

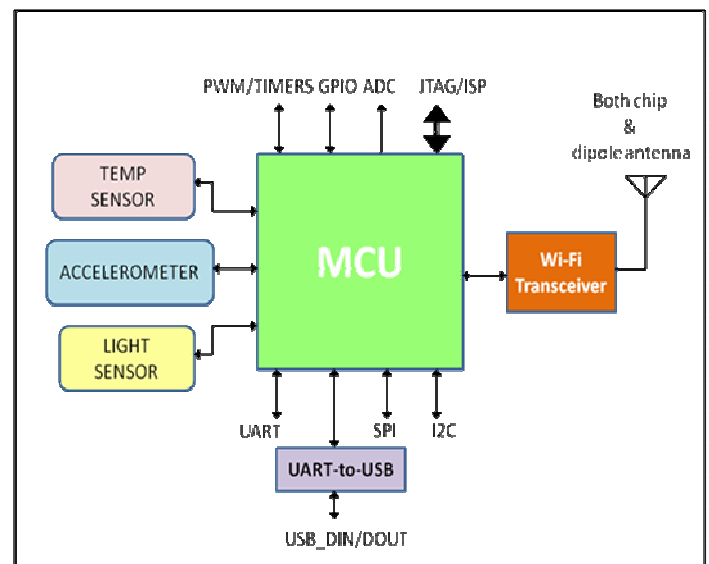
Indriya™ is a hardware development environment for building ambient intelligence based wireless sensor network applications.

## Features

- Simple, pervasive & low power 8-bit microcontroller core with IEEE 802.11b Wireless LAN interface
- $\pm 0.5$  °C accurate low power digital (I<sup>2</sup>C) on-board temperature sensor
- Miniaturized human eye response based digital (I<sup>2</sup>C) 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
- Options of dipole and chip antenna
- 2 x AA battery option available for standalone operation

- Data rates achievable ranges from 1Mbps to 11Mbps
- One of the few wireless sensor network (WSN) platforms that can support embedded operating system TinyOS
- Ease of integration to facilities with existing WLAN via TCP/IPv4 stacks configurable through AT-command set

## Block Diagram



*Snapshot of Wi-Fi based Wireless Sensor Network development platform*

## **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 offered is a simple to use, low-power Serial-to-WiFi WLAN module, GS1011M from GainSpan which comes with preloaded TCP/IPv4 stacks configurable through AT-command set.

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 - Wi-Fi based IDP*

Component Characteristics	Specifications	Comments
<b>Microcontroller</b>	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 5.5 mA	Idle 4 MHz, V <sub>CC</sub> = 3V Active 4 MHz, V <sub>CC</sub> = 3V

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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	
<b>RF Transceiver</b>		Part # GS1011M
Radio Protocol	IEEE 802.11b/g/n Compatible	
Operating Frequency Band	2412 to 2497 MHz	
Data rate	11, 5.5, 2, 1 Mbps (802.11b)	
Tx/Rx Current consumed	150 mA	
Receiver sensitivity	-90	In dBm
Security Protocols	WEP, WPA/WPA2-PSK Personal WPA/WPA2-Enterprise	
Outdoor range	700 to 1000 meters	
Indoor range	50 to 70 meters	
Supported # of sensor nodes per access point	Upto 256	
<b>On-board Sensors Interface</b>		
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

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Component Characteristics	Specifications	Comments
<b>Software Support</b>		
Embedded Operating System	TinyOS	
Protocol stacks support	TCP/IPv4 Stacks configurable through AT-commands	Includes preloaded embedded software to perform serial-to-Wi-Fi wireless networking
<b>Others</b>		
Battery Supply	2 x AA alkaline 1.5Volts each	
PC Interface	via UART -to- USB	

## Optional add-ons with IDP

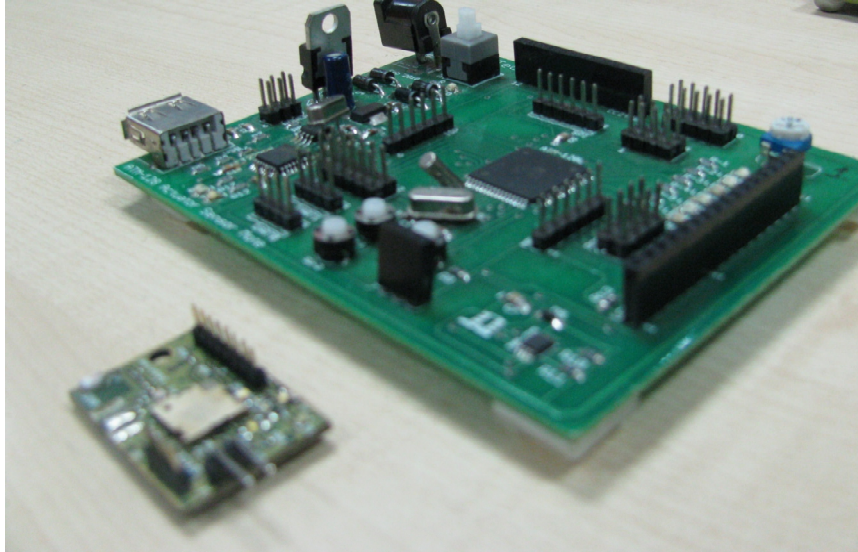
IDP's thoughtful hardware architecture fuels evasive development of range of wireless sensor based activities like WSN based irrigation management, structural health monitoring, commercial space automation and so on with just the right choice of off-the-shelf Indrion's sensor modules without hassle.

*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.*

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## **Programmers & debuggers supported**

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