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IOT

DEVELOPMENT BOARDS 52072 Series

Arduino-Mega | Arduino-UNO | ESP-32 |Raspberry PI

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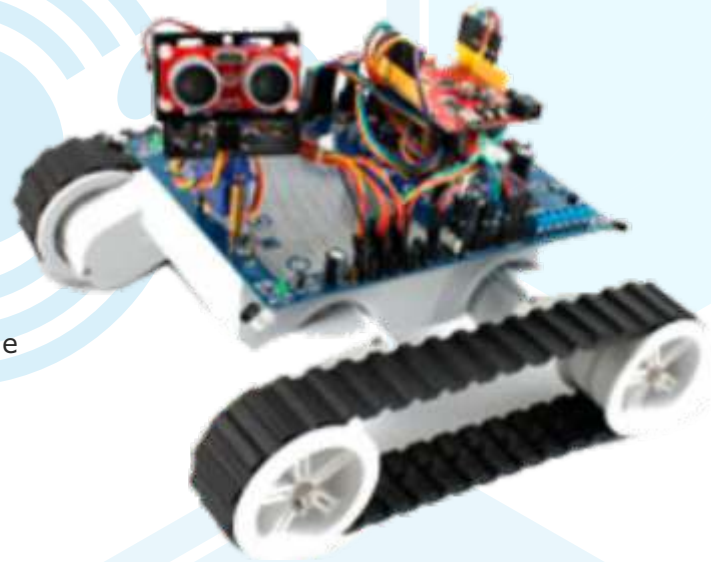
IOT - Trainer

Order Code - 52072

Features

The Kit includes everything you need to get started with the internet of things, including an Arduino Boards. Alphanumeric Display and Matrix Keypad, sensors and actuators. The Arduino starter kit is perfect for anyone (kids, adults or the elderly) who loves technology and wants a new geeky challenge or to get start building their own personal internet of things. You'll learn through building several creative projects. Start the basic electronics, do more complex projects, the kit will help you control the physical world with sensors and actuators This is a great kit for you to learn about Arduino and apply many smart home devices. Apart from a components list, we also provide details about the Device bit Platform including operation instructions, and 14 experiments to apply these components and learn about the related modules. Detailed materials such as module description, principle explanation and related code are provided in Manuals.

We want to use the Internet of Things to transform the way students learn about our world. Our learning materials have been designed to get educators using our kits to teach a broad swathe of subjects across Key Stages. Our current focus is getting feedback on how this new technology can help support the new computing curriculum.



Experiments List

Experiment 1 How to Use GYPROSCOPE sensor Module
Experiment 2 How to Use IR sensor Module
Experiment 3 How to Use PIR sensor Module
Experiment 4 How to Use REMOTE sensors
Experiment 5 How to Use Natural Gas Sensor
Experiment 6 How to Use HUMIDITY Sensor
Experiment 7 How to Use Temperature Sensor
Experiment 8 How to Use GSM MODEM Module
Experiment 9 How to Use RFID TX and RX 315MHz Module
Experiment 10 How to Use XBEE Module
Experiment 11 How to Use Voice Recognition Module
Experiment 12 How to Use Ultrasonic Sensor Module
Experiment 13 How to Use Magnetic compass Sensor
Experiment 14 How to Use Camera Module

Package Include

- ☑ 1 x ADXL335 Gyroscope Module
- ☑ 1 x Voice Recognition Sensor
- ☑ 2 x IR Sensor Module
- ☑ 1 x PIR Sensor Module
- ☑ 1 x Humidity and Temperature Sensor
- ☑ 1 x RGB Module
- ☑ 1 x Relay Module
- ☑ 1 x 10K Potentiometer
- ☑ 1 x Passive Buzzer
- ☑ 1 x Natural Gas sensor Module
- ☑ 1 x Ultrasonic sensor Module
- ☑ 1 x RFID TX and RX Module
- ☑ 1 x Xbee Module
- ☑ 1 x GSM SIM900 Module
- ☑ 1 x 4x4 Matrix Keypad
- ☑ 1 x 20x4 LCD
- ☑ 1 x Ardulno Module
- ☑ 1 x Robot Module
- ☑ 1 x Camera Module
- ☑ 1 x Magnetic Compass Module

Note: Specifications are subject to change.

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Arduino Development Board
Order Code - 52072A

52072A Experimental Set Up has been designed specifically for begineers to learn Arduino and apply it in embedded applications. The board contains the necessary components and sensors that covers the basic as well as advanced areas of embedded system. All the practical can be implemented using Arduino Programming Language which is an open source project with codes & library available on github.
Practical experience on this set up carries great educative value for Science and Engineering Students

Experiments

To develop Arduino program for

01. Blinking of LED.
    - Controlling LED arrays.
02. Controlling LED using Push button.
03. Interfacing 20x4 LCD.
04. Interfacing 7 segment display.
05. Generating tone using buzzer.
06. Designing Real time Clock using DS1307 IC.
07. Control DC motor.
08. Interfacing 4x4 keypad matrix.
09. Sensing environment humidity by interfacing humidity sensor DHT11.
10. Measuring distance by interfacing ultrasonic sensor HC-SR04.
11. Sensing smoke & its level by interfacing Smoke sensor MQ-135.
12. Sensing temperature by interfacing Lm35 temperature sensor.
13. Interfacing LDR.

Features

The board consists of the following:

01. +5V & +3.3V D.C. at 100mA, IC regulated power supply internally connected.
02. Arduino UNO Board with USB port for uploading programming and data communication.
03. 20x4 LCD for displaying output values.
04. 4 digit seven segment display for displaying output values.
05. 8 push buttons for controlling LED or to use it as an input unit.
06. 8 LED for indicating output.
07. Buzzer for indicating output or to generate tone.
08. BREAD BOARD One Terminal Strips with 640 tie points and 2 Distribution Strips with 100 tie points each, totaling to 840 tie points. For further expension.
09. DS1307 IC to be used as Real Time Clock
10. L293D Dual H-Bridge Motor Driver IC with two 5V DC motor.
11. MAX232 IC with DB9 Connector for serial port communication.
12. Humidity Sensor DHT11.
13. Ultrasonic Sensor HC-SR04.
14. Gas/Smoke/Alcohol Sensor MQ-135.
15. Temperature Sensor LM35.
16. LDR.
17. 4x4 Keypad Matrix.
18. Weight : 3.0 Kg. (Approx.)
19. Dimension : W 415 x H 165 x D315

Accessories

01 CD with programs and software.
02 Mains Lead.
03 RS-232 Cable.
04 Arduino Cable.
05 Operating Instruction Manual.

Other Apparatus

01 Cathode Ray Oscilloscope 20MHz (CRO).
02 PC System with Windows 7, 8, 8.1 or 10 with 32 or 64 bit Operating System.

Note: Specifications are subject to change.

