IoT Smart
Server+

With IoT Smart Server+, you can learn how to collect data from various IoT sensors, store it in a file or database, and analyze it on high-performance edge devices running Linux-based Soda OS. Cloud-based speech synthesis and real-time image processing technology using voice commands and cameras enable high-quality IoT projects.

Internet of Things

IoT Smart
Server+

Product Overview

IoT Smart Server+ allows you to acquire the basic knowledge and to perform application project necessary for IoT application development, through various exercises such as development environment, sensor control, database, and multimedia on Soda OS based

high performance edge devices. Soda OS is an IoT project-specific operating system that was selected and packaged with only the functions necessary for IoT programming, based on Debian Linux so that users can use IoT Smart Server + for IoT projects without any additional configuration.

Product Features

- It consists of 30 kinds of sensor modules connected by high-performance edge servers and jumper cables, optimized for IoT application learning, maker and capstone design, and hackathon.

- Provides a specially designed Pop library for the 30 sensor modules and Soda OS, which are high performance edge device operating environments.

- Soda OS is a Debian-based distribution, with all the tools that Linux professionals love and open software for IoT applications, so they can be used immediately without building a separate system.

- The high-level Pop library lets you implement real life ideas without complex hardware knowledge.

- Soda OS supports automatic IP address assignment, distributed name resolution using mDNS, and network service publishing / discovery using DNS-SD.

- It supports a wide range of languages including C/C++, Java, JavaScript, Node-Js, and more, including Python 3 and extension libraries such as numpy, matplotlib, pandas to extend to data science and AI applications.

- It supports Google Cloud-based speech synthesis and voice command function and IoT application service using camera. You can learn Linux operations and Python programming, sensor control, and multimedia applications on a high-performance IoT edge server.

Hardware Specifications

Module	Item	Specifications	
IoT Edge Server	Processor	Cortex-A53 (ARMv8) 64-bit SoC @ 1.4GHz	
	Memory	1GB SDRAM	
	Storage	32GB	
	USB	USB 2.0 A Type 4 ports	
	Audio	3.5mm A/V jack	
	Video	HDMI 1.4 Video	
	Ethernet	Gigabit Ethernet over USB 2.0 (maximum throughput 300 Mbps)	
	Wireless	2.4GHz and 5GHz IEEE 802.11.b/g/n/ac wireless LAN, Bluetooth 4.2/ BLE	
	Expansion I/O	40ea GPIO (2x20 2.54mm Pitch Header)	
	Size	85x56mm	
Shield Board	Camera	Still resolution	8 Megapixels
		Video modes	1080p30, 720p60 and 640 × 480p60/90
		Linux integration	V4L2 driver available
		Sensor	Sony IMX219
		Sensor resolution	3280 × 2464 pixels
		Optical size	1/4"
		Focal length	3.04mm
		Horizontal field of view	62.2 degrees
		Vertical field of view	48.8 degrees
		Focal ratio (F-Stop)	2.0
	ADC	8ch 12bit Analog to Digital Converter	
	Expansion I/O	40ea GPIO (2x20 2.54mm Pitch Header)	
	size	85x66mm	
Sensor Modules	Pir Sensor	Sensor : RE200B Sensing Range : 110 Degree Operating Voltage : 3.3V I/O Interface : 1 pin Digital Out	
	Sound Sensor	Sensor : Microphone Feature : ambient sound detection, sound level detection Operating Voltage : 5V I/O Interface : 1 pin Analog Output	
	Humidity Temperature Sensor	Sensor : DHT11 Feature : Temperature and humidity sensor, ambient temperature and humidity detection Operating Voltage : 5V I/O Interface : 1 pin Digital Output	
	Ultrasonic	Sensor : HC-SR04 Feature : 2~500cm distance measuring range, 40KHz Frequency Operating Voltage : 5V I/O Interface : 1 pin Digital Output, 1 pin Digital Input	
	Cds Sensor	Operating Voltage : 5V I/O Interface : 1 pin Analog Output	
	Potentiometer	Sensor : 1k(ohm) Variable Resistor Feature : 0~5V DC Variable Voltage out I/O Interface : 1 pin Analog Output	
	Tilt Sensor	Contact Resistance : 50m(ohm) Max Operating Voltage : 3.3v~5V I/O Interface : 1 pin Digital Output	
	Mercury Sensor	Operating Voltage : 3.3V~5V I/O Interface : 1 pin Digital Output	
	Reed Sensor	Operating Voltage : 3.3V~5V Switching Current : 0.5A I/O Interface : 1 pin Digital Output	
	Psd Sensor	Operating Voltage : 3.3V~5V Sensing Range : 2~40cm I/O Interface : 1 pin Analog Output	

