EOD Report

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Mecha comet linux handheld computer:

Description:

The Mecha Comet is a modular, handheld Linux-based computer developed by Mecha Systems, designed for developers, makers, and technology enthusiasts seeking a versatile and customizable platform. Emphasizing sustainability, repairability, and open-source principles, the Comet offers a range of features suitable for various applications.

* Modular Design: The Comet's magnetic snap interface supports swappable extensions, such as a game controller, keyboard, and breakout board, allowing users to customize the device for various applications.
* Sustainability**:** Designed with sustainability in mind, the Comet focuses on easy repairability, standard connectors, and open-source software, aiming to minimize environmental impact.
* Open-Source Software**:** The device runs on open-source software, providing flexibility and control to developers and users.

Hardware & software of mecha comet:

### Processor & Memory (NXP i.MX 8M Mini System-on-Chip (SoC))

* CPU: Quad-core ARM Cortex-A53 (1.8 GHz)
  + 64-bit architecture for efficient multitasking
  + Low power consumption for embedded applications
* Microcontroller Unit (MCU): ARM Cortex-M4 (400 MHz)
  + Used for real-time processing tasks like sensor data handling
* RAM: 4 GB LPDDR4
  + High-speed memory for efficient application execution
* Storage: 32 GB eMMC NAND Flash
  + Read speed: 250 MB/s | Write speed: 110 MB/s
  + Expandable via M.2 PCIe slot (up to 2 TB)

### Display & graphics (LCD Display)

* Size: 3.4-inch
* Resolution: 480 x 480 pixels (200 PPI)
* Technology: LED-backlit LCD
* Touch Support: 2-finger capacitive touch
  + Responsive interface for user interaction
* GPU**:** Integrates a Vivante GC NanoUltra 3D GPU, supporting OpenGL ES 2.0, suitable for basic graphical applications and user interfaces.

Camera & Audio

* Sensor: OmniVision OV5640
* Resolution: 5 MP
* Autofocus: Yes
* Video Support: 1080p @ 30fps
  + Suitable for video conferencing and real-time image processing
* Speaker: High-definition 1.2 W
  + Loud and clear output
* Microphone: Dual PDM MEMS microphones
  + High-quality voice capture for AI applications

### Connectivity & Expansion

#### Wireless Communication

* Wi-Fi: Dual-band 802.11ac (2.4 GHz & 5 GHz)
* Bluetooth: 5.0 with BLE support

#### Wired Interfaces

* Ethernet: Gigabit RJ45 for high-speed networking
* USB Ports:
  + 2 × USB 2.0 Type-A: Connect peripherals like keyboards/mice
  + 1 × USB 2.0 OTG: Supports both device and host modes

#### Expansion Ports

* 40-pin magnetic pogo connector
  + Supports GPIO, UART, I2C, SPI, ADC, PWM, and USB
* M.2 PCIe Slot (2230, M-key)
  + Allows NVMe SSD expansion (up to 2 TB)

### Sensors & Security

#### Sensors

* IMU (Inertial Measurement Unit): 6-axis gyroscope for motion detection
* ADC: 16-bit single-channel for analog sensor input
* RGB LED: Programmable for status indications

#### Security Features

* ARM Hardware Crypto Accelerator:
  + Supports AES, RSA, SHA, ECC encryption
* Isolated Trust Anchor:
  + Stores cryptographic keys securely
* Secure Boot:
  + Prevents unauthorized firmware modifications

### Power & Battery

#### Battery

* Capacity: 3,000 mAh Li-Po
* Recharge: USB Type-C (5V, 2-3A)
* Fast Charging: 0 to 50% in 25 minutes

#### Power Consumption

* Idle Mode: 2.5 W
* Active Usage: 10 W

Operating System and Software Development:

* OS: Runs Mechanix OS, a Debian 12-based Linux distribution with a custom UI built in Rust, optimized for GPU rendering on Wayland.
* Kernel: Utilizes Linux Kernel 6.1, ensuring support for modern hardware and software features.
* Development Tools: Access to a vast repository of Debian packages, Flatpak for sandboxed applications, and Docker for containerized environments.