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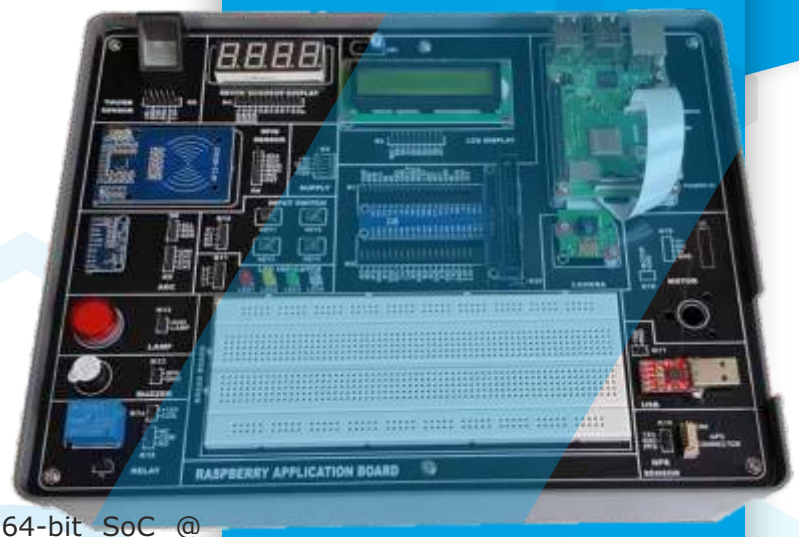
Raspberry Application Board

Order Code - 52072B



Specification

Raspberry PI 3 Model B+

- ☑ Broadcom BCM2837B0, Cortex-A53 (ARMv8) 64-bit SoC @ 1.4GHz
- ☑ 1GB LPDDR2 SDRAM
- ☑ 2.4GHz and 5GHz IEEE 802.11.b/g/n/ac wireless LAN, Bluetooth 4.2, BLE
- ☑ Gigabit Ethernet over USB 2.0 (maximum throughput 300 Mbps)
- ☑ Extended 40-pin GPIO header
- ☑ Full-size HDMI
- ☑ 4 USB 2.0 ports
- ☑ CSI camera port for connecting a Raspberry Pi camera
- ☑ DSI display port for connecting a Raspberry Pi touchscreen display
- ☑ 4-pole stereo output and composite video port
- ☑ Micro SD port for loading your operating system and storing data
- ☑ 5V/2.5A DC power input
- ☑ Power-over-Ethernet (PoE) support (requires separate PoE HAT)

Interconnection

All interconnections are made using 0.8mm Single stand wires.

- ☑ Test points are provided to analyze signals at various points.
- ☑ All ICS are mounted on IC Sockets.
- ☑ Bare board Tested Glass Epoxy SMOBC PCB is used.
- ☑ In-Built Power Supply of 3.3V,+5V & +12V with Power ON indication
- ☑ Attractive ABS Plastic enclosures
- ☑ Set of 0.8mm single stand wires for interconnections

List of Experiments

01. Starting Raspbian OS, Familiarising with Raspberry Pi
02. Components and interface, Connecting to ethernet, Monitor, USB.
03. Displaying different LED patterns with Raspberry Pi
04. Displaying Time over 4-Digit 7-segment Display using Raspberry Pi.
05. Setting up Wireless Access Point using Raspberry Pi
06. Fingerprint Sensor interfacing with Raspberry Pi
07. Raspberry Pi GPS Module Interfacing
08. IoT based Web Controlled Home Automation using Rasbperry Pi.
09. Visitor Monitoring with Raspberry Pi and Pi Camera.
10. Interfacing Raspberry Pi with RFID.
11. Building Google Assistant with Raspberry Pi.
12. Installing Windows 10 IoT Core on Raspberry Pi.

ON BOARD APPLICATIONS

- ☑ 4 Input Switches to give Digital Input
- ☑ 4 LEDs to display Digital Output
- ☑ 4 digit Seven segment displays
- ☑ 16*2 Alphanumeric LCD
- ☑ Miniature Buzzer
- ☑ 12V SPDT Relay
- ☑ Fingerprint Sensor Module
- ☑ RFID Sensor Module
- ☑ Neo 6m v2 GPS Module
- ☑ 16 Bit I2C 4 Channel ADC using ADS1115 module
- ☑ 40 Pin GPIO Extension Board for Raspberry Pi
- ☑ Pilot lamp Indicator
- ☑ Pi camera Module
- ☑ USB to Serial converter
- ☑ DC Motor
- ☑ 600 Tie Points Bread Board Area provided

Note: Specifications are subject to change.

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ARDUINO Application Board

Order Code - 52072C

Specification

ARDUINO UNO/MEGA BOARD

- ☑ Microcontroller ATmega328
- ☑ Operating Voltage 5V
- ☑ Input Voltage (recommended) 7-12V
- ☑ Input Voltage (limits) 6-20V
- ☑ Digital I/O Pin14 (of which 6 provide PWM output)
- ☑ Analog Input Pins 6
- ☑ DC Current per I/O Pin 40 mA
- ☑ DC Current for 3.3V Pin 50 mA
- ☑ Flash Memory 32 KB (ATmega328) of which 0.5 KB used by bootloader
- ☑ SRAM 2 KB (ATmega328)
- ☑ EEPROM 1 KB (ATmega328)
- ☑ Clock Speed 16 MHz

On Board Applications

- ☑ 4 Input Switches to give Digital Input
- ☑ 4 LEDs to display Digital Output
- ☑ 4 digit Seven segment displays
- ☑ 16*2 Alphanumeric LCD
- ☑ Miniature Buzzer
- ☑ 12V SPDT Relay
- ☑ Fingerprint Sensor Module
- ☑ RFID Sensor Module
- ☑ Neo 6m v2 GPS Module
- ☑ 16 Bit I2C 4 Channel ADC using ADS1115 module
- ☑ 40 Pin GPIO Extension Board for Arduino
- ☑ Pilot lamp Indicator

Interconnection

All interconnections are made using 0.8mm Single stand wires.

- ☑ Test points are provided to analyze signals at various points.
- ☑ All ICS are mounted on IC Sockets.
- ☑ Bare board Tested Glass Epoxy SMOBC PCB is used.
- ☑ In-Built Power Supply of 3.3V,+5V & +12V with Power ON indication
- ☑ Attractive ABS Plastic enclosures
- ☑ Set of 0.8mm single stand wires for interconnections

List of Experiments

· Starting and connecting Arduino board with Computer
· Displaying different LED patterns with Arduino
· LCD interfacing with Arduino
· DC Motor Interfacing with Arduino
· Buzzer & relay interfacing with arduino
· Displaying Time over 4-Digit 7-segment Display using Arduino
· Fingerprint Sensor interfacing
· GPS Module Interfacing
· Visitor Monitoring with Camera interfacing.

Note: Specifications are subject to change.

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IOT DEVELOPMENT Board
Order Code - 52072D

General Description

52072D Experimental Set Up has been designed specifically for begineers to learn IOT and apply it in embedded applications. The board contains the necessary components and sensors that covers the basic as well as advanced areas of embedded system. All the practical can be implemented using Arduino Programming Language which is an open source project with codes & library available on github.

Practical experience on this set up carries great educative value for Science and Engineering Students

Experiments

01. Blinking of the ESP32 in Build LED.
02. Inbuild Hall sensor in ESP32.
03. The use of Dual Core of ESP32.
04. Blinking of LED light using the ESP32 Wroom.
05. Controlling LED with Push Button using the ESP32.
06. To Develop Program For Controlling LED Arrays.
07. Establishes a Two Way Serial Bluetooth Communication Between Two Devices
08. Turn on Single LED from Your Phone using the Bluetooth.
09. Control the Array of LED by Mobile Phone using the Bluetooth.
10. Sensing the Temperature by Interfacing LM35 Temperature Sensor using the Bluetooth Module with Mobile.
11. To Interfacing 20*4 LCD with ESP32 Board.
12. To Interfacing OLED with ESP32.
13. OLED Image Display.
14. To Develop Program For Sensing Environment Humidity By Interfacing Humidity Sensor DHT11 With OLED.
15. To Develop Program For Interfacing 7 Segment Display.
16. To Develop Program For Generating Tone Using Buzzer.
17. ADC using the ESP32.
18. To Develop Program For Designing Real Time Clock Using DS1307 IC.
19. To Develop Program to Control DC Motor with ESP32.
20. To Develop Program For Interfacing 4x4 Keypad Matrix with ESP32.
21. To Develop Program For Measuring Distance By Interfacing Ultrasonic Sensor HC- SR04 With ESP32.
22. To Develop Program for Interfacing LDR With ESP32.
23. To Develop Program For Interfacing IR Sensor.
24. Moving Object Detection Detection Using the ESP32 with PIR Sensor.
25. SD Card Module Interfacing Using the ESP32.
26. To Develop Program for Sensing Smoke & Its Level By Interfacing Smoke Sensor MQ-135 with ESP32.
27. ESP32 web servers.

