

# Quron Cape

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REV 0.1

## Description

The Quron Cape serves as the first version of the Quron Project, designed to function as an add-on board (cape) for the BeagleBone Black (BBB). This modular approach leverages the BBB's computing power, connectivity options, and real-time capabilities to create a powerful brain-computer interface (BCI) platform. The Quron Cape simplifies the development process, enabling rapid prototyping while maintaining compatibility with existing BBB hardware and software ecosystems.

## Design Goals for the Quron Cape

- **Modular Add-On:** The cape integrates seamlessly with the BeagleBone Black, utilizing its GPIO pins and other I/O interfaces.
- **EEG Signal Processing:** Captures brainwave data using onboard ADCs, optimized for real-time neural processing.
- **Reduced Complexity:** Leverages the BBB's bootloader and operating system, minimizing the need for additional custom components.
- **Cost-Effective Prototyping:** Builds on widely available, affordable hardware to lower initial development costs.
- **Expandable Platform:** Allows further experimentation by connecting additional peripherals through I2C, SPI, UART, and GPIO.

## Hardware Overview

- **Processor:** Utilizes the BeagleBone Black's AM335x ARM Cortex-A8.
- **Power Supply:** Powered through the BBB, supporting micro-USB and DC barrel jack inputs.
- **Interfaces:** GPIO, I2C, SPI, UART for communication with peripherals.
- **Analog Input:** Captures EEG signals through BBB's onboard ADCs for real-time processing.
- **Onboard Components:** Essential filtering and amplification circuits for EEG signal conditioning.

## Software Overview

- **Operating System:** Runs on the BBB's custom Linux image (Debian 12.2).
- **Machine Learning:** Integrates TensorFlow Lite for local neural processing and inference.
- **Remote Access:** Supports SSH and web-based monitoring via the BBB's Ethernet interface.
- **Storage Options:** Logs and data stored on microSD or eMMC for analysis.