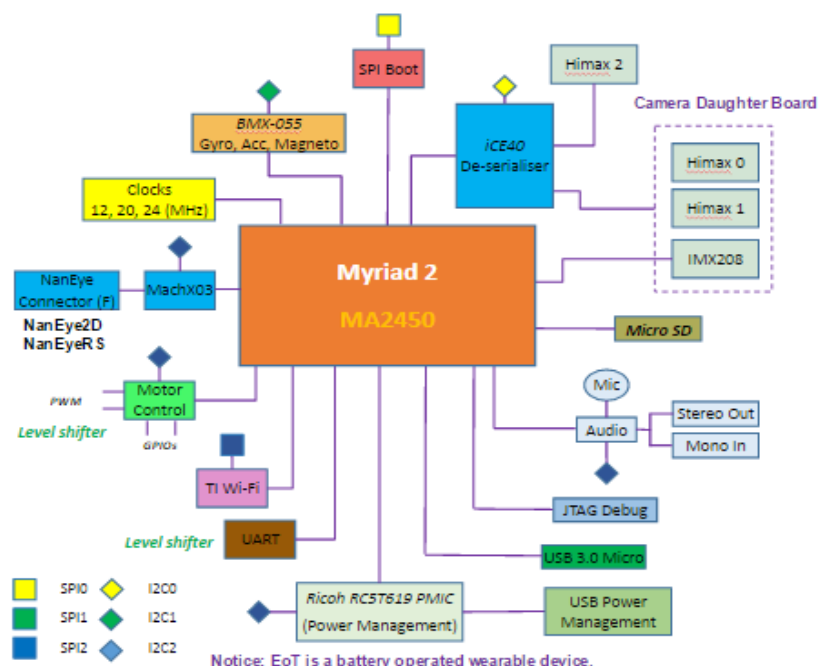


# EoT Module

## Introduction

The EoT<sup>1</sup> (Eyes of Things) form-factor device is a custom-designed 8-layer high density PCB, optimised for low cost, size and power efficiency. All processing and control is performed by the low-power Myriad2 MA2450 VPU. The system supports always-on vision processing using a range of low-power visual sensors including AMS International AG/Awaiba NanEye2D (250x250 pixel @60FPS ~5mW) and NanEyeRS (680x680 pixel @50FPS ~13mW), Himax HM01B0 (320x320 pixel @30FPS <2mW; 160x120 pixel @30FPS 1.1mW) along with the Sony MIPI IMX208 high resolution sensor (1080p 60FPS).

Additional peripherals such as a tri-axial gyroscope, tri-axial accelerometer, magnetometer, and microphone enable a progressive activation approach for the processing of ‘interesting’ events. Based on the sensor data and the information extracted from visual processing and neural inference, decisions coupled with relevant metadata can be communicated via the integrated low-power Wi-Fi module to external devices or to the cloud. In personal assistant use-cases, audio cues for prompting and notification are enabled via a complete on-board audio codec. Integrated level shifters expose motor control pins for glueless, yet generic, robotic control (GPIOs, PWMs, I2C, UART). By combining Myriad2, sensors, low-power board design and energy efficient component selection, the EoT platform can run for up to 24 hours from a fully charged Lithium-ion Polymer (Li-Po) battery. USB and encrypted micro-SD functionality support rapid development and secure data logging modalities.



<sup>1</sup> <http://eyesofthings.eu>

# Technical Specifications

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## PHYSICAL

- Dimensions 46x56 mm
  - Operating temperature 32 to 158°F (0 to 70°C)
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## INTERFACES

- Micro-SD card slot
  - USB 3.0 Type AB connector
  - 4 pin NanEye2D (NanEyeRS) LVDS connector
  - LSHM connector (2 HM01B0, 1 IMX208)
  - Wi-Fi TI CC3100 module (w. onboard antenna)
  - Motor control connector
  - 4 Buttons (1 on/off, 3 general purpose)
  - LEDs (1 power, 1 battery charging, 1 battery status, 3 user)
  - Dip-Switches (5 boot, 1 user, 1 board power off, 1 wakeup)
  - Audio connector (mic and speaker)
  - Breakout connectors (NanEye, Himax, GPIOs, I2S, MIPI, SPI, power, UART, I2C, PWM, WiFi programmer)
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## POWER DELIVERY

- USB 3.0 Type AB connector (5 V)
  - Lithium Ion Battery (3.7 V)
  - Internal battery charger
  - Battery status/charging indicator
  - Ricoh RC5T619 PMU
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## OPEN SOURCE SOFTWARE

- Wifi data transfer:
    - WiFi Myriad connection
    - WiFi driver and high level library
    - MQTT protocol
  - Camera:
    - Camera interface software
    - RTSP server, video streaming library
  - Peripherals:
    - Input buttons/DIP switches
    - SD card management
    - Cryptography for SD card
    - Audio input and output
    - Motor control
  - Bootloader:
    - Bootloader
    - Elf loader
    - FlashIO
    - Flasher
  - Device Control mode API:
    - Control mode API (server)
    - Control mode desktop application
    - Control mode Android app
    - Time library
    - Google Play Android app
  - Scripting with Python:
    - MicroPython server
    - MicroPython client
  - Computer vision:
    - Movidius MvCv library
    - Movidius CNN engine
    - Colour histogram matching
    - Keypoint matching
    - Rotation-invariant face detector
    - Sparse optical flow
    - LibCCV for Myriad2
    - OpenCV 1.0 for Myriad2
    - Quirc for Myriad2
    - OpenCV 2.4 in the Cloud support
    - Google Cloud Vision API support
    - Tiny-dnn CNN engine for Myriad2
  - Other libraries/applications:
    - MQTT client
    - MAVLINK (protocol for drone control and telemetry)
    - JSON parser
  - Available demos:
    - Histogram matching example
    - Optical Flow based on OpenCV 1.0
    - QR code detection and recognition
    - Audio output, audio recording
    - Text detection
    - Facial expression recognition
    - Number recognition using Google Cloud Vision API
    - Emotion recognition using Tiny-dnn
    - Push notifications
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