bstem™

beta robotics development board

Integrated Robotics Platform*

bStem is a small board with a Qualcomm Snapdragon S4-Pro processor designed to be an advanced brain for robots. bStem has a wide array of sensors, synchronized stereo cameras, and programmable logic with a full desktop Ubuntu Linux distribution. Sensors and motor control functionality have been tuned for accurate timing, and the on-board FPGA (field programmable gate array) provides low-level control and connectivity for many existing robotic standards. You can program bStem on and off the board using a Python and C++ API, which provides an easy interface to all sensors and controls.

Advanced Sensor Fusion

Featuring dual synchronized stereo cameras, bStem has over 15 independent sensors, ranging from inertial to visual, radio, and audio. You can also add your own through USB, Serial (I2C, SPI, GPIO), and Bluetooth. The bStem unified API gives you access to all of the sensors and processing power between the CPU, GPU and DSP, allowing you to filter and estimate state more accurately and in real time.

Scalable Computational Capability

Our Python distribution allows for easy parallelization and clustering of multiple bStem boards to increase computational power. With open-source tools like Pyro or Parallel Python, bStem allows distribution of processing between multiple boards and cloud computational resources.

Beta Hardware Specs

° 1.72GHz, dual-core Qualcomm Snapdragon S4-Plus processor (APQ8060AB)
° Adreno 320 GPU*
° Hexagon QDSP6 500MHz DSP 2GB RAM, 8GB Flash
° Synchronized stereo MIPI cameras with 1.2MP resolution at 30fps, 20MP max
° 4-ch audio input at 48kHz, 2-ch at 96kHz. 6-ch audio out at 48kHz, 2-ch out at 96kHz
° GPS*, accelerometer, gyroscope, altimeter, magnetometer, thermometer
° 802.11b/g/n, Bluetooth 3.x+4.0/LE
° 1080p video out, via HDMI
° 4 USB 2.0 ports (3 Host + 1 Device/Host on-the-go, 480 Mbps)
° 7680 logic cell FPGA
° 62 GPIO, SPI, I2C configurable I/O through FPGA
° 80-pin board-board connection for expansion boards (see expansion board specs)
° 3.7V LiPo cell with gas gauge, 5V regulated, or 7-24V unregulated power input

Beta Software Specs

° Ubuntu Linux with support for a monitor via HDMI
° Develop in Python or C++, bStem API provides a consistent interface to all hardware
° On-board development - develop, run and debug directly on bStem via Eclipse
° Event-based dynamical system programming model for precise motor control
° Six channel audio & DSP sound processing*
° Flexible and rapid development of custom UIs via an on-board web server & Javascript component library for sensor monitoring and motor control
° Graphical monitoring and debugging during mobile operation via Wi-Fi

Physical Specs

Dimensions: 75mm x 75mm x 11mm
Weight: 38 grams

brain CORPORATION

Beta Expansion Boards

We provide three connector boards and reference designs to control different robotic standards and make bStem integration easier. Developers can create their own boards, starting with these reference designs.

Inspired by biology, these expansion boards are similar to the spinal cord in vertebrates.

adCord™ : Advanced Drive Expansion Board

adCord is designed for wheeled platforms where precise DC motor control with quadrature feedback is required.
It also provides 8 RC servo outputs.

- 4x PWM DC motor driver, 24V, 5A maximum, bi-directional
- 4x Quadrature encoder inputs
- 8x 5V servo pulse output, with 5V 3A servo power
- 11 channel A/D converter
- 5 3.3V GPIOs
- Weight: 44 grams

lgCord™ : Lego® Expansion Board

with lgCord, bStem can completely replace lego's NXT or EV3 controller, driving up to 6 motors and reading from 2 or more sensors (with multiplexing).

- Compatible with Mindstorms™ motors and sensors
- Replaces NXT controller
- 6 motor outputs, 2 sensor inputs
- Weight: 50 grams

rcCord™ : Radio Control Expansion Board

rcCord is designed to control traditional RC vehicles, like RC cars, planes and quadcopters. rcCord can read signals coming from RC receiver units and can output RC servo pulses.

- 8x 5V servo pulse output
- 8x 5V RC receiver inputs
- 11 channel A/D converter
- 5V 3A servo power, or switch to external servo power
- 6 3.3V GPIOs
- Weight: 18 grams

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