

CORPORATE OVERVIEW

ENABLING NEXT-GEN SOLUTIONS

Silicon | Systems | Software | Product Engineering

OVERVIEW



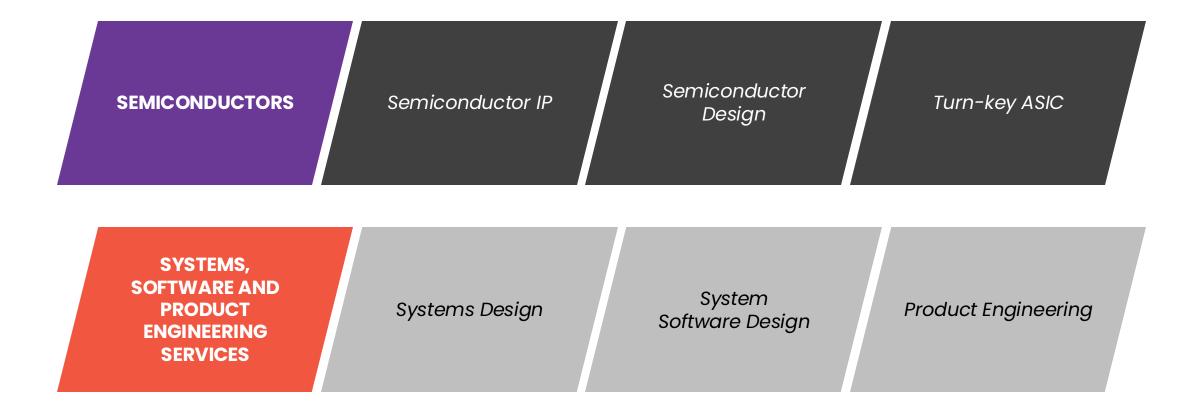
Established in **years** of Expertise.

1999, with **25+** Development Centers Across 5 locations | USA | INDIA Santa Clara, CA 💡 1300+ Employees: Ahmedabad 💡 Pune Bangalore 900+ Hyderabad (HQ) Semiconductor | 400+ Software Development **400+** Tape-outs **Global Headquarters** From the Leading Foundries Subsidiary / Branch Office

"WE ARE ONE OF THE VERSATILE ORGANIZATIONS WITH SOLUTIONS & SERVICES FOR ALMOST EVERY INDUSTRY" - CEO

OUR CAPABILITIES

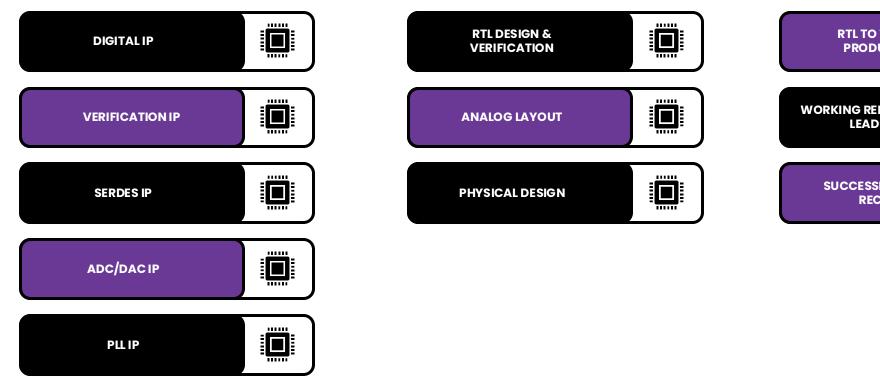


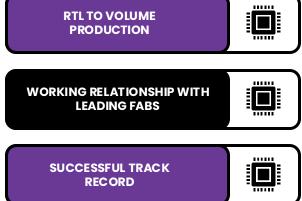


ISO 9001:2015 certification for SoC Design, Development, Assembly, Supply & Services of Semiconductors, Software, Systems











SYSTEMS, SOFTWARE AND PRODUCT ENGINEERING CAPABILITIES

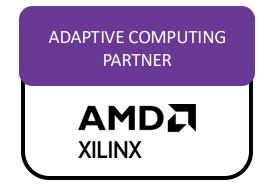
>_ **OSPORTING & BOARD HIGH SPEED PRODUCT &** >_ PLATFORM ENGINEERING **|**>_ **SUPPORT PACKAGE SYSTEM DESIGN** >_ **PLATFORM DESIGNS WITH AI ENGINEERING** >_ **ASIC DEVICE DRIVERS** FPGA, SOC & ASIC **>**_ ... **MULTIMEDIA** DFM / DFA, & EMS >_ >_ **SOFTWARE INTEGRATION ENGINEERING >_** ... PLATFORM BRING-UP & **SYSTEM ENGINEERING** >_ **SOFT WARE TESTING VALIDATION** >_ **>_** ... **SOFTWARE QUALITY ENGINEERING** MAINTENANCE/SUPPORT **DIGITAL & NETWORK ENGINEERING**

