MOBILE ROBOTICS SOLUTIONS:

(SHORT VERSION –ASK ABOUT ADDITIONAL SOLUTIONS)

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SECURE CONNECTIONS FOR A SMARTER WORLD

PUBLIC

SYSTEMS BLOCK DIAGRAM: MOBILE ROBOTICS

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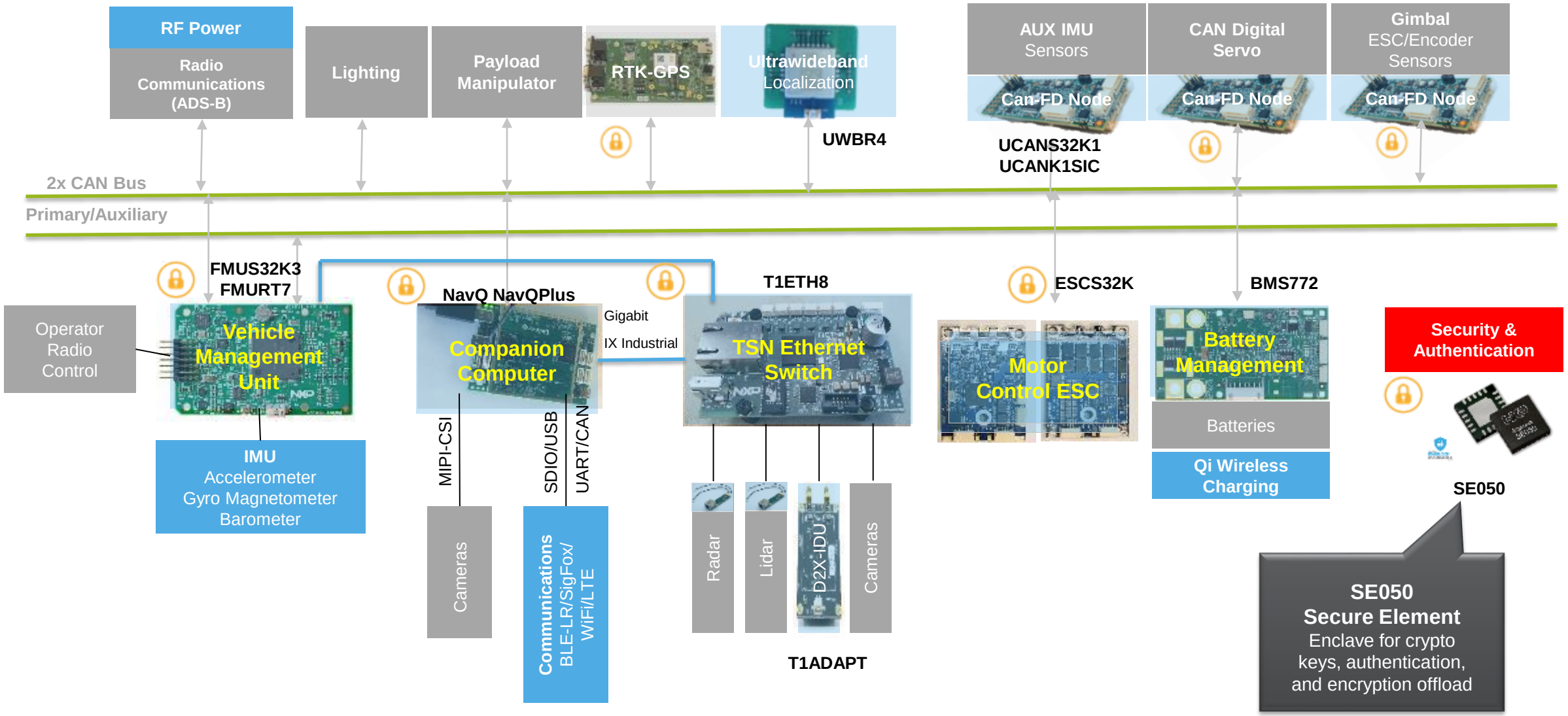
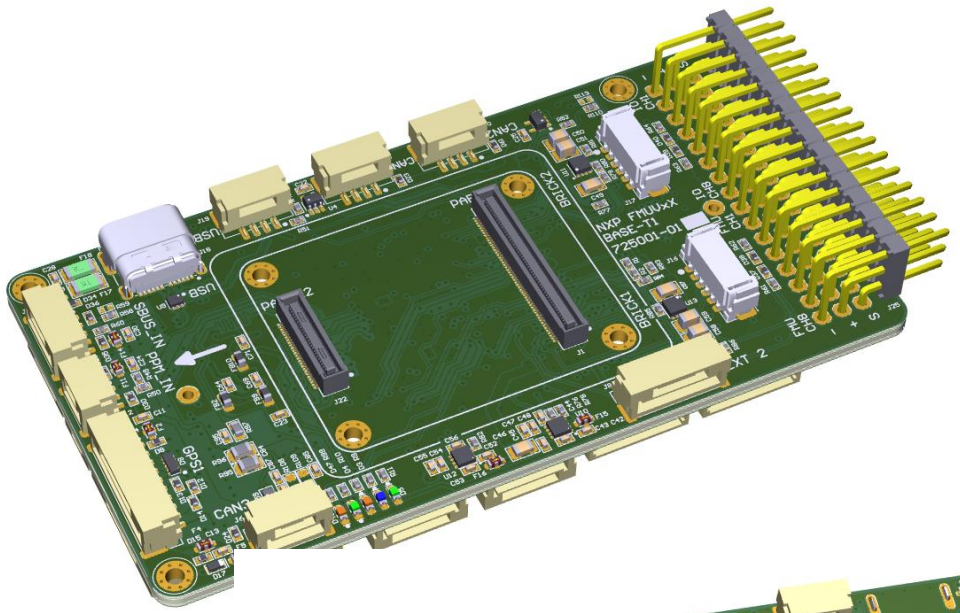
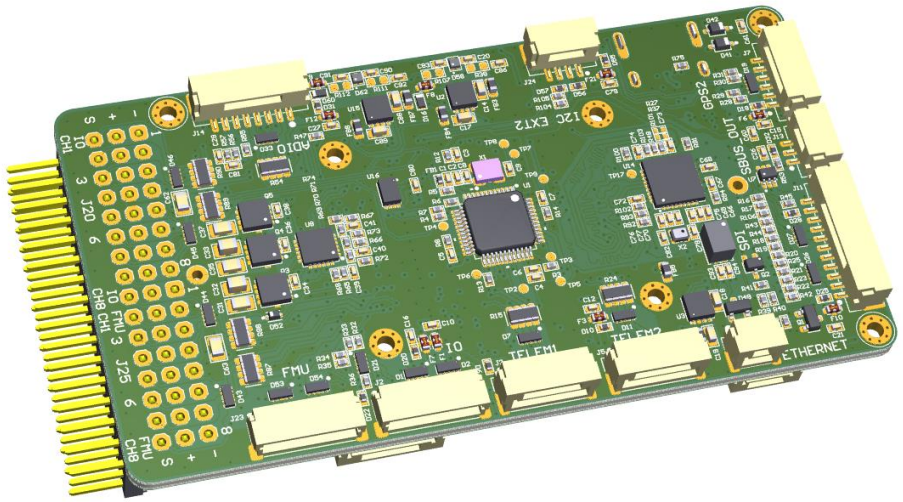
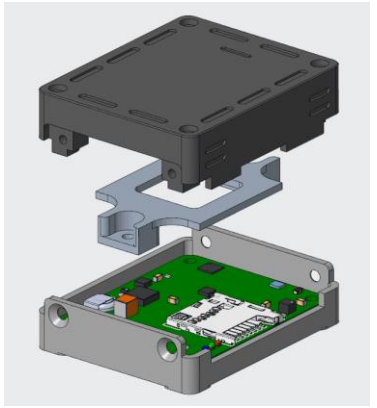