Note: Specifications are subject to change.

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IOT DEVELOPMENT Board

Order Code - 52072D

28. Controlling LED Brightness with the Slider on ESP32 Web Server.
29. Temperature and Humidity using ESP32 web Server.
30. Control outputs with Momentry Switch(Work as Push)
31. OTA (Over The Air Programming).
32. Email Alert Based on Temperature Threshold
33. Different waveform generation using ESP32 on CRO.
34. Telegram control outputs (LED Control).
35. Telegram Detect Motion Using PIR.
36. Telegram Group Controller Using ESP32
37. Web Serial Communication using the ESP32
38. Firebase Realtime Database
39. Telegram Sensor Reading. (Optional)

Features

The board consists of the following:

01 ESP32 Board with USB port for up loading programming and data communication.
02 Alpha Numeric LCD module for Displaying Output Values.
03 Seven segment display module 4 digit for displaying output values.
04 OLED display for displaying output values.
05 MAX232 IC (serial port) with DB9 Connector for communication.
06 Real Time Clock IC used DS1307.
07 SD Card Module for Storage Data.
08 1K pot for variation 09 +5V & +3.3V D.C. at 100mA, IC regulated power supply internally connected.
10 BREAD BOARD One Terminal Strips with 640 tie points and 2 Distribution Strips with 100 tie points each, totaling to 840 tie points. For further expension.
11 Dual DC motor interface using IC L293D Dual H-Bridge Motor Driver with two 5V DC motor.
12 Buzzer for indicating output or to generate tone.
13 8 push switches interface for controlling LED or to use it as an input unit.
14 8 LED interface for indicating output.
15 Humidity Sensor DHT11.
16 Ultrasonic Sensor HC-SR04.
17 Gas/Smoke/Alcohol Sensor MQ-135.
18 Temperature Sensor LM35.
19 PIR Sensor
20 IR Sensor
21 LDR.
22 Keypad Matrix 4x4.
23 Weight : 3.0 Kg. (Approx.)
24 Dimension : W 415 x H 165 x D315

Accessories

01 CD with programs and software
02 Mains Lead.
03 RS-232 Cable.
04 Operating Instruction Manual.
05 Data Cable

Other Apparatus

01 Cathode Ray Oscilloscope 20MHz (CRO).
02 PC System with Windows 7, 8, 8.1 or 10 with 32 or 64 bit Operating System.

Note: Specifications are subject to change.

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Automatic and Intelligent Weather Monitoring Trainer

Order Code - 52072E

52072E-incorporates one of the latest IoT applications in real-time weather monitoring. It provides users to have real-time access of weather data from different locations in areas covered by mobile network.

Weather information like temperature, humidity, wind speed and direction, rainfall, UV index and solar radiation is gathered simultaneously from TESCA WEATHER MONITORING SYSTEM. All the data can be centralized, organized and sent to the observatory through THINKSPEAK/ BLYNK platform. Through cloud management software, the data from weather stations is displayed in the form of dashboard & charts. Since the data transmission is instantaneous, alert is triggered in cloud management software once abnormal weather data is received. The observatory can issue warning signal to the public immediately after poor weather condition is recognized.

Overall TESCA is a very versatile system, allowing users to examine data that is essential to their operations.

Applications:

01. Agriculture
02. Conservation Engineering
03. Environmental Education
04. Weather Services
05. Fire Station
06. Alternative Energy
07. Meteorology
08. Solar Power Project
09. Wastewater Treatment
10. Construction
11. Data Centers
12. Waste Management
13. Disaster Mitigation

Features:

01. High Accuracy Reliability
02. Communication over cloud
03. Battery Charging from Solar Panel
04. Real time Data Access on Web
05. Low Maintenance

Technical Specification

Sensors Specification

01 Air Temperature Sensor (DS18B20):

Operating Range	:	-55°C to +125°C
Accuracy	:	±0.5°C

02 Tmospheric Pressure / Relative Humidity Sensor (BME 280)

Operating Range	:	20-80%
Accuracy	:	1%

03 Wind Speed /Direction Sensor (Provision)

Speed	:	0 to 20,/s
Resolution	:	1m/s
Direction	:	North, East, West, South, North-East, East-South, North-West, South-West

04 Rainfall Sensor (Provision) : Tipping bucket in mm

05 UV Index Sensor (GY-1145)

Response wavelength	:	200nm-370nm
Response time	:	5sec.

06 Solar Radiation Sensor (BH1750)

Output	:	0-2VDC
Range	:	0 to 2000W/m2
Spectral Response	:	400 to 1100nm

07 Power Supply

Battery	:	5V
Solar Panel	:	1.2W
Wireless Transmission	:	Thinkspeak / Blynk

08. Dimension : 200 x 300 x 73mm

09. Weight : 1Kg (Approx)

Note: Specifications are subject to change.

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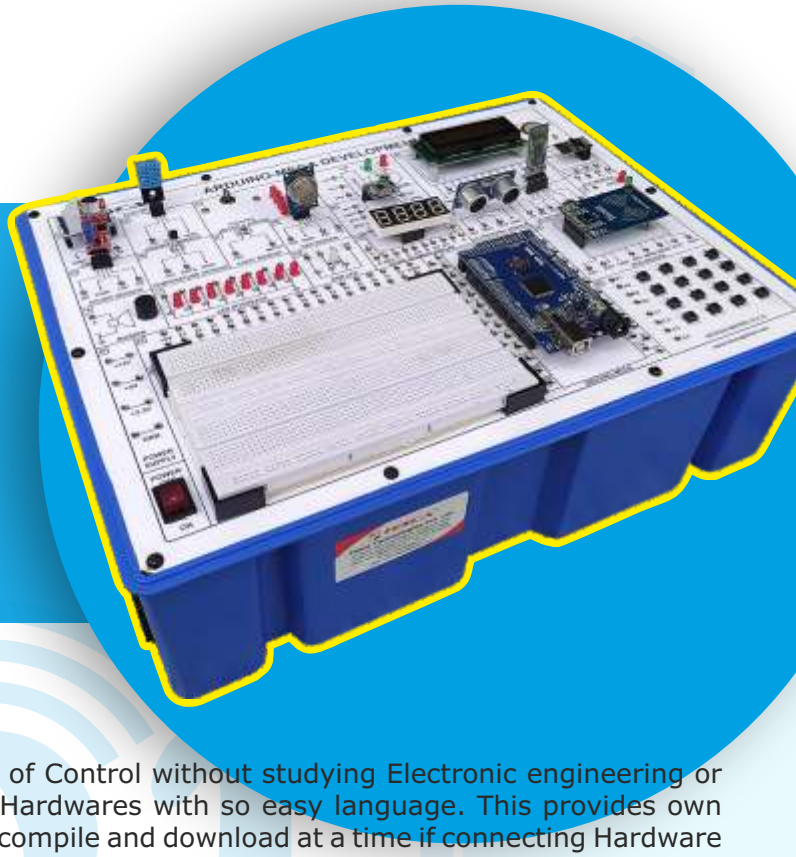
Arduino-Mega Development Board

Order Code - 52072F



Introduction

Ardunio is Open Platform, which can check the result of Control without studying Electronic engineering or Computer engineering , because this makes various Hardwares with so easy language. This provides own Software so we do not need other information. We can compile and download at a time if connecting Hardware with patch codes, programming with Block building program and pushing a button. And we do not need to know the function of Compile and Download. We can see the result immediately and we have increased interests so this will help us use other system. From the process to solve questions of operation one by one continuously, we can study how to control various devices. We can use this to various fields after studying how to use various sensors. This provides Bread board and Ext. Power so user can make other circuit by themselves.