KEY PARTNERSHIPS & ALLIANCES

















OUR BUSINESS VALUE PROPOSITION

- Silicon, Systems, Software & Product Engineering under single roof
- Replicated success over 25+ years with long term customer retention
- Continuous growth in relationship with leading semiconductor firms, foundries & EDA players
- Stability, low attrition & continuous knowledge upgrade on latest tools/technology



Alignment with client business cycle



End-to-end ownership



Flexible Business Model



Collaborative Approach





SEMICONDUCTOR IP



MIXED SIGNAL IP AND RELATED SERVICES

IP

CUSTOMIZE

INTEGRATE

Mixed-Signal IP Standards Based IP

- PCIE Gen1/2/3 PHY
- SATA I/2 PHY
- XAUI PHY
- CEI-6G-SR-PHY
- SerialLite PHY & PCS
- ARM HSSTP PHY & Link
- PCIE Gen4 PHY (In Lab)

Analog IP

ADC, LVDS I/O, PLL

Customer Specific:

 Custom SerDes for automobile / ADC / other applications MosChip Technologies offers customization to other Foundries/nodes and emerging standards

Porting to other foundries

- TSMC, Global, Tower, Samsung, Intel
- 180nm, 130nm, 55nm
 40nm, 28nm, 22nm,
 16FF, 14FF, 7FF, 6FF, 4FF,
 5FF, 3FF
- Design services for customization / porting of customer's own technology

- Complete integration services of MosChip IP into customer's SOCs. In addition, provides design services in the following:
- Synthesis
- DFT
- Place & Route
- Analog/Mixed Signal Design
- Analog Layout



ANALOG IP CUSTOMIZATION SERVICES

Nodes				
TSMC SAMSUNG		GLOBAL FOUNDRY		
FinFET 3nm, 5nm, 6nm and 7nm	4nm	12LP		
12FFC	5nm	14FF		
28nm HPC, HPC+	12nm	22 FDX		
40LP, 180nm		40nm, 55nm		

CUSTOMER PROJECTS	INTERNAL PLATFORMS
DISPLAY PORT/HDMI SerDes (10G)	Long Range SerDes (16G)
Multi- Protocol SerDes (6.4G)	Short Range SerDes (10G)
DDR4, GDDR5 PHY	ARM HSSTP PHY (12.5G)
TOUCH SENSOR IMAGE SENSOR	ADC
Serial Lite SerDes (2.5G)	LVDS IO, PLL

Design Tools

Layout Tools

Other Tools

cādence°

cadence°

_Mentor



80+ Engineers

- Capable of providing Complex IP
 Porting solutions like Serdes, DDR
- Experience in working with Latest nodes in TSMC and Samsung
- Recognized TSMC Partner (TSMC DCA Partner)
- Adheres to strict IP Development

 Methodology
- Follows established CAD Flows and Methodology
- Adherence to ISO Standards,
 ISO9001:2015 Certified Company
- Professional Program
 Management and Status
 Updates



MOSCHIP SERDES IP

[Phy product standards' overview]

Name	Standards	PCS	Data Rate per Lane (Gbps)	Comments
PC le Gen 1	PCIe 1.1	PIPE	2.5	 Endpoint or Root Complex PIPE includes skip insertion, deletion PCIe power savings modes
	PCIe 1.1	PIPE	2.5	Endpoint or Root Complex PDT in alcohology deletion
PC le Gen 2	PCIe 2.1	PIPE	5.0	 PIPE includes skip insertion, deletion PCIe power savings modes Port bifurcation support
PC le Gen 3	PCIe 3.1/2.1/1.1	Partners	8.0	Endpoint or Root ComplexPCIe standard multi-lane interface
XAUI	XAUI, CX4, KX4	Customer	2.4 - 3.2 / 1.2 - 1.6	Generic backplane uses
CEI-6	CEI-6, XAUI, CX4, KX4	Customer	4.8 - 6.4 / 2.4 - 3.2 / 1.2 - 1.6	Generic backplane uses
SATA I/II/III	SATA I/II	SATA	1.5/3.0	 Advanced frequency offset (PPM) compensation for +0 / -0.5%
SATATITI	SATA III	SATA	6.0	SSC
Switchable	Multiple	Multiple	Multiple	Switchable between 2 or 3 standardsSeparate interface for each standard
ARM HSSTP	HSSTP 6.0	Aurora Link	6.25 / 12.5	ARM HSSTP PHY along with Link Layer as a single macro
PCIe Gen4	PCIe 4.0	Partners	16	Test silicon functional and in CHAR/Debug
Seriallite PHY	IEEE149.1	PCS	3.125	chip2chip, board2board, shelf2shelf or backplane
10/100/1000 Ethernet	IEEE802.3	PCS	1	AFE Block in development
USR/VSR/SR		PCS	10	Chip to Chip SerDes. In Development