NEXT GENERATION REAL TIME VEHICLE MANAGEMENT UNIT





- GHz dual core MCU
- T1 Auto Ethernet
- CAN-FD
- IMUs



- NuttX
- PX4/NuttX
- Zephyr
- Cognipilot

MR-T1ETH8

8Port 100base-T1 Ethernet switch

- 100BaseT1 “two wire” ethernet switch application reference design*
  - (6x) 100Base-T1 Two wire Ethernet
  - (1x) 100Base-TX Ethernet w/ traditional RJ45
  - (1x) 1000base-TX Gigabit w/ IX industrial connector

– NXP parts

- SJA1110 10 port ethernet switch IC supporting TSN
- VR5510 automotive PMIC
- SE050 Secure Element with NFC interface

- Small 75x50mm board

Available on NXP.com

T1-ADAPTER

RDDRONE-BMS772/BMS771
BATTERY MANAGEMENT BOARD

- Battery management system with CAN-FD and SMBUS (i2c)
- Flexible - MCU oversight of functions
- Multiple chemistries supported, active cell balancing
- 6 cell and 14 cell version
- Automotive grade components
- Secure element based security, identity, certificates

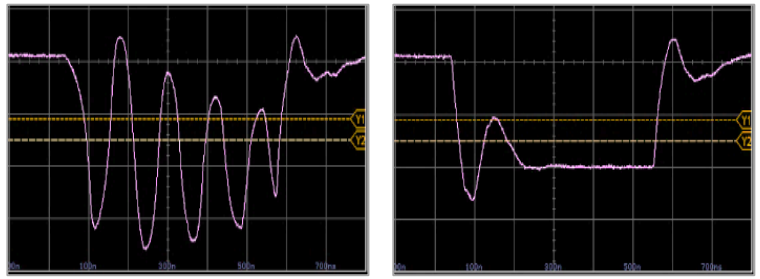
- Standalone smartbattery, NFC for status/diagnostic
- Software: NuttX RTOS + BMS libraries/applications

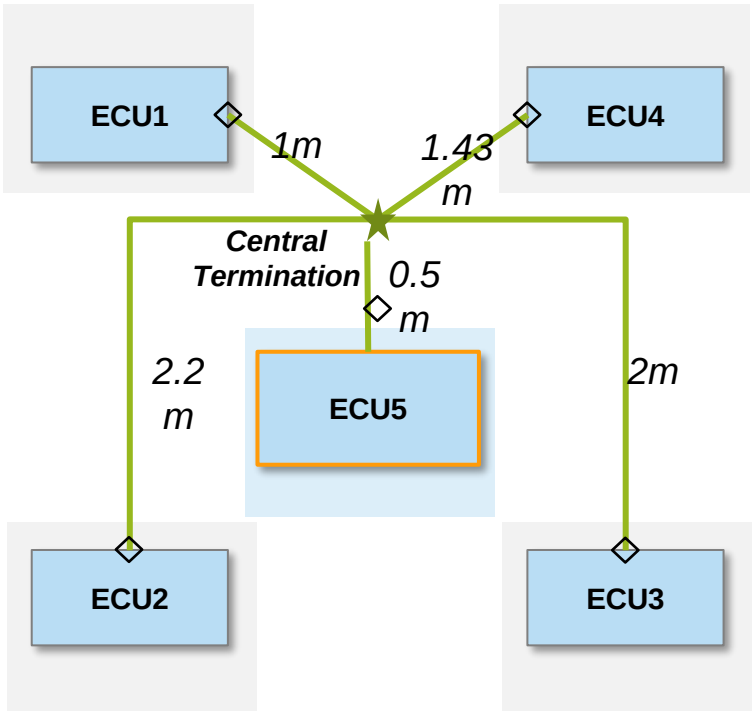
UCANS32K1SIC
UAVCAN NODE BOARD

- Cost effective development boards for CAN-FD based sensor and actuator development
- Automotive S32K1 MCU
- Edgelock Secure Element with NFC
- PX4/NuttX RTOS or bare metal

