AKADEMIKA

Product Catalogue

WL-WSN:
Wireless And
Sensor Network Laboratory

Wireless Sensor Network Test Bed designed by AKADEMIKA is an important laboratory facility to study wireless media propagation, network behaviour, impact of radio parameters and network settings. The test bed allows real time emulation of wireless packet transmission and network parameters measurement along with study of wireless media behaviour.

This System makes use of Patented S-WiFi Network Stack. S-WiFi is hardware (processor, radio) independent network layer , Self-Organizing and self-healing network stack.

S-WiFi is based on fixed 16 bit addressing, two-tier hierarchical network. First layer device is MD (Master device). There is only One MD in the network. Second layer devices are called as NDP (Network Processing Device). The NPDs acts as end node device as well as router device.

S-WiFi allows formation of up-to 5 hop, multi-hop network. The MD and NPD can attach up-to 30 devices in star network topology. The network is scalable to 150 devices in total. Each device is provided with small OLED screen to locally view the settings.

The NPDs are equipped with Temperature, Pressure, Humidity sensors along with ADC input, configurable two DIO port lines , a relay and PWM output.

"Wireless Ginie" The GUI application provides various commands to reset network, change radio, network and experiment parameters and measure the packet transmission activity parameters.

FEATURES

Evaluate 802.11 (Wi-Fi) Networks

Examine wireless communication, networks, and sensor communication by reconfiguration of Radio and Network Parameters

Measuring Wireless media propagation and parameters affecting the communication reliability

Measuring parameters impacting wireless communication and network formation

Evaluating wireless and sensor network performance parameters

Formulate various defined / programmed Network Configuration

Explore the Network Layer parameters that are not allowed to play with in standard wireless network

Build Applications with available on-board sensors

SYSTEM SPECIFICATIONS:

802.11(Wi-Fi) based (Master Device and Network Processing Device)

OLED display 1.3"
LED indications: Power, Rx/Tx

Keys: Program, Reset, User key

Serial interface for Programming

Processor:

Xtensa® single-/dual-core 32-bit LX6 microprocessor

Radio

2.4 GHz 802.11 compatible

Up to 20.5 dBm of transmitting power, adjustable transmitting power

Receiver sensitivity –90 dBm

TX/RX current 95~100 mA @ 0 dBm

3.3V operation

Battery: 3500mAh
Sensors

Integrated Temperature, Pressure and Humidity Sensor

PWM, Relay, DAC, ADC & two programmable DIO

"Wireless Ginie": GUI Application Software
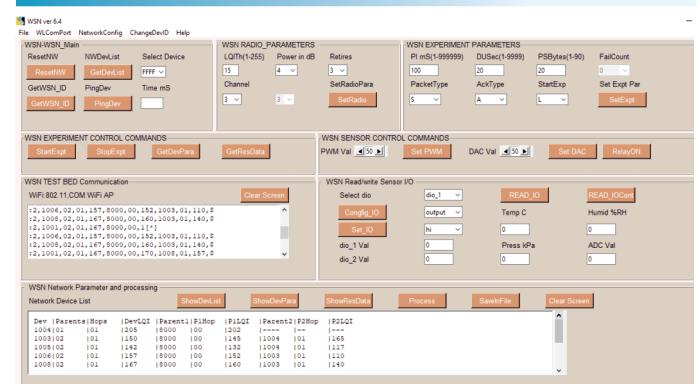
WSN Control Commands to establish Network

Radio/transmission setting: Power, LQI threshold, message transmission Retries

Experiment settings: Packet interval, Packet size, Acknowledge type, Experiment Duration,

Change device address and Role

Reset network

Ping

Network device list

Start experiment

Stop experiment

Read and process result

WSN Sensor Control Command

Set PWM
Configure DIO
Set/Get DIO val,
Read sensor and ADC values

CONFIGURABLE PARAMETERS

Radio Parameters

Power: 0 dBm to 19.5 dBm in steps of 11.5 dBm Specific to WiFi (LR) setup
Radio Channel
LQI Threshold, connectivity range: 0-255
Number of packet transfer retry: 1- 3

Experimental Parameters

Packet interval time: 0-999999 mS
Experiment duration: 1-9999 seconds
Data size in packet: 0-99 Bytes
Packet type: Sequential, Random
ACK for packet: No ACK, Hardware ACK
Start of experiment: Start on reset, Start after command

Network Configuration Setting

Facility to emulate and define Network Configuration. The user can set the list of devices in the MD and NPD to allow or to block these devices during network formation. This facility allows the user to create user defined network topology as well create multi-hop network within the laboratory space.

WSN Network Parameters and Processing Display

Facility to display Device list with details like Device, Parent, Hops, DevLQI, Facility to display Device Parameters like Device, packet Interval, duration, expected Data packets, packet size, Retry, Ack Type, LQI Th, Facility to display processed Results like device, data/control transmitted packets, Communication Load %, Dev Efficiency %, Expected NW Efficiency%, NW Efficiency %