Features

1. Ardunio IDE provided
2. Completely compatible with Arduino Standard Shield
3. Programmable immediately to block program just with basic circuit without wiring
4. Designed for wiring to desired pin
5. The latest version Ardunio 1.0.5.
6. Bread broad and various Powers usable for application
7. 20 kinds of I/O device
8. Available to controlled by Smart phone with built-in Bluetooth and Wireless LAN.

(Note : Android App is not provided)

Specifications

MCU Board

Type	Specification	Remark
MCU	ATmega2560	
Operating Voltage	5V	
Input Voltage	7-12VDC	
Max. Input Voltage	6-20V	
GPIO	70 pin, current 50mA	Including PWM pin
ADC	16Ch	
Flash Memory	256KByte	Bootloader 8KByte
SRAM	8KByte	
EEPROM	4KByte	
Clock	16Mhz	External Crystar
Compatible Shield	Compatible with Arduino Shield	

Note: Specifications are subject to change.

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Arduino-Mega Development Board

Sensor Board

NO	Type	Description	Interface
1	PIR	PIR motion sensing sensor, adjustable Sensitivity and Response Time	GPIO
2	3-axis Gyro	Analog output included, measurable of Tilt	ADC
3	Sound	Sensing after amplifying noisy around. Microphone	ADC
4	LED	SPi RED LED SEA. Controlled with l C chip	GPIO
5	Gas	LNG, LPG, Propane, Butane measurable.2,000-10,000 PPM measurable	ADC
6	Wi-Fi	Chip Antenna IEEE 802.11 b/g 2.4GHz	SPI
7	Ultrasonic	NT-TS601 20cm -400cm distance measurable	GPIO
8	Bluetooth	Connectable directly with Chip Antenna, Smart phone	UART
9	RFID	13.56MHz Read Range SCm,RFID card 2EA. UART type	UART
10	Push Button	4x4 Push Button (16EA button)	GPIO
11	Segment	4Digit, Anode	I^2C
12	Text LCD	16x2 Line	GPIO
13	Piezo Sensor	Used as Buzzer or Speaker. Responded to Shock and Sound waves ADCaround Capacitance 10nF ± 30%	GPIO ADC
14	RGB LED	Various colors displayable with adjusting brightness of each Red, Green, Blue	GPIO
15	Humidity Sensor	Measuring Analog output value by Humidity, 0-100% humidity measured	GPIO
16	Buzzer	Operating voltage :5VDC / Frequency: 2400 ±50Hz, Current consumption: Max. 35mA / SPL: Min. 90dB	ADC PWM
17	Light Sensor	Analog output by brightness, 20 Ix - 100 Ix, connected with ADC	ADC
18	Temp. Sensor	Digital Temperature Measurement sensor, error 40°C-125°C (±0.5°C)	I^2C
19	Step Motor	1.8°/pulse, Wheel provided	PWM
20	DC Motor	Output avg. Current 1.2A, max. 3.2A, Wheel provided	PWM

Main Configuration

Circuit in Arduino-Mega Development Board is composed enough to make us understand the system basically. And this provides Bread board and various Voltages. We can use Bread board to make application circuit and test it.

1. PIR sensor
2. Humidity sensor
3. Step motor
4. DC motor
5. Sound sensor
6. Temperature sensor
7. Light sensor
8. Gas sensor
9. 3 axis Gyro sensor
10. Buzzer
11. LED 8EA
12. RGB LED 1EA
13. Seven Segment Display
14. TEXT LCD
15. Piezo sensor
16. Ultrasonic Distance sensor
17. Bluetooth module
18. Wi-Fi Module
19. Red/Green LED
20. 16EA Buttons
21. Bread board
22. Adruno-Mega
23. Wiring port(corresponded to no.21 port)
24. DC voltage(+12V, +5V, +3.3V)
25. 13.56MHz RFID reader

Note: Specifications are subject to change.

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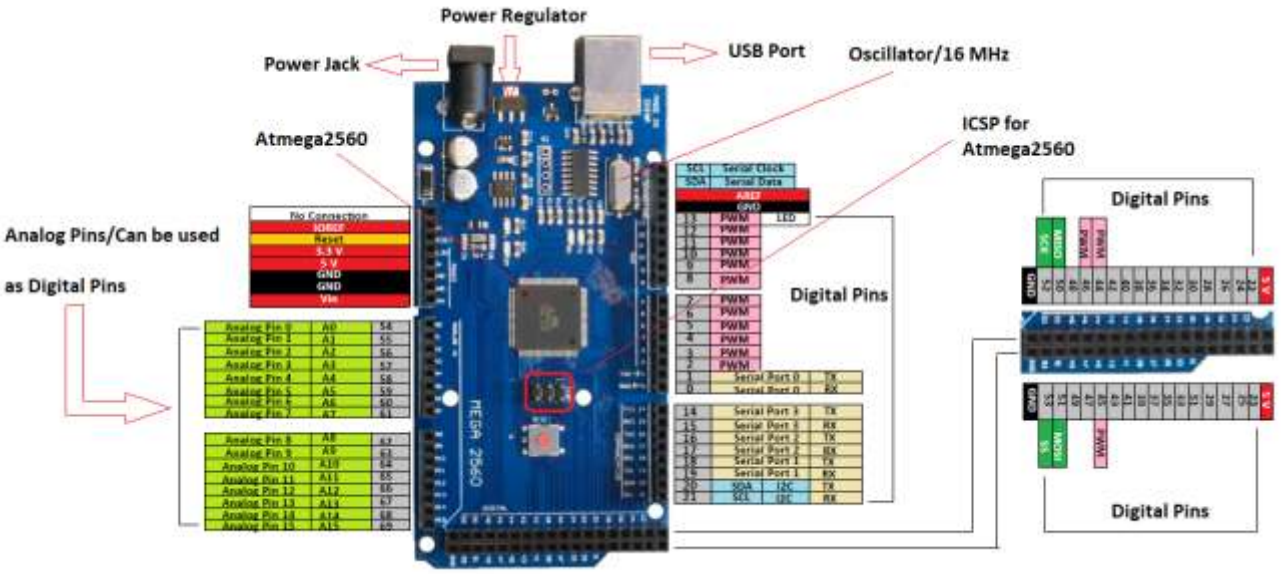
Arduino-Mega Development Board

Block Diagram



List of Experiments

Educational Contents

Learning Arduino-Mega Development Board Arduino programming

- 1st Week – AVR Microcontroller
- 2nd Week – Arduino Development Environment
- 3rd Week – Basic Structure of Arduino Program
- 4th Week – LED and Buzzer Control
- 5th Week – 7 Segment Display
- 6th Week – LCD Display
- 7th Week – Push Button (4x4 Matrix) Control
- 8th Week – DC Motor and Stepper Motor Control
- 9th Week – Humidity and Temperature Sensor Control
- 10th Week – LDR and PIR Sensor Control
- 11th Week – Sound Sensor and Piezo Sensor Control
- 12th Week – Gyro Sensor and Smoke Sensor Control
- 13th Week - Ultra Sonic Sensor Control
- 14th Week – RFID Reader Test
- 15th Week – Bluetooth Test
- 16th Week – Wi-Fi Test

Note: Specifications are subject to change.