MOSCHIP DIGITAL IP



USB

- Host Controller
- Device Controller
- Retimer
- Dual-Role-Device

SECURITY

- Secure Hash Algorithms (SHA1, SHA2, SHA3)
- Reed-Solomon based FEC
- Reed-Solomon based Erasure (Static & Dynamic)

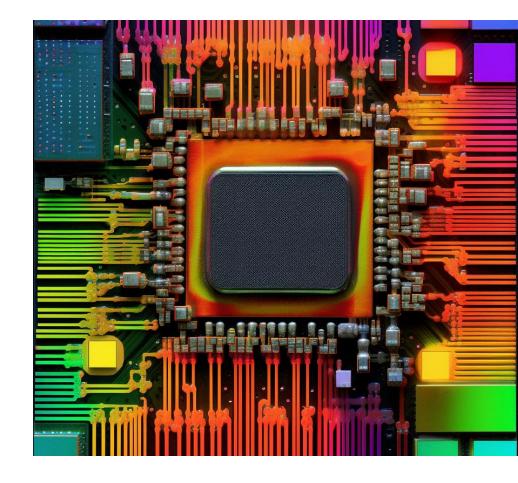
ENCRYPTION

- Advanced Encryption Standard (AES 128, AES 256)
- XTS-AES

Best in class performance

Up to 20% Better throughput

Platform Independent







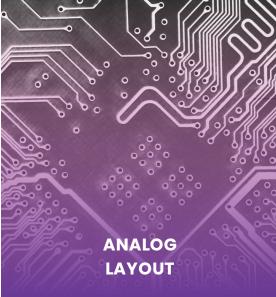
SEMICONDUCTOR DESIGN SERVICES

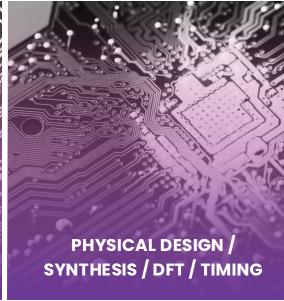


OVERVIEW OF SEMICONDUCTOR GROUP









- Achieved "first-pass silicon success" across 400+ tape-outs
- Expertise ranging from 500nm to the latest 3/5/6/7/10/14/16 nm FinFET & SOI process nodes
- Very strong RTL Design, Design Verification, Physical Design, Analog Design, and Analog Layout team with over 15 years of average experience in the senior team
- Engaged in complex chip designs extending to 100+ million gates
- Highest level of training & experience on state-of-the-art technologies
- Design Houses in Hyderabad, Bengaluru, Ahmedabad, Pune and Santa Clara, USA



900+ VLSI Engineers



400+ Tape-outs with 100% First-Pass Silicon Success



Engagement Model ODC | T&M | Turnkey





RTL DESIGN & VERIFICATION SERVICES





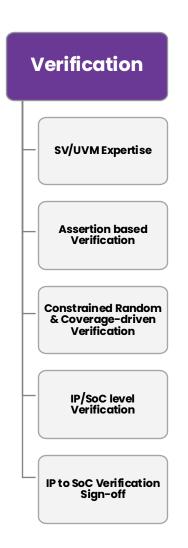


18+ AVG.EXP. OF LEADERSHIP 100+ TAPE-OUTS 200+ ENGINEERS



RTL DESIGN & VERIFICATION

RTL Design RTL Front-end Design & Integration Micro-architecture Design Synthesis & Optimization Low power and GLS IP/VIP Development, 3rd party IP/VIP& SoC integration



Turnkey Concept to Deployment IP to SoC Design & Prototyping Architecture, Coding, Testing, Release & Support **Functional** Verification



Highlights

- Digital
 IPs/Subsystem –
 GCC, and Arite core
- Mixed signaling IPs
 Tejas, Brain beats
 and Borealis
- Turnkey project Matrix SoC



TECHNOLOGY EXPERTISE

IP Interfaces / Protocols



Verification Tools

Questa | Incisive
VCS | Jasper
QuestaFormal
Xcellium
Simvision
Visualizer
Codelink Verdi
Formality
FormalPro
QuestaSLEC
Conformal