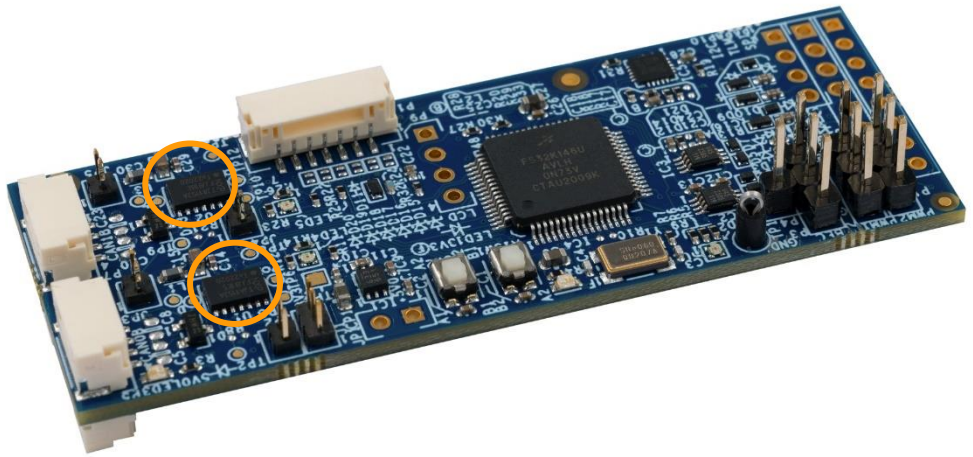
UCANS32K1SIC
Signal Improvement CAN Phy

- SIC Phy enables stubs and central termination if desired.





UCANS32K1SCT (KIT-UCANS32K1SCT)



UCANS32K1SCT
SECURE CAN PHY

UAVCAN NODE BOARD - SECURE

Hardware based detect and contain security incidents:

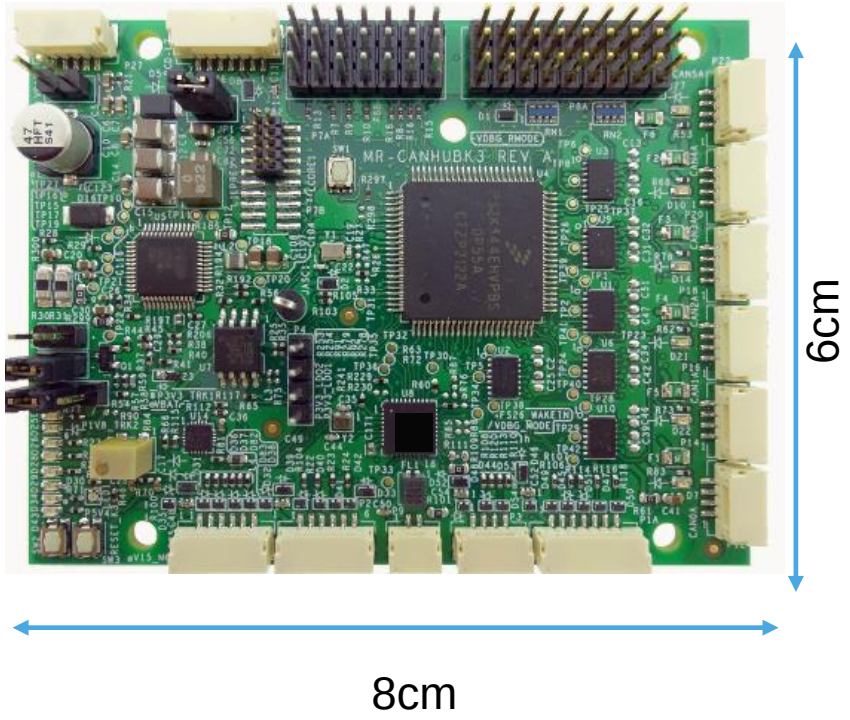
1. Local node bus flooding
2. CAN TX messages sent from compromised MCU on this node
3. CAN RX messages which should only be associated with this node
4. Tampered messages (Bus Bit-level tampering)