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Order Code - 52072G

Arduino-Uno IOT Development Board

Introduction

Arduino is an open-source physical computing platform based on a simple I/O board and a development environment that implements the Processing / Wiring language. Besides easy-to-use hardware and software interface, Arduino is designed to be as flexible as possible to fit your project's needs.

52072G Arduino-UNO IOT Development Board provides an environment for Arduino to interact with different forms of electronics (26 module blocks) with simple codes and connections. With a universal breadboard, it is convenient for students to construct the circuits that are not provided by the 52072G.

Features

1. Ardunio IDE provided
2. Designed for wiring to desired pin
3. The latest version Ardunio 1.0.5.
4. 26 kinds of I/O device
5. Bread broad and various Powers usable for application
6. Completely compatible with Arduino Standard Shield
7. Programmable immediately to block program just with basic circuit without wiring
8. Available to control by Smart phone with built-in Bluetooth and Wireless LAN.

Technical Specifications

MCU Board

Type	Specification
Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328P) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz
LED_BUILTIN	13
Length	68.6 mm
Width	53.4 mm

Note: Specifications are subject to change.

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Arduino-Uno IOT Development Board

Main Configuration

Circuit in Arduino-UNO IOT Development Board is composed enough to make us understand the system. In addition, this provides Breadboard and various Voltages. We can use Breadboard to make application circuit and test it.

1. Arduino Uno
2. Power Supply
3. 4x4 Keypad
4. DIP Switch
5. CDS & Microphone
6. Joystick
7. Accelerometer
8. Humidity/Temperature Sensor
9. IR Line Tracer
10. Ultrasonic
11. Slide Potentiometer
12. LED Matrix
13. LED Bar
14. 1W LED
15. RGB LED
16. Serial RGB LED
17. I2C LCD 16x2
18. 4-Digit-Segment Display
19. Buzzer
20. Relay
21. Servo Motor
22. DC Motor
23. Step Motor
24. Bluetooth
25. Wi-Fi
26. Breadboard

List of Experiments

Learning Arduino-Uno Development Board Arduino programming

1. To develop Arduino program for blinking of LED
2. To develop Arduino program for fading of LED
3. To develop Arduino program for controlling LED brightness with a potentiometer
4. To control active and passive buzzers using DIP switches
5. To develop Arduino program for controlling parallel RGB LEDs
6. To develop Arduino program for controlling a 5x5 LED matrix with rainbow colors
7. To develop Arduino program for controlling a 4-digit seven-segment display
8. To develop Arduino program for displaying an emoji on an 8x8 LED matrix
9. To develop Arduino program for displaying text on an i2c LCD
10. To develop Arduino program for interfacing a 4x4 keypad and I2C LCD
11. To develop Arduino program for interfacing mpu6050 and detecting motion
12. To develop Arduino program for interfacing IR sensors and controlling LED bar
13. To develop Arduino program for interfacing dht sensor and displaying temperature and humidity on LCD
14. To develop Arduino program for interfacing smoke sensor and activating alarm system
15. To develop Arduino program for interfacing ultrasonic sensor and displaying distance on LCD
16. To develop Arduino program for interfacing LDR and controlling LED
17. To develop Arduino program for interfacing KY-038 sound sensor module and controlling LED
18. To develop Arduino program for controlling two dc motors using L293D motor driver
19. To develop Arduino program for controlling a step per revolution motor using the stepper library
20. To control two axis servo motors using a joystick
21. To develop Arduino program for remote control LED using Bluetooth module (HC-05) and remotexy platform
22. To develop Arduino program for remote control LED relay using wifi module (ESP-01) and remotexy platform

Note: Specifications are subject to change.

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Raspberry Pi Kit

Description

The Raspberry Pi is a mini computer allowing people of all ages to explore the world of computers and to learn how to code in programming languages, such as Scratch or Python. Just like a desktop PC, this credit card sized computer is capable of browsing the internet , playing videos, making spreadsheets, processing word document, and playing games.

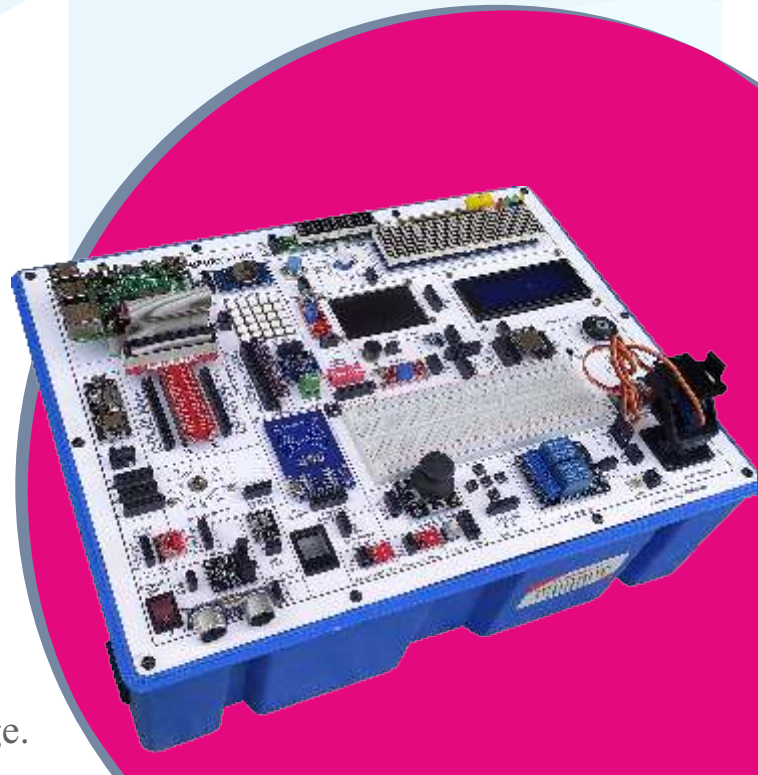
The 52072I Tutor for Raspberry Pi provides an environment for Raspberry Pi to interact with the outside world through different forms of electronics (16 faya - nugget electronic blocks). Students can efficiently learn and create various digital maker projects through simple connections and simple Python codes in the tutorials provided.

Features

- The trainer includes various 1/0 peripherals Suitab le for learning Raspberry Pi projects.
- There are step- by-step procedures in the experiment manual for the Python programming language.
- An independent power supply is provided to maximize the number of peripheral modules.
- Three sets of 1/0 ports are extended around the working area for easy signal connection.
- Two sets of independent DAC/ADC are built in to expand more experimental circuits.