Languages & Methodology



Scripts

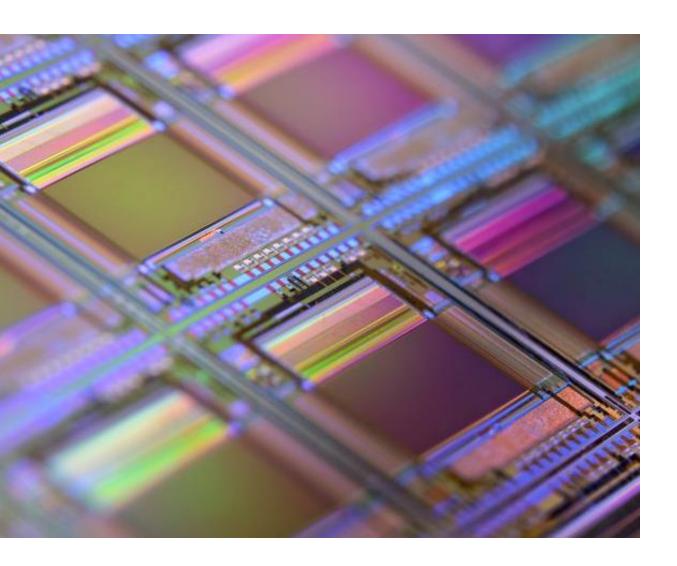


Prototype Platforms



MIPI | DP





ANALOG LAYOUT SERVICES







18+ AVG.EXP. OF LEADERSHIP 150+ TAPE-OUTS 250+ ENGINEERS



ANALOG LAYOUT SERVICES

Technologies

- TSMC N3E | N3P | 5FF | 6FF | 7FF | 12FF | 16FF
- TSMC 22nm, 28nm, 180nm
- SAMSUNG 3nm, 4nm, 5nm, 7nm
- GF 14nm, 12nm, 22nm, 40nm, 55nm, 65nm

Expertise

- High Speed Serdes up to 112Gbps Very Short Reach or Extra Short Reach Serdes of 112Gbps data rate, PCle6 Gen Protocols
- Power Management Layouts LDO, BGR, SMPS, Bias blocks, Buck Boost converters, etc.
- I/O cells GPIOs, LVDS, DDR Ios and GDDR IOs
- Data Converters ADC, DAC with different architectures (Pipeline, SAR ADC, Flash ADC, Current steering DAC and R-2R ladder DAC)
- RF Layouts
- Memory Layouts Register files, Dense RAM, Cache Memory, CAM Memory
- Clock Generators Phase Locked Loop, Delay Locked Loop

Unveiling

- Ready to Tape-out the Chip in 3nm
- TSMC 22nm Ultra Low Leakage (ULL) AloT Edge Al SoC for NTU, ASTAR & EMass.ai [RTL-Silicon]

Highlights

- SerDes Up-to 112GBPS
- SerDes PCLe5 & PCLe4 with Multiprotocol support
- SerDes Up-to 112GBPS

Tools

cādence°

Mentor Graphics

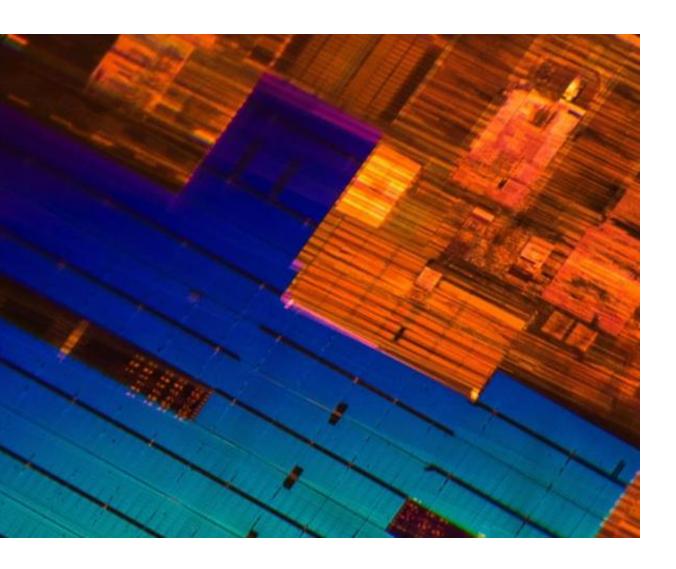
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ANALOG LAYOUT - IP DETAILS

