Features:

- On board MicroSD socket for Fat16/32 read & writing capability Up to 2GB supported (SDHC support in development)
- On board socket for xBee wireless module
- On board 5volt, 1A regulator. Power source should be between 7 to 16 volts
- On board 3.3volt regulator for xBee device or can be used to power external devices like a 3.3volt GPS device (250mA max)
- Support for remote flash programming via xBee wireless (Requires BahBots-USB-xBee-SBL board and two xBee modules)
- Access to all GPIO Pins
- Support for ceramic resonator or crystal (18.432MHz crystal installed)
- Optional 32.768KHz crystal for Real Time Clock
- I/O ports brought to 2x5 headers with +5V & ground
- Dual serial port headers
- Stackable with PB10 and PB20 protoboards

Features of ATMega1284P 8-bit MCU:

- High-performance, Low-power AVR® 8-bit Microcontroller
- Advanced RISC Architecture
 - On-chip 2-cycle Multiplier
 - High Endurance Non-volatile Memory segments
 - 128K Bytes of In-System Self-programmable Flash program memory
 4K Bytes EEPROM
 - 16K Bytes Internal SRAM
 - Write/Erase cycles: 10,000 Flash/100,000 EEPROM
 - Data retention: 20 years at 85°C/100 years at 25°C
 - Programming Lock for Software Security
- JTAG (IEEE std. 1149.1 Compliant) Interface
 - Boundary-scan Capabilities According to the JTAG Standard
 - Extensive On-chip Debug Support
 - Programming of Flash, EEPROM, Fuses, and Lock Bits through the JTAG Interface
- Peripheral Features
 - Two 8-bit Timer/Counters with Separate Prescalers and Compare Modes
 - Two 16-bit Timer/Counter with Separate Prescaler, Compare Mode, and Capture Mode
 - Real Time Counter with Separate Oscillator
 - Six PWM Channels
 - 8-channel, 10-bit ADC Differential mode with selectable gain at 1x, 10x or 200x
 - Byte-oriented Two-wire Serial Interface
 - Two Programmable Serial USARTs
 - Master/Slave SPI Serial Interface
 - Programmable Watchdog Timer with Separate On-chip Oscillator
 - On-chip Analog Comparator
 - Interrupt and Wake-up on Pin Change
- Special Microcontroller Features
 - Power-on Reset and Programmable Brown-out Detection
 - Internal Calibrated RC Oscillator
 - External and Internal Interrupt Sources
- Six Sleep Modes: Idle, ADC Noise Reduction, Power-save, Power-down, Standby and Extended Standby

BahBots Controller

BAHBOTS-644P-xBeeSD

Advanced Microcontroller Board with ATMEGA1284P MCU, MicroSD Socket, xBee Wireless socket and Regulated +5V and +3.3V Power





Introduction:

The BahBots controller board is designed for the moderate or advanced user of the Atmel AVR micro controllers. The specified purpose for this board is to provide a powerful brain for small robots, data logging and special purpose applications. The BahBots controller board combines extremely powerful computation with versatile communications capabilities to allow development of robust projects. The board can be programmed in several different languages: Bascom-AVR Basic; gcc and in the future, Arduino.

The controller was designed and built in cooperation between BahBots.com and Wright Hobbies, LLC and is distributed by Wright Hobbies Robotics.

The BahBots controller is a breakout board style controller for access to all of the features of the Atmel ATMega1284P MCU but also has advanced capabilities making the board much more useful than just a basic breakout board. As such, the user has access to nearly all of the advanced features of the ATMega1284P.

Powering the board:

The board's power is connected via J1 and it is recommended to be between 7 and 14volts (16v max). Note: There is a protection diode in series with the vBat power to guard against reversed battery polarity. An optional 2-pin Molex connector and snap-on power cable are provided with the controller.

The board has a 5volt Low Drop-Out (LDO) regulator that can supply a maximum of 1A of current but should be limited to 500mA without an external heat sink. For convenience, the controller board gives you access to the regulated 5volts at several locations; each 2x5 I/O port header, the serial headers and the 3x8 headers for Ports A & C.

Programming the ATMega1824P:

2 ISP headers are included on the board for In-System Programming (ISP) using an ISP cable such as the AVRISP. Connector ISPa is a standard 2x3 ISP header, while ISPb is a non-standard 1x6 header provided for convenience.

The Bahbots controller is preloaded with the Bascom serial bootloader. This can be replaced with another bootloader of your choice or programmed directly with an ISP cable. Please refer to the Bascom help file on using the Bascom bootloader – <u>http://www.mcselec.com</u>

Serial communication via UARTs:

layout of each port's connector. The voltage levels of these ports are straight TTL compatible and will not work directly with an RS-232 system. A level converter chip such as the MAX-232 series may be used to interface the BahBots controller to a computer (either PC or Macintosh based) for either downloading programs or for uploading/downloading data. The ports may be used with or without the level converters for communication with other compatible serial devices, depending upon the remote device's serial communication voltage levels.

Wireless connection via xBee module:

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One of the more useful features of the BahBots controller is the ability to plug in an xBee (ZigBee) wireless module and communicate to a PC or other controllers without the need for wires.

Also, with the use of the BahBots USB-xBee-SBL module you can not only communicate with the board from a PC or Mac, but also allows you to wirelessly reprogram the AVR making development much easier!

See <u>http://www.bahbots.com</u> for more information on using the xBee modules.





The ATMega1284P has two TTL level UARTs which are accessible via J5 & J6.

The schematic diagram of the serial interface connections shows the layout of each port's

Port Access:

Ports A, B, C and D on the ATMega1284P are broken out to 2x5 headers on the board. Each header has the 8 I/O port pins (pins 1-8), +5v (pin 9) and ground (pin 10).

Ports A and C are also brought to the two 3x8 headers. J14 is the I/O pins for Port A, J15 is +5v and J16 is ground. J17 is the I/O pins for Port C, J18 is

MicroSD Flash Drive:

The BahBots Controller features a built-in MicroSD socket. This allows you to read and write to FAT16/32 formatted MicroSD drives with the appropriate software. With this feature, you may store large amounts of data, such as conversion tables or maps, or you may conveniently transfer data to and from any computer which is capable of reading or writing MicroSD cards.

Refer to your compiler documentation for support of SPI-based SD card access. Bascom, an excellent Basic compiler for AVR microcontrollers, supports SD cards up to 2GB. Examples of accessing a microSD card are provided at <u>http://www.bahbots.com</u>.

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