Module	Item	Specifications
Sensor Modules	Flame Sensor	Operating Voltage : 3.3V~5V Sensing Range : 60 Degree I/O Interface : 1 pin Digital Output
	Touch Sensor	Sensor: TTP223 Operating Voltage : 3.3V~5V I/O Interface : 1 pin Digital Output
	Opto Sensor	Sensor : FC33 Operating Voltage : 3.3V~5V I/O Interface : 1 pin Digital Output
	Shock Sensor	Sensor : SW-420 Operating Voltage : 5V I/O Interface : 1 pin Anlog Output
	Dust Sensor	Sensor : GP2Y1014AUOF Operating Voltage : 5V I/O Interface : 1 pin Analog Output, 1Pin Digital Input
	Gas Sensor	Sensor : MQ-6 Operating Voltage : 3.3V~5V I/O Interface : 1 pin Analog Output
	Soil Moisture	Operating Voltage : 3.3V~5V I/O Interface : 1 pin Analog Output
	Line Trace Sensor	Operating Voltage : 3.3V~5V I/O Interface : 1 pin Digital Output
	Thermistor	Operating Voltage : 3.3V~5V I/O Interface : 1 pin Analog Output
	Temperature	Sensor : LM35 Operating Voltage : 3.3V~5V I/O Interface : 1 pin Analog Output
	Limit Switch	Operating Voltage : 3.3V~5V I/O Interface : 1 pin Digital Output
	knock Sensor	Operating Voltage : 3.3V~5V I/O Interface : 1 pin Digital Output
	Relay	Feature : NC/NO Relay, 250VAC 10A/30VDC 10A Operating Voltage : 3.3V~5V I/O Interface : 1 pin Digital Output
Actuator Modules	LED Module	Operating Voltage : 3.3V~5V Current : 20mA I/O Interface : 1 pin Digital input
	DC Motor	Motor : Micro Type DC Motor Motor Driver : TB6552 Operating Voltage : 5V I/O Interface : 2 pin Digital input
	Step Motor	Feature : 32 Step, 1/16Gear Motor Motor driver : ULN2003 Operating Voltage : 5V I/O Interface : 4 pin Digital input
	Switch Module	Feature : Tact Button I/O Interface : 1 pin Digital input
	Buzzer Module	Sound Output at 10cm : 60dB(Min) Operating Voltage : 3.3V~5V Current Consumption : 2mA I/O Interface : 1 pin Digital input
	Laser Module	Wavelength : 650nm Operating Voltage : 5V I/O Interface : 1 pin Digital input
	RGB LED	Operating Voltage : 3.3V~5V I/O Interface : 3 pin Digital input
Network Adaptor		USB 3.0 Gigabit Ethernet Card IEEE 802.3/ 802.3u/ 802.3au 10/100/1000Mbps RJ-45 62x23x16mm(LxWxH)
Sound Card		Virtual 7.1ch USB2.0 to Audio Converter Realtek ALC DAC/ADC 48KHz 16bit output, I2S/PCM/TDM support 47x28x12mm(LxWxH)

Features of Soda OS

- It provides the latest development environments, including the latest self-built GCC toolchain and Python 3 interpreter, as well as customized Geany and NeoVim to support code completion, and Visual Studio Code to support autocompletion and debugging.
- Provides an enhanced CLI environment with oh-my-zsh combined with tmux, solarized, and powerlevel9k themes. It also provides its own built-in desktop experience with lightdm, openbox, tint2, and more.
- Enhanced IoT development environment including BlueZ, the latest Bluetooth library, MQTT Server (mosquitto), a representative IoT server, and Blynk Server for mobile integration.
- Python data science libraries, Matplotlib, seaborn, numpy, sympy, pandas, scipy, Scikit-learn, TensorFlow, Keras, etc. are installed.
- For enhanced multimedia support, PyAudio, Google Assistant, python-vlc and the latest OpenCV libraries for image processing are installed.
- Pop library specially designed for 30 sensor modules included in IoT Smart Server + is installed.