PRODUCT	TECHNOLOGY	SPECIFICATION	APPLICATION
XSR SerDes	TSMC N5	112 Gbps	Networking/Servers
PCIe Gen6	TSMC N5	64 Gbps	Networking / Servers
DDRIO	TSMC N3	4.8 Gbps - 5.6 Gbps	Memory Applications
DDRIO	TSMC 5G	4.8 Gbps - 5.6 Gbps	Memory Applications
DDRIO	Samsung 5nm	4.8 Gbps - 5.6 Gbps	Memory Applications
Graphical DDR	TSMC 12FFC	12 Gbps	Memory Applications
PMU / PMW Controllers	TSMC180		Laptop / Servers
High Precision Oscillators	TSMC N55	Speed of 5Ghz	Aerospace, Defense, Automotive, Electronics, Mobile & IoT
Clock Generator	TSMC N3	Speed of 5Ghz	Processors
Smart Electrical Meter IC	TSMC 180	45-55Hz, 1 Phase / 3 Phase	Electric Measuring Applications





PHYSICAL DESIGN SERVICES







20+ AVG.EXP. OF LEADERSHIP 150+ TAPE-OUTS 400+ ENGINEERS



PHYSICAL DESIGN SERVICES

EXPERTISE

- Block-Level Place & route
- Timing Closure & Static Timing Analysis
- Multiple Domain Clock-Tree Synthesis
- Physical Verification (DRC/ERC/LVS)
- EM-IR Drop Analysis, SI Closure
- Chip-Integration
- Logic Synthesis & Physical Synthesis
- Low Power Expertise Clock Gating, Multi-Vt, Voltage Islands, Power Gating

FLIP-CHIP EXPERTISE

- O-ring design
- Bump Assignment work with Package team and Finalize
- Customer Designed Bump/RDL integration to chip level
- RDL Design and Routing
- Help Customers to decide Metal Stack
- Bumps and Package

Leadership History



Tools

cādence°
SIEMENS
SYNOPSYS°

Mentor

Foundries



Highlights

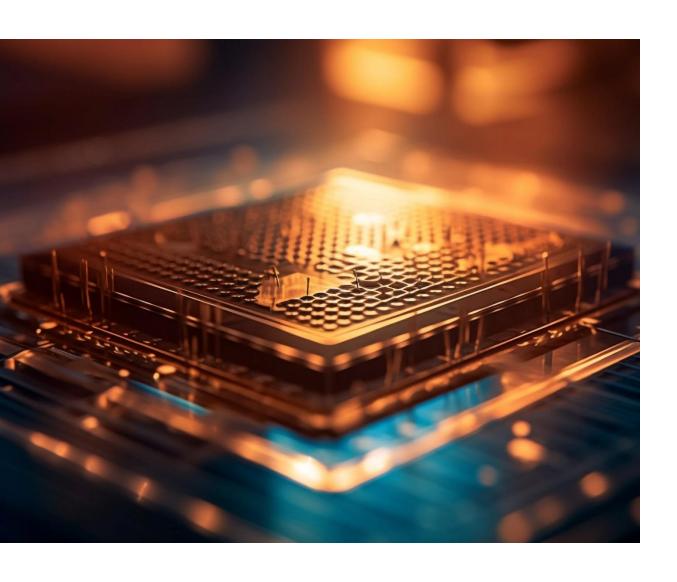
- Full-Chip Integration | Floor-Plan | Analog Integration | IP-Integration
- Full-Chip Pin-Assignment & Budgeting | Power-Grid Design & Analysis
- Clock-Design | timing Closure | Physical Verification & EM-IR
- DDR-Integration using new generation timing libraries (LVF)



SUMMARY OF PD PROJECTS

PROCESS	APPLICATION	DESIGN FEATURES	TEAM SIZE PD ENGINEERS	FLOW	DURATION MONTHS
TSMC 5nm	Client SoC	~ 75M gates, ~ 30 Blocks	15	Customer	12
TSMC 6nm	Client SoC	~ 190M gates, ~ 66 Blocks	35	Customer	12
TSMC 6nm	Client SoC	~ 70M gates, 20 Blocks	15	Customer	7
TSMC 6nm	GPU	~ 365M gates, ~ 100 Blocks	50	Customer	11
TSMC 7nm	GPU	~ 275Mgates, ~ 80 Blocks	44	Customer	12
TSMC 16nmFFP	Video Game	~ 22M gates, 25 Blocks	10	Customer	10
GF 14LLP	Graphics	~ 40M gates, 30 blocks	11	Customer	12
TSMC 28nm HPC+	Networking	~ 103M gates, 14 Blocks	12	MosChip	15
TSMC 40nm G	Networking	~ 12M gates, 8 Blocks	8	MosChip	7
GF 14nm HPP	Ethernet	~ 28M gates, 9 Blocks	6	MosChip	7
TSMC 28nm HPC+	GSP	~ 93M gates, 3 (Unique) Blocks	6	MosChip	12
Samsung 14nmLPP	GSP	~ 120M gates, 3 (Unique) Blocks	6	MosChip	12
TSMC 22nm ULL	Edge SoC	~ 2.2M gates, Flat Chip	3	MosChip	4





