

Zigbee based ultra-low power Wireless Sensor Network Development platform

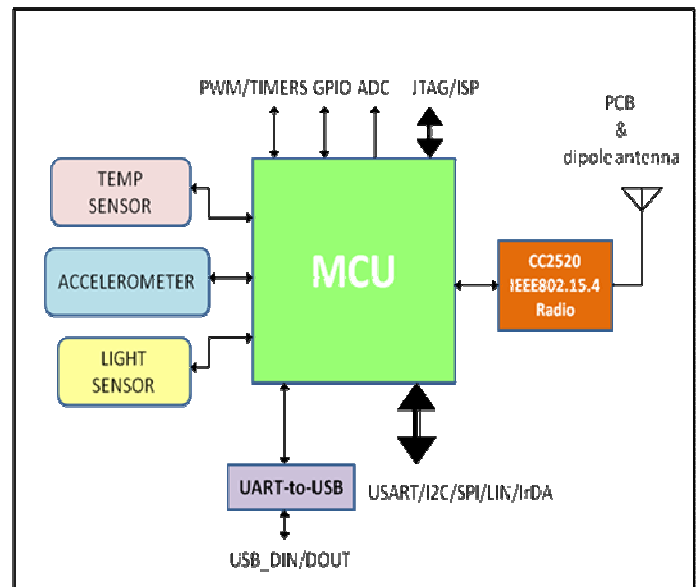
Indriya™ is a hardware development environment for building ambient intelligence based wireless sensor network (WSN) applications.

Features

- Ultra low power 16-bit MSP430 microcontroller core with low-power IEEE802.15.4 ZigBee transceiver as wireless interface making it the most suitable WSN mote
- ± 0.5 °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 channels, ADC & DAC interfaces
- 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*

Block Diagram



Target Applications

- Indoor building automation
- Ambient condition monitoring
- Remote security
- Surveillance
- Academic research

Highlights

This Indriya development platform (IDP) variant features the one of the industry's ultra-low power microcontroller family from Texas Instruments, MSP430.

This particular IDP variant comes with a different flavor of MCU & programming environment while the rest of the resources on-board are very much consistent 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 *MSP430F2618*. This is a low voltage 16-bit, 16MIPS core computing unit with 116KB+256B Flash Memory, 8KB RAM while the RF communication interface comes with low-power IEEE 802.15.4 Zigbee radio module based on CC2520.

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 – MSP430/CC2520 based IDP

Component Characteristics	Specifications	Comments
Microcontroller	MSP430F2618	
Performance	< 16 MIPS throughput	
In-system programmable Flash Memory	~116K(116Kx8 + 256B)Bytes	
RAM	8 KB	
Operating Voltage	1.8~3.6V	
Current consumed	24uA to 100uA	across LPM0 to LPM3 at 3V

Component Characteristics	Specifications	Comments
ADC/DAC	12-bit	
Timer/Counter/PWM channels	Available	For motor control & other applications
Serial Communication Interface	2 - SPI 2 - UART 2 - I2C/TWI 2 - LIN 2 - IrDA	
Programming Interfaces	ISP & JTAG	
RF Transceiver		Part # CC2520
Radio Protocol	IEEE 802.15.4 Compatible	
Operating Frequency Band	ISM 2.4GHz	
Data rate	upto 250 Kbps	
Current consumed	18.5 mA (Rx) 33.6 mA (Tx)	
Receiver sensitivity	-98	In dBm (1% packet error rate)
Supported network topologies	Point-to-point, Point-to-multipoint, Peer-to-peer & Mesh	
Outdoor range	75~100 meters	
Indoor range	20~30 meters	
On-board Sensors Interface		
Temperature Sensor		Part# : TMP-275
Range	-40 to +125	In °C
Accuracy	0.5	In °C
Resolution	0.0625	In °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	

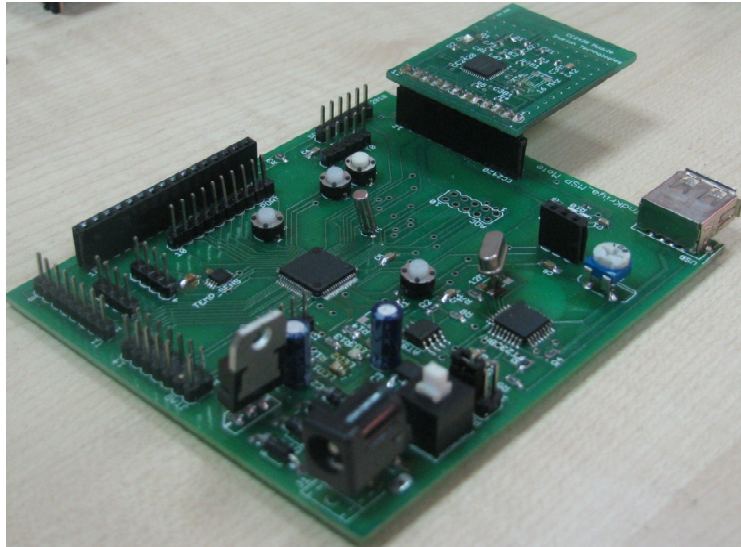
Optional add-ons with IDP

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 hassle.

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 Zigbee based ultra-low power Wireless Sensor Network Development platform

Programmers & debuggers supported

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