MR-CANHUBK3 APPLICATION BUILT FOR MOBILE ROBOTICS

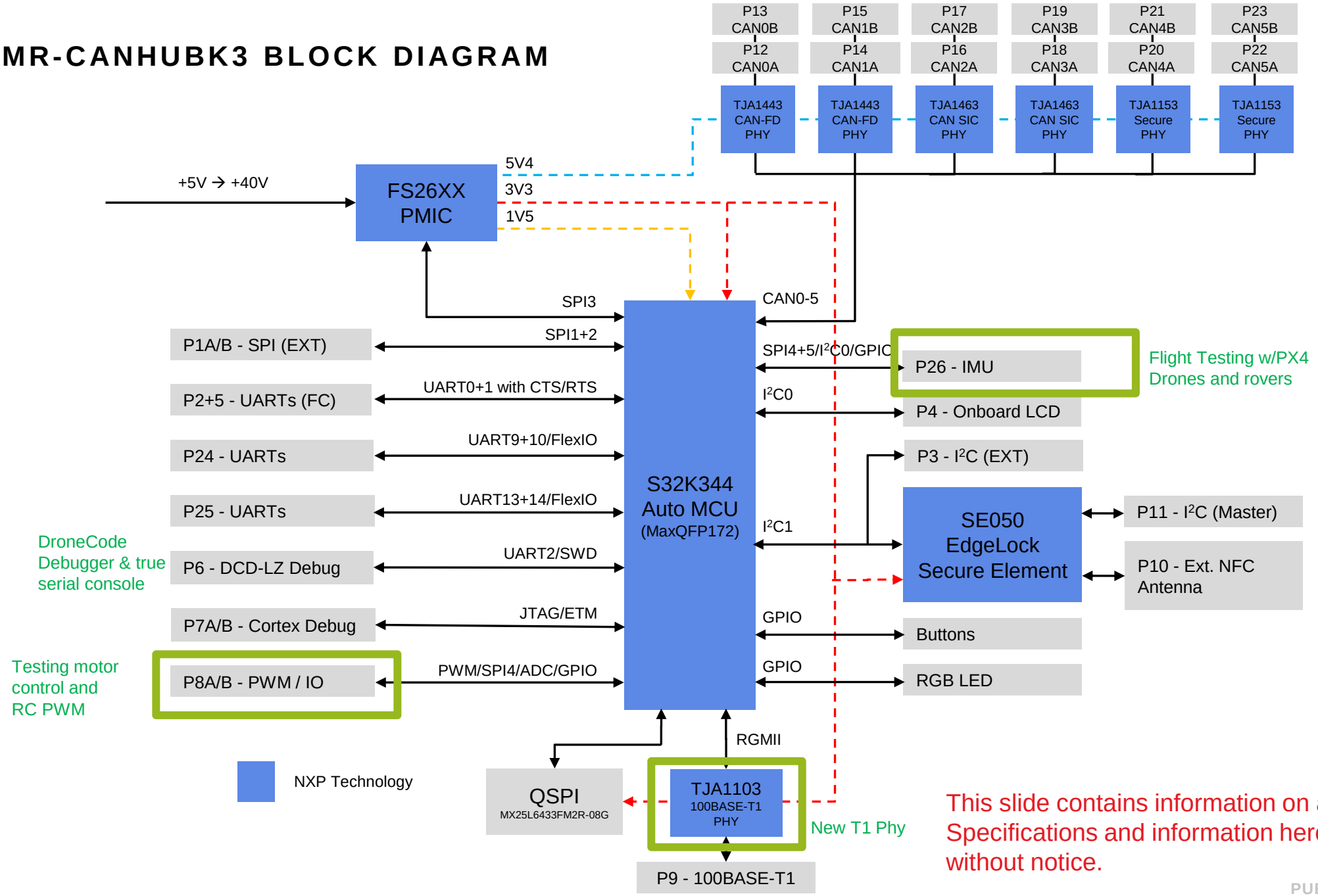
S32K344 Automotive MCU features:

- Dual lockstep M7@160Mhz package, ASIL-D capable
  - Alternatively dual independent cores or 3 cores possible
- Functional Safety PMIC

- 6 CAN transceivers (CAN-FD, SIC, Secure)
- 100BASE-T1 2-wire Automotive ethernet
- UART, I2C, SPI
- IMU connector
- Edgelock Secure Element with NFC