SEMICONDUCTOR TURNKEY ASIC

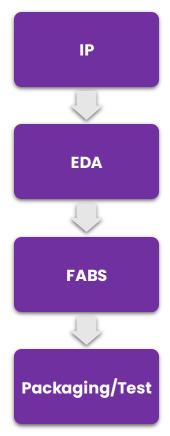
[RTL TO VOLUME PRODUCTION AND BRING-UP]



MICROCHIP

TURNKEY ASIC ECOSYSTEM PARTNERS

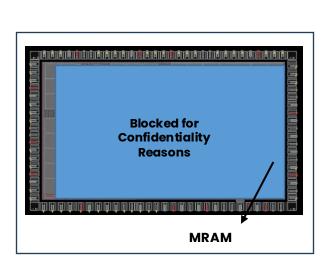
RTL to Volume Production

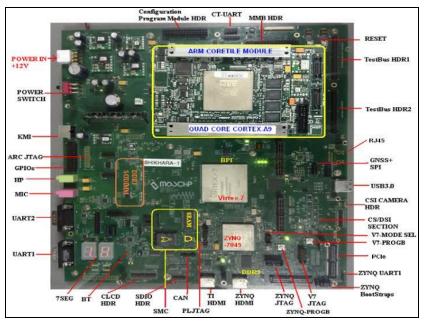


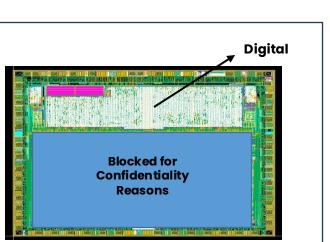


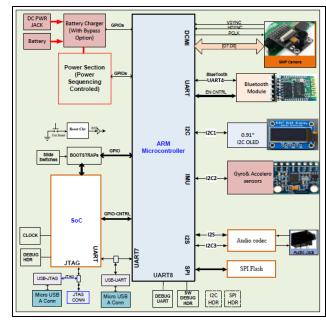
TURNKEY ASIC

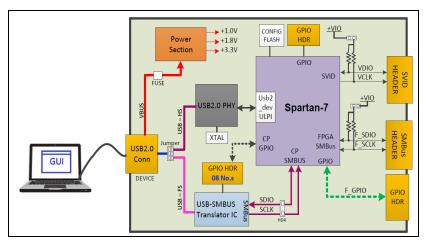
- Turnkey ASIC Edge SoC
- Turnkey Mixed Signal ASIC POWER IC
- Edge SoC Reference Platform & Bring-up
- Power IC Debug Platform Development
- Turnkey ASIC Matrix (Digital SoC)
- Matrix FPGA Platform Pre-Silicon Validation
- Matrix Reference Platform & BSP