DELIVERABLES

Wireless and Sensor Network Laboratory Configuration

A set of 802.11 (Wi-Fi) wireless nodes (10 x nodes (NPD),
+1 x Master (MD) + WAP)
"Wireless Ginie "GUI Application Software
Experimental Manual
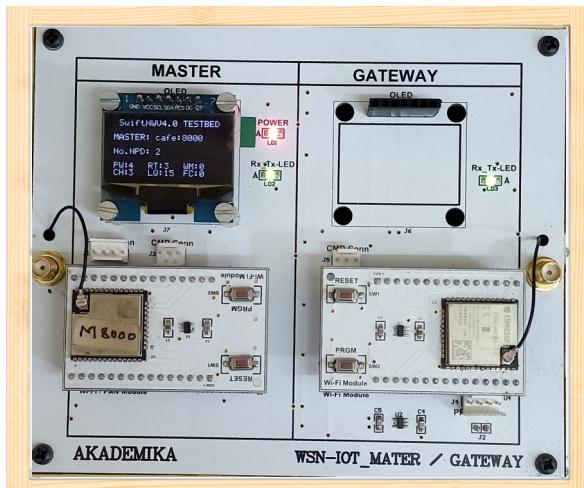
EXPERIMENTATION

- Introduction to Wireless Network Setup & Software.
- Measurement of Packet Delivery Ratio & Communication load.
- Measurement of Distance & Signal Strength (LQI) & Find Relation Between Them.
- Measurement of Bandwidth Overhead
- To Study Effect of Hops over Network Transmission Delay.
- To study the Effect of Packet Payload on Network Throughput
- To Study Effect of Packet Transmission Rate Over Network Throughput.
- To study and Compare Network Throughput In Outdoor (Line of Sight) & Indoor Setup.
- Calculate communication Load, Network Efficiency Device Efficiency in Different topology like Star, Tree and Linear network
- To study of Network Nodes as IoT Sensor.
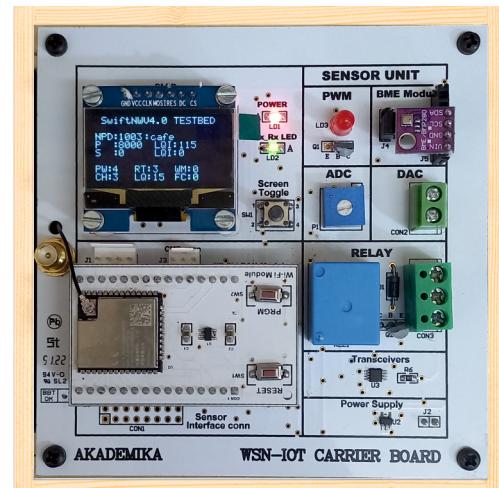
WL-IoT:
Internet of Things Training Kit.

Capacitive touch buttons | LCD display RGB 1.2"
RGB LED | IMU sensor
Temperature & humidity sensor | Pressure sensor
Light, gesture & proximity sensor

The kit includes:

Hardware:

MKR IoT Carrier designed for this kit, including:
- Round OLED Display
- Five capacitive touch buttons
- On-board sensors (temperature, humidity, pressure and light)
- Two 24 V relays
- Micro SD card holder
- Plug and play connectors for different sensors
- RGBC, Gesture and Proximity
- IMU
- 18650 Li-Ion rechargeable battery holder (battery not included)
- Five RGB LEDs

Arduino MKR WiFi 1010
- Plastic encasing
- Micro USB cable
- Moisture sensor
- PIR sensor
- Plug-and-play cables for all the sensors

Technical specifications for MKR IOT Carrier

Pressure sensor	LBPS22HB
IMU	LSM6DS3
Humidity and Temperature sensor	HTS221
Ambient light, Gesture and proximity sensor	APDS-9960
5x Capacitive buttons	Qtouch Pad
Buzzer	
2x 24V Relays	V23079
5x RGB LEDs	
Display	KD013QVFMD002-01
2x Grove to Analog Input/Output	
Grove to I2C Input/Output	
microSD Card slot (microSD card not included)	
Battey holder (Battery not included)	18650 Li-Ion rechargeable battery

Our Products
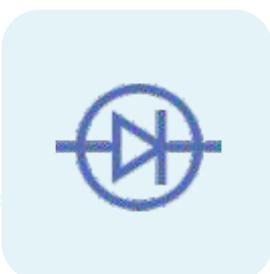
Basic Electronics

Analog Communication
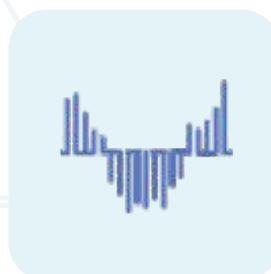
Digital Communication
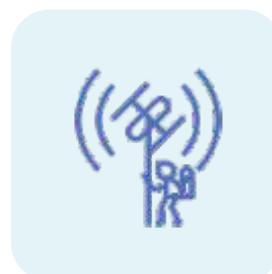
RF/Antenna & Microwave
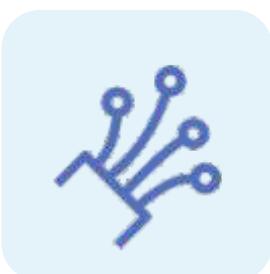
Fiber Optics

Radar

Wireless Communication

Network Laboratory

Processor
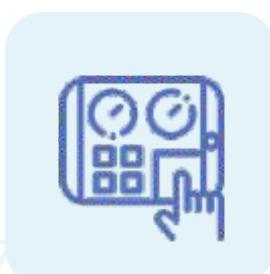
Controls & Instrumentation
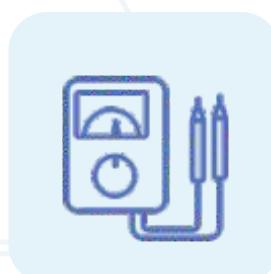
Test & Measuring Instruments

Drone Technology Laboratory

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