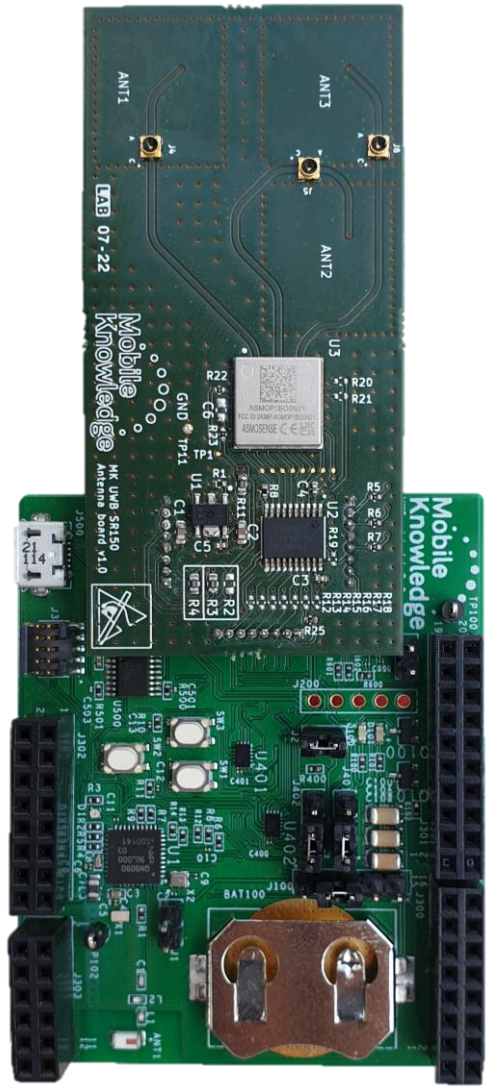
MR-CANHUBK3 BLOCK DIAGRAM



Test/Compare all latest Standard, Signal Improvement and Secure CAN-FD PHYs

This slide contains information on a preproduction product. Specifications and information herein are subject to change without notice.

ULTRAWIDEBAND, GPS DENIED LOCALIZATION



- **SR040**: Trimension™ SR040
- **SR150**: Trimension™ SR150 w/Angle of arrival (Dual antenna)

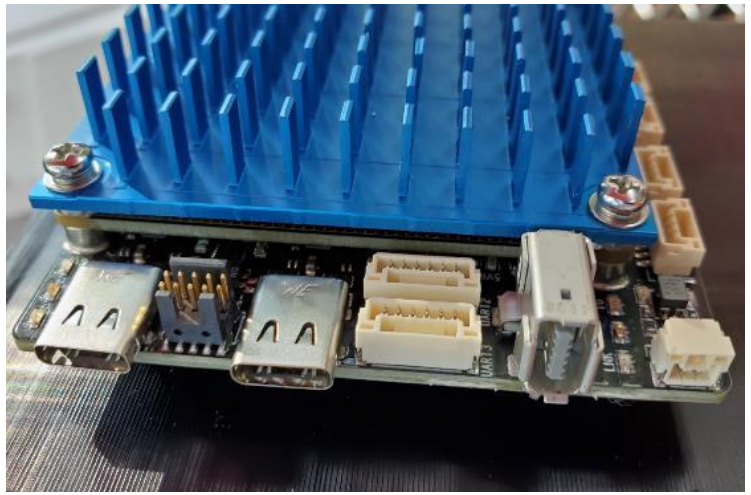
- EdgeLock® SE051W : IoT Secure Element for secure UWB ranging

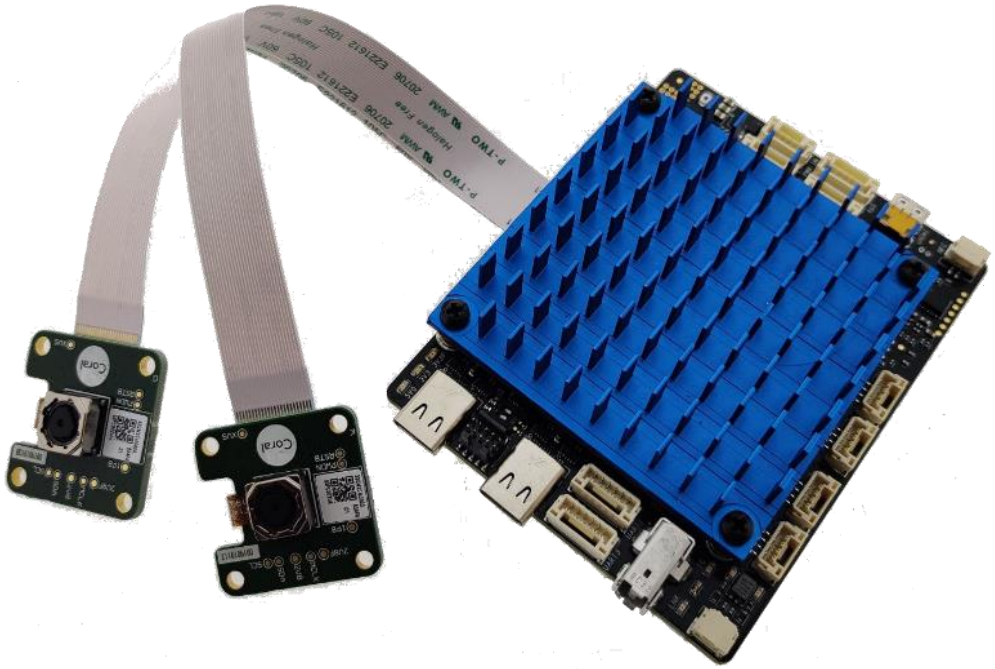
- 3D Angle of Arrival (AoA) capable

- RTOS and Linux SW Solution for IoT integration
- FiRa compliant software stack
- IEEE 802.15.4z compatible

- 10cm ultra low power accuracy, <10cm with additional signal processing.