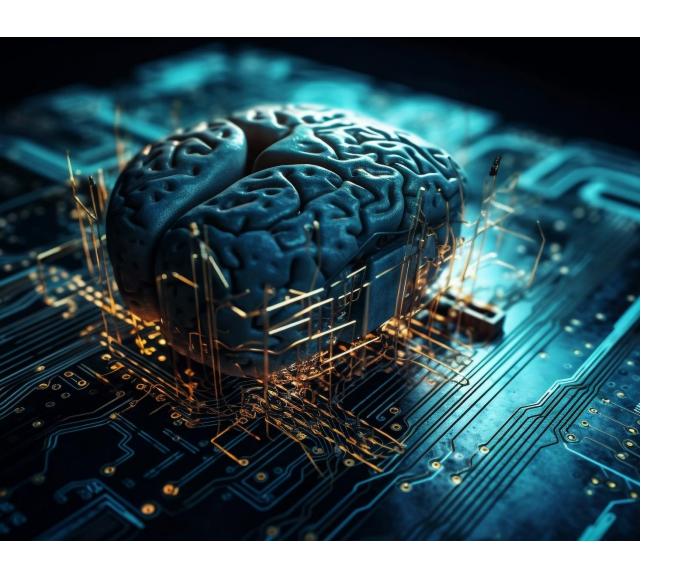








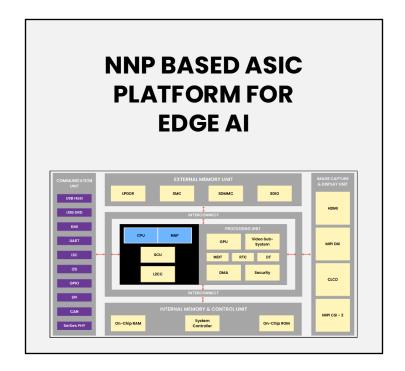




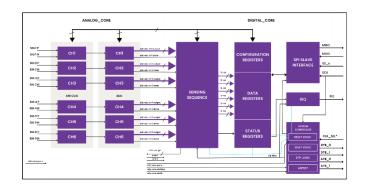
MOSCHIP ASIC PLATFORMS

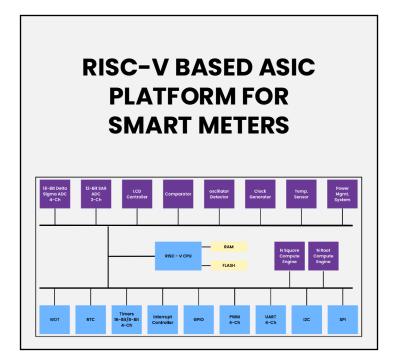






LOW FREQUENCY MONITORING ASIC PLATFORM FOR HEALTHCARE











SYSTEMS, SOFTWARE & PRODUCT ENGINEERING SERVICES



OVERVIEW OF EMBEDDED GROUP





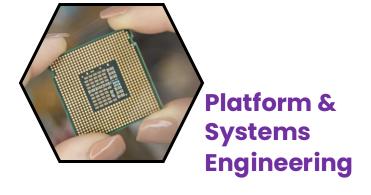


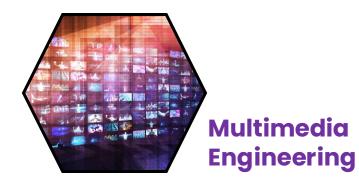
- · 23+ years of experience in Embedded Systems, Software and Product Engineering
- · Enabling end-to-end solutions from concept to design and sustainability
- Skilled at building miniaturized, low-energy, high-accuracy secure portable solutions
- Empowering digital and product transformation for domains involving Medical, Storage, Computing, Multimedia, Automotive, Consumer, Defense and more
- Embedded expertise in Video, Audio, ML, and AI solution development along with Edge and Cloud deployment





















Engineering



PLATFORM & SYSTEMS ENGINEERING

FPGA DESIGN	EMBEDDED SYSTEMS, SOFTWARE & PRODUCT DESIGN
 RTL Front-End Design & Integration FPGA Software & Systems Bring-up FPGA Acceleration Solutions Interface & IP Integration Reference Design 	 Platform Enablement Firmware & Driver Development BSP & Board Bring-up PCB Layout, OS Porting & Bootloader Optimization Middleware Integration Product Re-Engineering & Sustenance Turn-key solutions with System/Product Design and Software Development System validation, feature & benchmark testing Customization, Maintenance, and Support Formfactor Designs for Custom or COTS Enclosures









PLATFORM & SYSTEMS ENGINEERING

SECURITY	COMPLEX/HIGH SPEED SYSTEMS DESIGN
 Secure Platform Root-of- Trust (PRoT) Fuzz & Penetration Testing Edge to Cloud Security Device & Data Security Lifecycle Management Identity & Access Management 	 System Architecture / Schematic Design SI / PI / Thermal Sims System Integration & Software Testing Design updates with Version Control, Prototyping and Manufacturing







AI ENGINEERING



COMPUTER VISION	ML LIFECYCLE MANAGEMENT	COGNITIVE COMPUTING	AI/FPGA ACCELERATION SOLUTIONS
 Machine & Computer Vision Algorithms 	 MLOps - Automated ML Pipeline Deployment 	 Deep Learning & Neural Networks 	Scene Detection & Text AnalyticsPredictive Analytics
 Object Detection, Identification & Visual Perception 	 Model Designing, Optimization, Testing & Porting 	AI/ML on Edge & CloudML Application Acceleration	 Audio Analytics & Key- phrase Detection
Image Capture & OptimizationVision Analytics & Processing	 Inference Engines & Metrics ML Transfer Learning Framework 	Cross Platform Porting & Integration	Face RecognitionML Reference Designs & POC
Optical Character Recognition	Data Augmentation & Annotation	 Natural Language Processing (NLP) 	

Al Tools & Frameworks



Architectures

VGGNet	AlexNet
Inception V3	SqueezeNet
SSD	YOLO
MobileNet v1/v2	ResNet

MULTIMEDIA ENGINEERING



AUDIO SOLUTIONS	VIDEO SOLUTIONS	EMBEDDED & MULTIMEDIA SYSTEMS	CAMERA ENABLED SOLUTIONS	IMMERSIVE SOLUTIONS
 Audio Codec Engineering Audio Command Detection Audio Algorithm Development ALSA Driver Development 	 Video Codec Engineering Surveillance & DVR Video Analysis & Validation VoD & Media Streaming Image Stitching 	 Multimedia Framework Integration Multimedia Systems & SDK Development Android Multimedia & HAL Development OpenVX Acceleration Media Infotainment Systems 	 Smart Camera Applications Firmware & Driver Development Image Signal Processing (ISP) Camera Framework Integration 	 AR/VR application development VR gadget feature development VR streaming on Wi-Fi Open Standard based VR/AR VR on Cloud