Software Specifications

Module		Specifications
Soda OS	Linux Kernel	4.19.66-v7+
	Desktop	Openbox: V3.6.1 LightDM: 1.8.3 Tint2: V16.6.1
	Command Line Interface	Zsh: V5.3.1 Tmux: V2.8 Peco: V0.4.5
	Development Environment	GCC: 9.1.0 Python3: 3.7 Nvim: V0.3.2 Geany: V1.35 Visual Studio Code: V1.29.0
	Connectivity	Mosquitto: 1.4.10 BlueZ: 5.50 Wireshark: 2.6.3 Flask: 1.1.0, Blynk: 0.1.3
	Multimedia	PyAudio: V0.2.11 OpenCV: 4.1.0 Google Assistant: 1.0
	Data Science	numpy: V1.17.0 matplotlib: V3.1.1 sympy: V1.4 pandas: V0.25.0 seaborn: V0.9.0 Scipy: V1.1.0 Scikit-learn: V0.20.0 Tensorflow: V1.11.0 Keras: V2.2.4
Pop library	Output Devices	Led, Laser, Buzzer, Relay, RGBLed, DCMotor, StepMotor
	Input Devices	Switch, Touch, Reed, LimitSwitch, Mercury, Knock, Tilt, Opto, Pir, Flame, LineTrace, TempHumi, UltraSonic
	ADC Input Devices	Shock, Sound, Potentiometer, Cds, SoilMoisture, Thermistor, Temperature, Gas, Dust, Psd
	Multimedia	AudioPlay, AudioPlayList, AudioRecord, Tone, SoundMeter
	Google Assistant	GAssistant, create_conversation_stream

Training Contents

Edge Device Development

- HBE-IoT Smart Server + and Soda OS
- Connecting Host and Edge Device
- Edge Device Support Software
- Python 101
- Desktop Environment
- CLI environment
- Linux 101
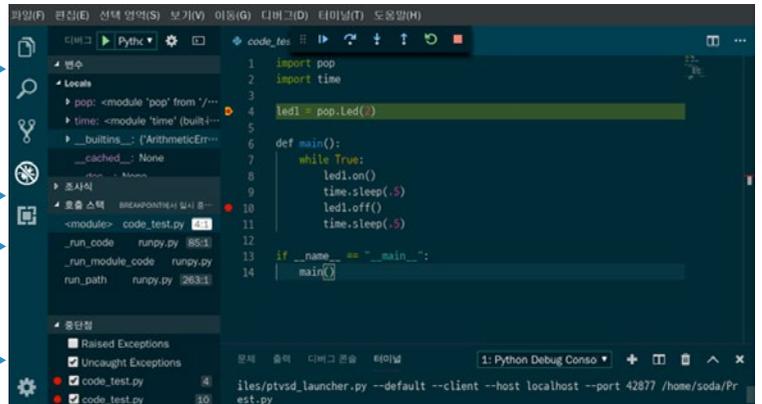
Part II Sensor Programming

- Circuit Basics (charges, voltages, currents, resistors, capacitors, inductors, diodes, transistors, op amps, comparators, integrated circuits, electrical supply devices)
- Hardware Interface (Signal Type, GPIO, PWM, ADC, I2C, SPI, UART)
- WiringPi and Pop Library
- GPIO output device control (Led, Buzzer, DC Motor)
- GPIO input device control (Switch, Pir, Ultrasonic)
- ADC Input device control (Potentiometer, Sound, Cds, Thermistor)
- Reading multiple analog sensor values
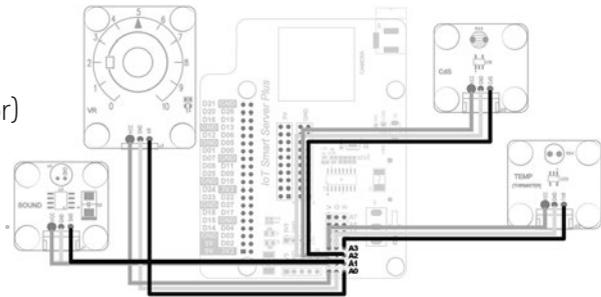
Part III IoT Application Technology

- Save the sensor value as a text file and draw a chart with Excel
- Collect sensor values and run multiple SQL statements
- WAV file playback and waveform output
- Use the microphone as an ambient noise level sensor
- Google text-to-speech converter
- Leverage the Google Assistant API
- GAssistant based user device actions
- Creates Stop Motion with camera and switch module
- Record whenever a human movement is detected by camera and PIR module
- Create a vehicle video recording device with camera and shock module
- Gesture detection system
- OpenCV and Matplotlib Visualization
- Capture video with OpenCV and PiCamera

HANBACK ELECTRONICS