Indriya_DP_03A14

*XBEE based Wireless Sensor Network development platform*

Indriya^{TM} is a hardware development environment for building ambient intelligence based wireless sensor network applications.

Features

- Simple, pervasive & low power 8-bit microcontroller core with low-power IEEE802.15.4 ZigBee as wireless interface

- $\pm$ 0.5 ^{0}C accurate low power digital (I^2C) on-board temperature sensor

- Miniaturized human eye response based digital (I^2C) ambient light sensor

- Small, low-power on-board 3-axis $\pm$ 3g accelerometer

- (Optional) add-on sensor interface boards for range of wireless sensor network applications

- Multiple timer/counter, PWM channel

- Data acquisition, configuring, debugging, on-chip serial port access from PC and many more simply via on-board USB interface

- 2 x AA battery option available for standalone operation

- Data rates achievable ranges upto 250Kbps

- One of the few wireless sensor network (WSN) platforms that can support embedded operating system TinyOS

- Simple PC based or AT Commands based Zigbee stack configuration supported

Block Diagram

(Ph)+91-80-41556375   www.indrion.co.in
sales@indrion.co.in
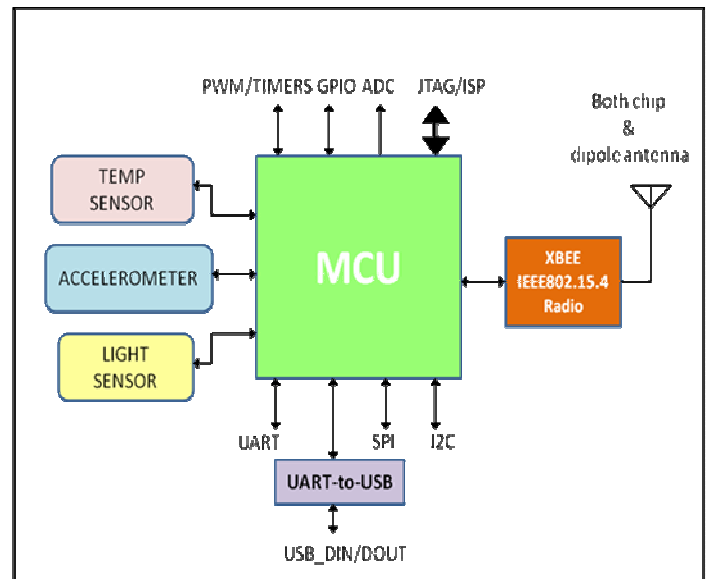
Target Applications

- Indoor building automation

- Ambient condition monitoring

- Remote security

- Surveillance

- Academic research

Highlights

This Indriya development platform (IDP) variant features one of most common AVR family's low-power microcontroller unit (MCU), Atmega128L.

The hardware architecture of Indriya is consistent with every mote in IDP having essential components organized on base & add-on sensor boards to enable suit to fast & easy adaptability in building systems to cater range of WSN applications based on wireless ambient intelligence.

The heart of the IDP is the MCU core *Atmega128L*. This is a low voltage 8-bit, 16MIPS core computing unit with 128 KB in-system programmable flash while the RF communication interface comes with a simple factory configured, low-power IEEE 802.15.4 Zigbee radio module, XBEE-Series2 from Digi.

The base board encompasses ultra low-power digital ambient sensors like temperature, light and vibration/tilt sensor all on a single board. In addition, MCU's numerous on-chip resources are all available for interfacing to external world of developer's choice.

Table 1: Summary of characteristics - XBEE based IDP

Component Characteristics	Specifications	Comments
Microcontroller	Atmega128L	
Performance	< 16 MIPS throughput	
In-system programmable Flash Memory	128 KB	
RAM	16 KB	
Configuration EEPROM	4 KB	
Operating Voltage	2.7V to 5.5V	
Current consumed	2.5 mA	Idle 4 MHz, V_{CC} = 3V
	5.5 mA	Active 4 MHz, V_{CC} =3V

Component Characteristics	Specifications	Comments
Analog-to-Digital Converter	8-channel, 10-bit	
Timer/Counter/PWM channels	Available	For motor control & other applications
Serial Communication Interface	1 - SPI 2 - USART 1 - I2C/TWI	
Programming Interfaces	ISP & JTAG	
RF Transceiver		Part # XBEE Series 2
Radio Protocol	IEEE 802.15.4 Compatible	
Operating Frequency Band	ISM 2.4GHz	
Data rate	upto 250 Kbps	
Tx/Rx Current consumed	40 mA	
Receiver sensitivity	-95	In dBm (1% packet error rate)
Supported network topologies	Point-to-point, Point-to-multipoint, Peer-to-peer & Mesh	
Outdoor range	120 meters	
Indoor range	40 meters	
On-board Sensors Interface		
Temperature Sensor		Part# : TMP-275
Range	-40 to +125	In ^{0}C
Accuracy	0.5	In ^{0}C
Resolution	0.0625	In ^{0}C
Current Consumed	50 µA	
Ambient Light Sensor range	Visible Light Spectrum upto 10,000 Lux	Part# : APDS9300
Accelerometer	3-axis, ±3g	Part# : ADXL335

| Component Characteristics	Specifications	Comments
Software Support		
Embedded Operating System	TinyOS	
Protocol stacks for communication	6LoWPAN, Zigbee	API framework for essential communication are provided
Others		
Battery Supply	2 x AA alkaline 1.5Volts each	
PC Interface	via UART -to- USB	

Optional add-ons with IDP

IDP's thoughtful hardware architecture fuels evasive development of range of wireless sensor based activities like WSN based irrigation management, structural health monitoring, commercial space automation and so on with just the right choice of off-the-shelf Indrion's sensor modules without hastle.

Table 2: Range of sensor plug-on modules that suit with this IDP are listed as under

Part #	Sensing platform	Sensors	Application Suite
AS1124	Air Quality	Humidity Sensor, Co2 Sensor	Indoor air-quality management
AS101216	Acoustics	Ultrasonic, Magnetometer	Range measurement, direction finding, tracking
SS21	Camera	Image Sensor	Security & surveillance
OS34	Occupancy Detection	PIR	Human activity based controls

For more specific details on the above listed sensor plug-on modules request vendor for specific datasheet.
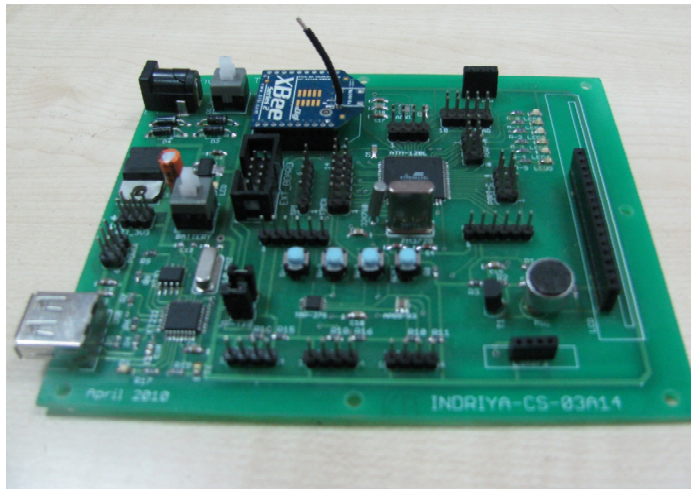
Snapshot of XBEE based Wireless Sensor Network development platform

Programmers & debuggers supported

Are available as a separate module on request. Contact Indrion for the same.