NAVQPLUS MISSION COMPUTER: I.MX 8M PLUS



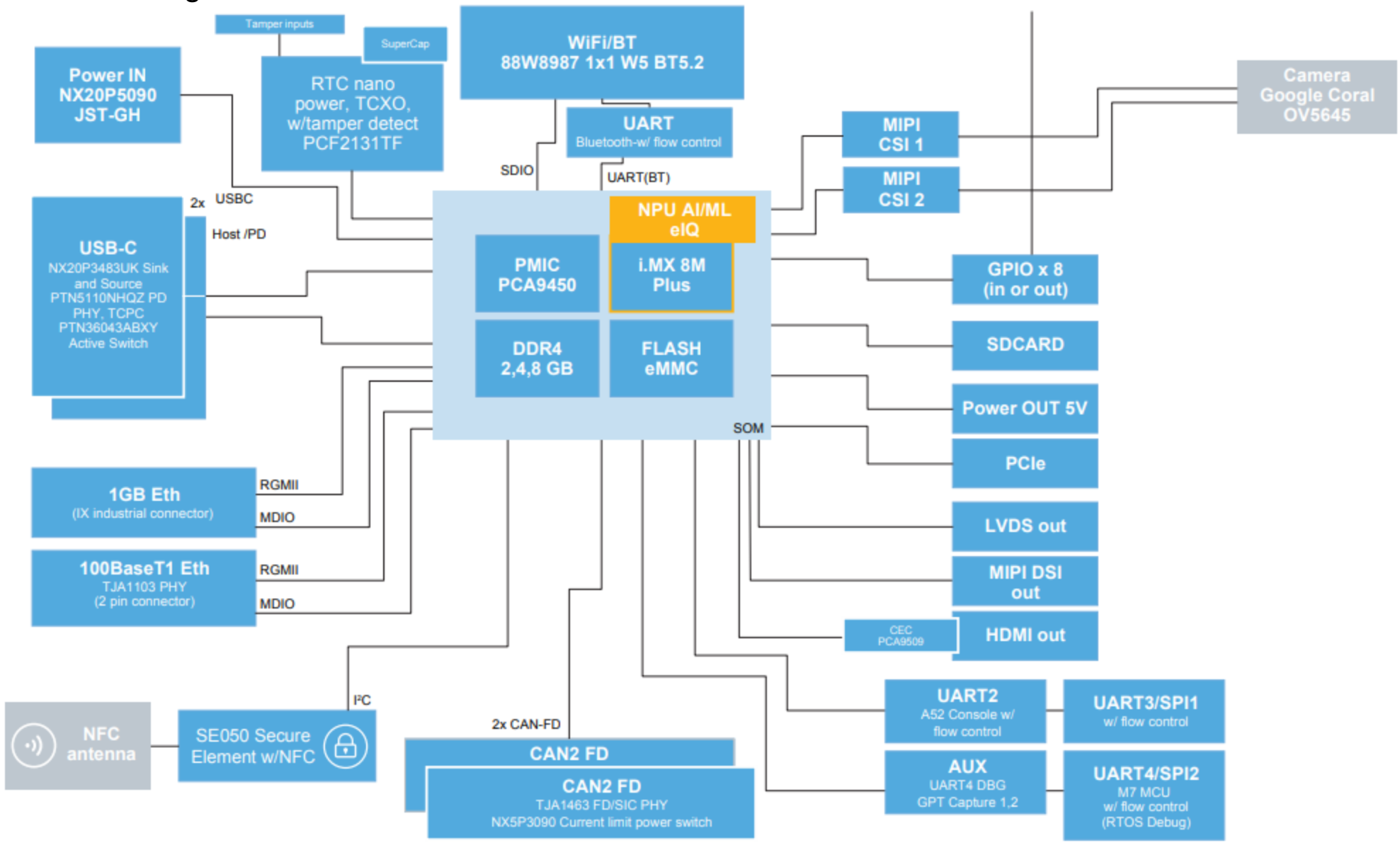


- Common SOM with i.MX 8M Plus EVK, with customized carrier board
- AI/ML **NPU accelerator,** eIQ ML Software w/TFLite, ArmNN, ONNX
- **Yocto** Linux + **Ubuntu POC*** and **ROS2** enablement.