List of Available Components

1. Active Electromagnetic Buzzer (Pack of 5) 5V
2. ADC 4 channel Module with Programmable Gain AmplifierI2C ADS1115 16 Bit
3. BMP180 Digital Barometric Sensor Module compatible with Arduino
4. Breadboard Solderless Transparent 830 Points
5. Capacitive Proximity Sensor Detection Distance(5mm) CRJ-A12-5ANB NPN M12 Pro-Range
6. Correlation Photoelectric Infrared Count Slot Sensor Module 10 mm
7. DAC Breakout Development Board CJMCU MCP4725 I2C
8. DC JACK-005
9. DC Motor Driver MX1508 Dual H Bridge
10. DC-DC Step-Down Buck Converter Power Supply Module 24V 12V 9V to 5V 5A 25W
11. DF Player -A Mini MP3 Player DF Robot
12. Digital LDR Module
13. Digitek (DCR-007) High-Speed Multi-Card Reader Supports All Standard
14. DIP Switch 8 Way Slide Type Red - DS-08R
15. Dual-Channel 24 Bit Precision A/D weight Pressure Sensor HX711
16. Fast Charging Adapter Module DC5521 PD65W
17. Fast Charging Braided Type C Data Cable Amazon Brand - Solimo (1 Meter, Black)
18. Fingerprint Reader Optical Sensor Module Optical R307
19. Hall Effect Sensor Module A3144
20. INA219 I2C Current/Power Supply Monitoring Module CJMCU-219
21. Joystick Module Breakout Sensor Ps2
22. LCD Display with IIC/I2C Interface LCD2004
23. LED Dot Matrix 4 In 1 Display with 5P Line Module MAX7219
24. Led red green blue yellow 3mm
25. Linear Slide Potentiometer 10k
26. Memory Card with Adapter Amazon Basics 32GB Micro SDHC



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Raspberry Pi Kit

27. Raspberry Pi 4 Model-B with 8 GB RAM
28. Reed Magnetic switch Module
29. Relay Module 5V sugar cube dual channel
30. RFID Reader/Writer RC522 SPI S50 with RFID Card and Tag
31. RGB LED Matrix WS2812 5050 5x5 Digit
32. RTC Module Precise Real Time Clock I2C AT24C32 without cell Ds3231
33. Screw Terminal Block 3 Pin
34. Self-Lock Switch-KFC-8X8-A
35. Servo bracket PT pan/tilt camera platform 2-Axis FPV Techtonics for SG90 MG90
36. Servo Motor Tower Pro SG90-Good Quality
37. Seven Segment Display Module Control Module MAX7219 Digital Tube
38. SMPS NHP 12V 5A 60W Plastic Case Single Output
39. Sound Detection Module Sensor for Intelligent Vehicle Compatible with Arduino
40. Step-Down Buck Converter Power Module Mini 360
41. Stepper Motor DC 5V 28BYJ-48
42. Stepper Motor Driver Module ULN2003A
43. T Type GPIO Breakout board with 40 pin Cable and 400pt Breadboard for Raspberry Pi 3
44. Tact Switch 6x6x5 (Pack of 10)
45. Thermistor 1% NTC MF52 100K ohm 3950 (Pack of 5)
46. Touch Key Module TTP223– 2Pcs
47. Ultrasonic Sensor HC-SR04
48. WaveshareOLEDDisplay Module,128×64 Resolution, 2.42inch SPI/I2C Communication (White)
49. 4G Development Board with GNSS/GPS & BLE **(Optional)**
50. RPi Pi 4 CSI Camera Module 5MP Webcam Support 1080p 720p Video for Pi 4 Model B Pi 3 Model B/B+ **(Optional)**

Specifications:

- Input: - 110/220VAC, 50Hz/60Hz
- Output: - +12V 10Amp, +5V 5Amp, 3.3V 3Amp

Control Board:

- Raspberry pi 4 Model B (8GB Ram)
- Memory Card: Amazon Basics 32GB
- Power Supply: 65W PD power Delivery Module
- Heat Sink & Fan for Raspberry pi (Optional)

List of Experiments

1. **Active Electromagnetic Buzzer (Pack of 5) 5V**
   Create a sound alarm system using the buzzer. Use Python to control the buzzer with GPIO pins to produce different tones or patterns.
2. **ADC 4 Channel Module with Programmable Gain Amplifier (ADS1115)**
   Measure analog signals from sensors (e.g., potentiometer, thermistor) and convert them to digital values using the ADS1115. Display the readings on the Raspberry Pi.
3. **BMP180 Digital Barometric Sensor Module**
   Build a weather station to measure temperature, pressure, and altitude. Log the data and display it on an LCD or send it to a cloud platform.
4. **Breadboard Solderless Transparent 830 Points**
   Use the breadboard to prototype circuits for various sensors and modules, such as LEDs, buttons, and sensors.
5. **Capacitive Proximity Sensor (CRJ-A12-5ANB)**
   Detect the presence of objects within 5mm using the proximity sensor. Use it to trigger an action, such as turning on an LED or buzzer.
6. **Correlation Photoelectric Infrared Count Slot Sensor Module**
   Build an object counter using the infrared sensor. Count objects passing through the slot and display the count on an LCD or serial monitor.
7. **DAC Breakout Development Board (MCP4725)**
   Generate analog signals using the MCP4725 DAC. Use it to control the brightness of an LED or the speed of a motor.
8. **DC JACK-005**
   Power the Raspberry Pi or other components using the DC jack. Test different power sources and measure their efficiency.
9. **DC Motor Driver (MX1508 Dual H-Bridge)**
   Control the speed and direction of a DC motor using the MX1508 driver. Interface it with the Raspberry Pi and create a small robot or fan control system.
10. **DC-DC Step-Down Buck Converter (24V to 5V)**
    Step down a higher voltage (e.g., 12V or 24V) to 5V to power the Raspberry Pi or other components. Measure the output voltage and current.
11. **DF Player Mini MP3 Player**
    Play audio files using the DF Player. Create a music player or sound effects system controlled by the Raspberry Pi.

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12. **Digital LDR Module**
    Measure light intensity using the LDR module. Use it to automatically control LED brightness or trigger a light-based alarm.
13. **Digitek Multi-Card Reader (DCR-007)**
    Read and write data to SD cards using the card reader. Use it for data logging or storing media files.
14. **DIP Switch 8-Way Slide Type**
    Use the DIP switch to configure settings or input binary data into the Raspberry Pi. Create a simple binary input system.
15. **Dual-Channel 24-Bit Precision A/D Weight Pressure Sensor (HX711)**
    Build a digital weighing scale using the HX711 and a load cell. Display the weight on an LCD or serial monitor.
16. **Fast Charging Adapter Module (PD65W)**
    Test fast charging capabilities for compatible devices. Measure the power output and efficiency.
17. **Fast Charging Braided Type-C Data Cable**
    Use the cable to power the Raspberry Pi or transfer data. Compare its performance with other cables.
18. **Fingerprint Reader Optical Sensor Module (R307)**
    Create a fingerprint-based access control system. Store and match fingerprints using the Raspberry Pi.
19. **Hall Effect Sensor Module (A3144)**
    Detect magnetic fields using the Hall effect sensor. Use it to count rotations or trigger actions based on magnetic proximity.
20. **INA219 I2C Current/Power Supply Monitoring Module**
    Measure current, voltage, and power consumption of a circuit. Use it to monitor the power usage of the Raspberry Pi or other devices.
21. **Joystick Module Breakout Sensor (Ps2)**
    Use the joystick to control a servo motor, LED, or robot. Map the joystick movements to specific actions.
22. **LCD Display with IIC/I2C Interface (LCD2004)**
    Display sensor data, system status, or custom messages on the LCD. Interface it with the Raspberry Pi using I2C.
23. **LED Dot Matrix 4-in-1 Display (MAX7219)**
    Create scrolling text or animations on the LED matrix. Use the MAX7219 driver to control the display.
24. **LED (Red, Green, Blue, Yellow) 3mm**
    Build a traffic light system or RGB color mixer. Control the LEDs using GPIO pins.
25. **Linear Slide Potentiometer (10k)**
    Use the potentiometer as an analog input to control the brightness of an LED or the speed of a motor.
26. **Memory Card with Adapter (32GB Micro SDHC)**
    Use the memory card to expand the Raspberry Pi's storage. Install an operating system or store data.
27. **Raspberry Pi 4 Model-B with 8 GB RAM**
    Use the Raspberry Pi as the central controller for all experiments. Explore its capabilities, such as running multiple sensors, cameras, and displays simultaneously.
28. **Reed Magnetic Switch Module**
    Detect the presence of a magnet using the reed switch. Use it to trigger an alarm or log events.
29. **Relay Module 5V (Dual Channel)**
    Control high-power devices (e.g., lights, fans) using the relay module. Interface it with the Raspberry Pi to automate appliances.
30. **RFID Reader/Writer (RC522)**
    Create an RFID-based access control system. Read and write data to RFID cards and tags.
31. **RGB LED Matrix (WS2812 5x5)**
    Create dynamic lighting effects or patterns on the RGB matrix. Use Python libraries to control the LEDs.
32. **RTC Module (Ds3231)**
    Build a real-time clock system. Use the RTC module to keep accurate time even when the Raspberry Pi is powered off.
33. **Screw Terminal Block (3 Pin)**
    Use the terminal block to securely connect wires for sensors or actuators. Test its reliability in high-current applications.
34. **Self-Lock Switch (KFC-8X8-A)**
    Use the self-lock switch to control power to a circuit. Test its functionality in a simple on/off system.
35. **Servo Bracket PT Pan/Tilt Camera Platform**
    Build a pan/tilt camera system using the servo bracket and SG90 servos. Control the camera's movement using the Raspberry Pi.
36. **Servo Motor (Tower Pro Sg90)**
    Control the servo motor to rotate to specific

