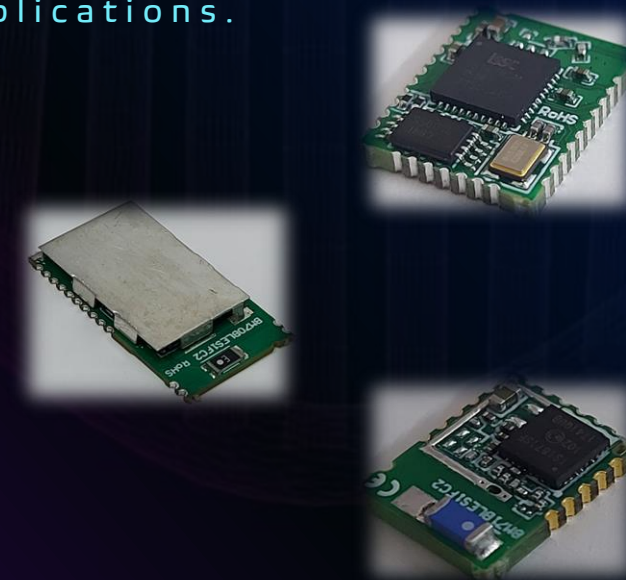
The SIGBlu70/71 module has an integrated Bluetooth stack and is available in different form factors to optimize space, cost, and RF performance. The power optimized design minimizes the current consumption and extends battery life for portable and wearable applications.

Operating Conditions

- Operating voltage range: 1.9V to 3.6V
- Operating temperature: -40°C to +85°C

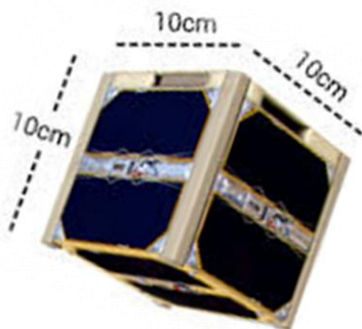
Applications

- Internet of Things (IoT), Secure Payment, Wearable Devices, Home and Security, Health and Fitness, Beacons, Industrial and Data Logger



CubeSat

BASIC	BEGINNER	EXPERT
OBC		
Communication module	Communication module	Communication module
TT&C sensors	TT&C sensors	TT&C sensors
Power modules	Power modules	Power modules
Mechanical structure		
Aluminium	Aluminium	Aluminium
Payload Electronics		
	GPS	GPS
	Temperature sensor	Temperature and Humidity sensor
	Pressure sensor	Pressure sensor
	Ambient Light sensor	Ambient Light sensor
		IMU
		UV sensor
		CO2 sensor
		Gas sensor
		TVOC (AQI) sensor



Secure Products



Android Secure Products

Inevitable Secure **Smart Phone** and **Tablet** offers the core functionalities you would expect from an Android OS with military grade security on top. The phone offers intuitive design, absolute privacy, and familiar user experience. It have End To End Encryption, Triple Password Protection, Zero attack-surface.



Particulars	Specifications
Platform	Mediatek i500
OS Version	Android 10 Customized version
Network Band	GSM:B2/B3/B5/B8 WCDMA:B1/B2/B5/B8 FDD-LTE:B1/B2/B3/B5/B7/B8/B20/B28 TDD-LTE: B38/B39/B40/B41 LTE-Advanced Cat-6
Memory	64GB+4GB
Camera	13 MP Back and 8 MP Front
Hardware Security	TPM, Hardware Tempered Detection
Software Security	Secure Boot ,Software Tempered Detection Anti-tamper wipe, Custom Recovery



Few of our Associations...



Few of our Associations...



Edge2Systems



OLOID



Road Ahead



Drone Quadcopter

Sl. No.	Specifications
1	Quad-Copter
2	Vertical Take-Off and Landing (VTOL)
3	4G Cat-4 or better, GNSS (including IRNSS)
4	Travel duration \geq 45 mins; Ceiling height $<$ 120 mts (as per MoCA restrictions) Above Ground Level
5	Obstacle detection and avoidance \sim 10m in all the directions
6	Withstand the windspeeds (head/tail/cross) up to 45kmph (12.5m/s)
7	Hovering capability, Return to base capability
8	Communication range of \sim 15Km (LOS)
9	Travel range \sim 40 Km (Onward + Return)
10	Minimum speed 30 Kmph, maximum speed \sim 90 Kmph (with full payload and in still air)
12	Total weight carrying capacity of 10kg – 12Kg (including the drone)
13	Mounts for Gimbal and Camera
14	IP67, -10°C to $+60^{\circ}\text{C}$ operating temperature range
15	100% Battery powered and capacity to be chosen to suit the above-mentioned parameters



Drone Applications

End Application / Use Case	Quad-Copter	Fixed Wing Hybrid	Remarks
Surveillance (Outdoor)		•	Depends upon the area and conditions of deployment.
Surveillance (Indoor)	•		
Security (Outdoor)		•	Depends upon the area and conditions of deployment.
Security (Indoor)	•		
Survey/Mapping		•	Depends upon the area and conditions of deployment.
Delivery	•		
Photography / Videography	•	•	Depends upon the area and conditions of deployment. Also upon the type of photography or videography to be conducted.
Search and Rescue	•		

Vision Systems Safety & Security

Our solutions are offered to protect human lives and safeguard high value assets

Our system is developed from ground up for protection of critical assets and sensitive areas



Why Inevitable?

-
- Provide indigenized platforms for multi-domain technology solutions.
 - Collaborate with innovative ecosystem partners for quicker time-to-market.
 - Mature Processes for quality deliverables.

Thank you

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