- Vision – Dual MIPI camera w/ ISPs, H.265 hardware codecs
- WiFi 5 / BTLE 5.0
- 100Base-T1 “2-Wire” Automotive Ethernet
- 1000Base-TX Ethernet on IX industrial connector (mates to MRT1ETH8)
- 2x USB-C with up to 20V power input, Ethernet Gadget mode.
- External 20V power input

- SE050 EdgeLock secure element with NFC interface
- RTC with tamper timestamping
- PCIe expansion
- HDMI and LCD display (MIPI-DSI,LVDS,HDMI (w/CEC)

NavQPlus Block Diagram



MR COMPATIBLE COMPONENTS

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P/N	Description	Notes
KIT-HGDRONEK66	HoverGames Drone complete development KIt	LiPo Battery and Telemetry purchased separately
HGD-TELEM433/ HGD-TELEM915	Telemetry radio for HoveGames Drone or FMUs	Choose 433Mhz (EU) or 915Mhz (Americas)
RDDRONE-FMUK66 /L FMURT7 (new w/i.mxRT1176)	FMU (Flight/Vehicle management Unit) K66 MCU	w/ pwr mod, GPS, Debugger, SDCARD, USB-UART cable.
RDDRONE-IOT	Rapid IOT module adapter board	With CAN and 2x click modules. VSCP.org
SLN-IOT-RPK	Rapid IOT module	*limited PX4 support, MAVlink project available
8MMNAVQ	**NavQ** i.MX 8M Mini Mission Computer	Yocto, Ubuntu, ROS/ROS2
8MPNAVQ	**NavQPlus** i.MX 8M Plus Mission computer with 2.3TOPS AI accelerator	Yocto, Ubuntu, eIQ, ROS/ROS2. Dual CSI Camera, Triple Display, Dual CAN, Dual Ethernet (incl T1)
MR-BUGGY3-KIT	RC car robot use in NXP-CUP Car	*DroneCode PX4, being updated
KIT-UCANS32K146 (UCANS32K146)	CAN Node adapter board kit or individual units.	NuttX RTOS and PX4 Software 2x CAN-FD. Kit includes 2x units and Debugger Supports UAVCANv1 development
UCANS32KSIC UCANS32KSCT	"SIC" = Signal Improvement CAN-FD PHYs "SCT" = w/Hardware security CAN-FD PHYs	NuttX, BareMetal
RDDRONE-BMS772 / 771	BMS Battery Management System for Mobile Robotics	Auto components NuttX RTOS, UAVCANv1, SMBUS,
RDDRONE-T1ADAPT	100BaseT1 "Two Wire" Automotive Ethernet adapter	RJ45 <-> 2pin JST GH 100BaseT1. 5V/USB power
RDDRONE-T1ETH8	100BaseT1 "Two Wire" 8 port Automotive Ethernet switch	RJ45, IX industrial <-> 6x 2pin JST GH.
FMUMRT1062/1176 + VXX carrier board	FMU (Flight/Vehicle management Unit) i.MX RT MCU	(Available Q4 2023) NuttX, Zephyr RTOS
MR-CANHUBK344	K3 CAN Hub. S32K3, 6x CAN-FD, T1 Ethernet, Motor control	NuttX, Zephyr RTOS

Third party

MOBILE ROBOTICS SOLUTIONS

- Leverage reference designs such as
  - BMS
  - T1 Ethernet
  - UAVCAN and CAN-FD development
  - Distributed architecture enablement
- NavQPlus – with AI /ML, Ubuntu, ROS2 and simulation
- Get a HoverGames reference drone or Buggy3 as a learning platform
- In addition to this enablement, there is much more applicable silicon solutions in Automotive and Industrial. Happy to discuss your needs
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FOR A SMARTER WORLD