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Raspberry Pi Kit

angles. Use it in a robotic arm or camera positioning system.

37. **Seven Segment Display Module (MAX7219)**
    Display numbers or simple characters on the seven-segment display. Use it for a countdown timer or scoreboard.
38. **SMPS (12V 5A 60W)**
    Power the Raspberry Pi and other components using the SMPS. Test its efficiency and stability.
39. **Sound Detection Module**
    Detect sound levels using the module. Use it to trigger actions, such as turning on lights or recording audio.
40. **Step-Down Buck Converter (Mini 360)**
    Step down a higher voltage (e.g., 12V) to 5V or 3.3V to power the Raspberry Pi or sensors.
41. **Stepper Motor (28BYJ-48)**
    Control the stepper motor to rotate precisely. Use it in a 3D printer or CNC machine prototype.
42. **Stepper Motor Driver Module (ULN2003A)**
    Drive the stepper motor using the ULN2003A driver. Test different stepping modes and speeds.
43. **T-Type GPIO Breakout Board**
    Use the breakout board to easily connect multiple sensors and modules to the Raspberry Pi's GPIO pins.
44. **Tact Switch (6x6x5)**
    Use the tactile switches as input buttons. Create a simple game or control system using the switches.
45. **Thermistor (NTC MF52 100K)**
    Measure temperature using the thermistor. Use it in a temperature monitoring system.
46. **Touch Key Module (TTP223)**
    Create a touch-sensitive switch using the TTP223 module. Use it to control lights or other devices.
47. **Ultrasonic Sensor (HC-SR04)**
    Measure distance using the ultrasonic sensor. Use it in a obstacle avoidance system or distance logger.
48. **Waveshare OLED Display Module (128x64)**
    Display graphics, text, or sensor data on the OLED screen. Use it for a compact user interface.
49. **4G Development Board with GNSS/GPS & BLE**
    Build a GPS tracking system or IoT device with 4G connectivity. Use BLE for wireless communication.
50. **RPi Pi 4 CSI Camera Module (5MP)**
    Capture images or video using the CSI camera. Use it for surveillance, object detection, or time-lapse photography.

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AI-IOT Robotic Kit

Powerful Raspberry Pi 4B model, sensors, and necessary accessories and is ready to develop AI, IoT, and robotic applications

52072K AI IOT Robotic Kit; all-in-one solution for building AI , IOT and robotic systems. Tailored for researchers, students, and developers, it includes the powerful Raspberry Pi Model B 4 (4GB) at its core, integrated with a suite of supporting accessories and hardware for robotics and automation applications.

Key Features

1. **Raspberry Pi Model B 4 (4GB RAM):**
   - Quad-core ARM Cortex-A72 CPU
   - Supports 4K video output
   - Dual-band Wi-Fi and Bluetooth 5.0
   - USB 3.0 for faster data transfer

2. **Motor and Servo Control:**
   - 16-channel PWM servo driver for precise motor control
   - DC motor driver module supporting up to 4 motors
   - Servo motor (3 included) for robotic arm movement

3. **Sensors for Robotics and IoT Applications:**
   - Ultrasonic distance sensor
   - IR sensor for line following
   - MPU6050 Gyroscope and Accelerometer for motion tracking
   - Optical encoder for speed and position monitoring

4. **AI and Vision Integration:**
   - Raspberry Pi Camera Module (8MP or higher)
   - Compatible with TensorFlow Lite for on-device machine learning
   - Preloaded software for face, object, and gesture recognition

5. **Connectivity and Expansion:**
   - GPIO pin access for custom sensor and module interfacing
   - HDMI output for display connectivity
   - Preloaded OS with software development tools (Python, Scratch, etc.)

6. **Power System:**
   - 7.4V rechargeable lithium-ion battery with 5V step-down regulator for powering the Raspberry Pi and motors
   - USB-C power adapter for Raspberry Pi

7. **Chassis and Build:**
   - High-quality aluminum robotic car chassis
   - Four-wheel drive with adjustable mounting slots for sensors and servos
   - Compact and modular design

8. **Cloud Integration:**
   - Compatible with popular IoT platforms like ThingSpeak, AWS IoT, and Azure IoT
   - Preconfigured to send data via HTTP, MQTT, or WebSocket

9. **Development and Learning Resources:**
   - Detailed documentation and tutorials for beginners and advanced users
   - Preloaded with robot control software and test codes

Note: Specifications are subject to change.

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Kit Contents

1. Core Components:

- Raspberry Pi Model B 4 (4GB RAM)
- Raspberry Pi OS preloaded on a 32GB micro SD card
- Camera Module (8MP or higher)

2. Actuation Components:

- 4x DC motors with encoders
- 3x Servo motors
- Motor driver module (L298N or equivalent)
- 16-channel PWM Servo Driver

3. Sensors:

- 1x Ultrasonic Sensor (HC-SR04)
- 1x IR Sensor
- 1x MPU6050 Module

4. Power Supply:

- 7.4V 2500mAh rechargeable battery
- USB-C power adapter

5. Accessories:

- Aluminum robotic car chassis with wheels
- Mounting hardware and screws
- Jumper wires and GPIO expansion board

Robotic Applications

- Autonomous robotic vehicles
- Gesture-controlled robots
- AI-powered vision systems
- IoT-based home automation
- Industrial automation projects
- Target tracking and following
- Autonomous navigation robot with SLAM

AI IoT Applications:

- Implementing facial recognition
- Smart Healthcare Monitoring
- Edge AI application
- Implementing Emotion Detection
- Implementing text analysis applications
- collect data from IoT devices and process the data with AI models for real-time analysis, predictions, or optimization of IoT systems.
- Smart traffic flow monitor or speed track analytics
- Tracking the movement of a particular person or object
- Real-time Language Translation
- Smart Vision Brightness Control
- Cursor Control via Webcam

Basic IoT Applications (ESP32):

- Home Automation
- Bluetooth enabled applications
- Voice/speech controlled IoT devices
- Thingspeak/Blynk Cloud-based applications
- M2M communication using Wireless

Benefits

- Open-source Flexibility: Fully compatible with Python, Open CV, and other open-source software.
- Modularity: Easily customizable for various robotic applications.
- Performance: Combines the computational power of the Raspberry Pi 4 with precise motor and sensor integration.
- Automation: Automates decision-making processes, reducing the need for human intervention and increasing efficiency
- Real-time Processing: Supports real-time analytics, enabling quick responses and adaptive behavior in dynamic environments
- Data Collection and Analytics: Facilitates the collection of large volumes of sensor data, which can be used for analysis and predictive maintenance.