Audio & Speech Codecs



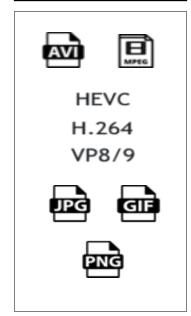


WMA



AMR-NB/WB **QCELP EVRC**

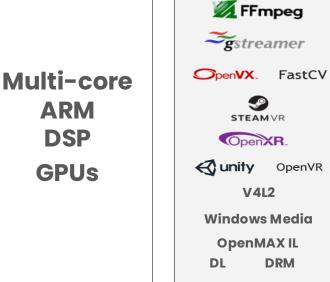
Video& Image Codecs



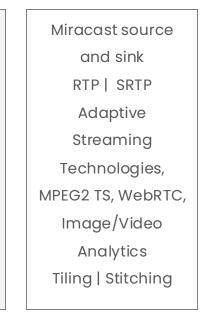
Platforms



Architectures



Frameworks



Streaming & Screen-Casting

QUALITY ENGINEERING



QUALITY ASSURANCE & CERTIFICATION, COMPLIANCE & DEVICE & EMBEDDED TESTING DEVOPS & TEST AUTOMATION ML TESTING PRODUCT TESTING CONSULTING · Multimedia, Audio/Video · Performance & Dataset & Feature Validation Continuous FuSa - ISO 26262 · Functional Testing Integration, Deployment & Model Validation & Performance AUTOSAR & MISRA-C Testing OpenVX Vision Library Embedded System Sensor Integration & Benchmarking Testing Interoperability Device to Cloud Model Parameters Traceability Conformance & Integration Testing Tools/Frameworks Test Tool Development Peripherals & Test Automation · ML Library Integration Testing Embedded Neural Network Connectivity testing Assessment & Integration Network Interface Card Test Automation Connected App/Edge **Application Testing** Frameworks Validation Support • CNN Compiler Validation · Software Toolchain Testing • Feasibility Analysis Testing Automation Scripts Test Lab Setup Advisory QA Farms

Automation Frameworks



Performance/Load Testing

Version Control

Networking

In-House QA Tool









TestNG



Robot Framework

Test Management











PERFORCE



NRF

SNIFFER



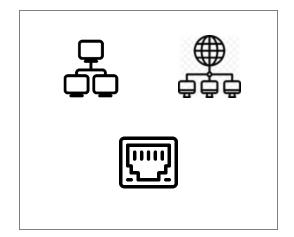
STAF





WIRED	WIRELESS
Network Protocol & App Development	Wireless Solutions (Wi-Fi, BLE, RF)
 Network Stack & Performance Optimization 	Customer Premise Equipment
Network Test Automation	WLAN drivers
Network Module Integration	Wi-Fi co-existence
Software Defined Networking	

Wired



Wireless



DIGITAL ENGINEERING



ЮТ	MOBILITY	CLOUD
IoT Device Connectivity	Mobile App Development	Cloud Migration
Gateway Integration & Management	UX Design	 Cloud Design & Architecture
Digital Twin	 Mobile Automation Framework 	Cloud Service Integration
IoT Device Lifecycle Management		
Gateway & Cloud Security		

Connectivity



Web/ Mobile Applications



Cloud





SUMMARY OF EMBEDDED PROJECTS

Application	Embedded Service
Home Automation	Firmware development of Wi-Fi module
Health Monitoring	Firmware development of Wi-Fi & BLE MCU
Autonomous Driving	ECU software development FuSA (ISO26262), MISRA-C Compliance
Multimedia	GStreamer plugins development & porting
Multimedia	DSP based firmware development, audio codecs driver development
AIML	Data annotation, algorithm training, deployment Computer vision, NLP, OCR, NLP
Multimedia	ALSA compliant Linux kernel audio driver, Audio firmware feature enhancement
Camera	Profile & optimize low level u-boot code, A/V subsystem activation at boot-up, design & develop kernel wrapper module
Inertial Measurement Unit (IMU)	STM firmware development with peripherals like I2C, SPI, USB, etc.
Wireless	BT-Wi-Fi-LTE Co-existence IP firmware development & validation





THANK YOU

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