Note: Specifications are subject to change.

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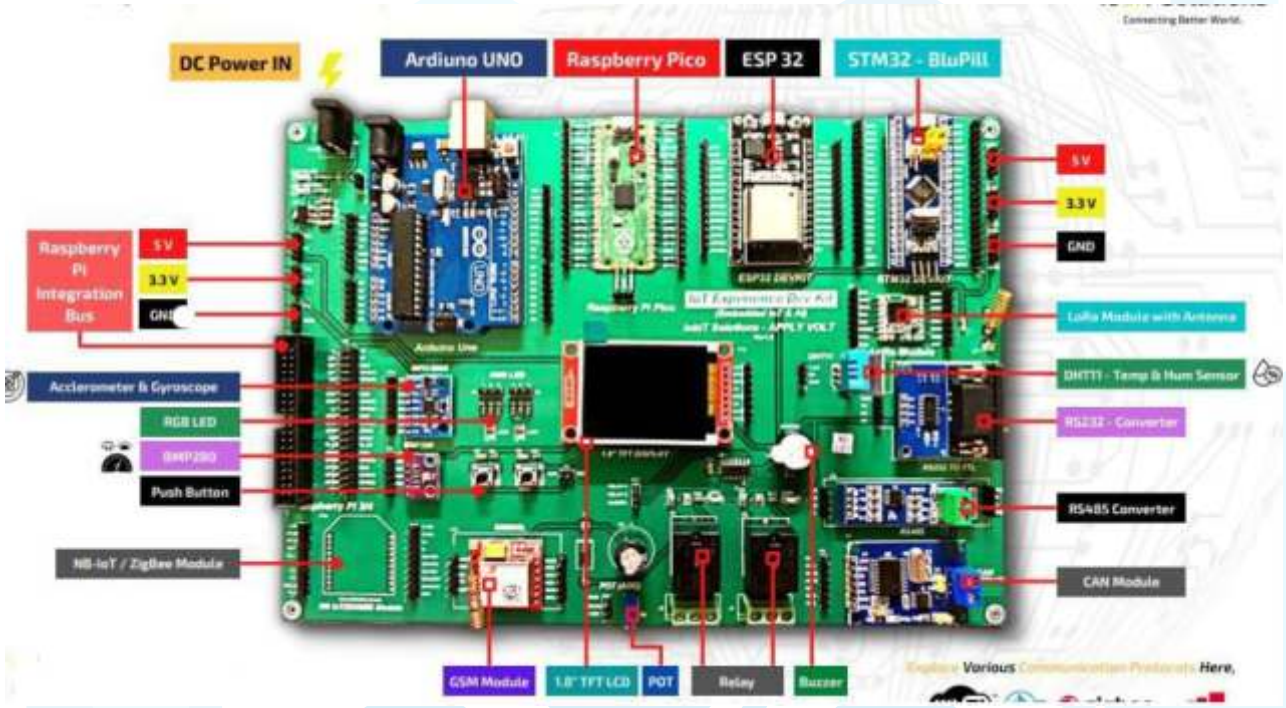

IOT4U - Four Industrial Microcontrollers and ready to use with a various Wireless protocol's like Wi-Fi, BLE, LoRa and Embedded AI/ML with onboard sensors

We have designed a new Variant of Multi-controller IoT4U, which is ready to use with a various Wireless protocol's like Wi-Fi, BLE, LoRa and Embedded AI/ ML with onboard sensors. In "IoT4U Kit" students can perform more than 200+ lab experiments.

Technical Specifications

- Raspberry Pi Bus Interface (External I/F)
- Ardiuno Uno Module
- Raspberry PiCo Module
- ESP32 Module
- STM32 Module
- RFM95W – LoRa Module with onboard Antenna
- 1.8" TFT LCD
- 2 Channel onboard Relay
- Accelerometer and Gyroscope Sensor (MPU6050)
- Pressure Sensor (BMP280)
- Temperature and Humidity Sensor (DHT11)
- RGB LED, Push Button, POT and Buzzer
- GSM Module
- RS232 Convertor
- RS485 Convertor
- CAN Module
- NB-IoT/Zigbee Module (Provision)
- External Power Pins (5V & 3.3V)

Note: Specifications are subject to change.

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On Board Sensors

Description	Specifications
MPU6050 Sensor	• Operating Voltage (VDC): 3 ~ 5 • Communication: I2C Protocol • Gyro range(Â°/s): Â± 250, 500, 1000, 2000 • Acceleration range(g) : Â± 2 Â± 4 Â± 8 Â± 16
BMP280	• Operating voltage (v) : 1.71 ~ 3.6 • Peak current : 1.12mA • Operating Pressure: 300 hPa ~ 1100 hPa. • Operating Temperature:-40 ~ +85 Â°C
DHT 11	• Power Supply: 3.3~5.5V DC • Measurement Range: Humidity 20-90%RH, Temperature 0~50°C • Accuracy: Humidity +-5%RH, Temperature +-2°C • Resolution: Humidity 1%RH, Temperature 1°C
1.8" TFT Display	• Display Size (inch) : 1.8 • Input Voltage (V) : 3.3 to 5 • Pixel Resolution : 128 x 160 • Interface Type : SPI
Relay	5V - 10A
Potentiometer	100 K
Pushbutton	SPST
Buzzer	5V
RGB LED	5V RGB LED

Communication Models

Description	Specifications
LoRa	Frequency : 865 -867MHz | Power Output Capability : +20 dBm 100 mW | Voltage range: 1.8V to 3.6V
RS232	IC Chip: MAX3232 | Operating Voltage: 3.3-5.5V
RS485	IC Chip : MAX485 | Operating Voltage (VDC) : 5 V
CAN	CAN transceiver TJA1050 Supports CAN V2.0B
Zigbee / NB-IoT	Zigbee - 2.4GHz for worldwide deployment | NB-IoT - BC95-B5
GSM	SIM 800L 850/900/1800/1900MHz | GPRS data (TCP/IP, HTTP, etc.).

Note: Specifications are subject to change.

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Microcontroller Details

Parameters	Arduino UNO	ESP 32	STM32 - BLUPILL	PI PICO
Architecture	RISC	RISC	RISC	RISC
Pin Count	20	36	47	40
SRAM	2 KiloBytes	512 kiloByes	20 kiloBytes	264 KiloBytes
Serial wire Debug	1	1	1	1
Flash Memory	32 KiloBytes	4MB	64/128 KiloBytes	2MB
CPU speed	16 MHz	80 MHz	72 MHz (max)	133 MHz
USB Connector	USB-B	Micro	Micro	Micro
ADC	6	18	2	3
On-Board Wireless Interface	Nil	WiFi & BLE	Nil	Nil
USB module	Yes	Yes	Yes	Yes
I2C	1	2	2	2
SPI	1	3	2	2
UART	2	2	2	2
I2C	2	2	2	2
Operational Temperature	-40°C to +125°C	-40°C to +125°C	-40C – +105C	-20°C to +85°C
Source/Sink Current	20mA	6 mA	6 mA	6 mA
Operational Voltage	5v	3.3v	2.0V – 3.6V	3.3v
USART module	Yes	Yes	Yes	Yes
Internal Oscillator	16 MHz	4-16 MHz	4-16 MHz	4-16 MHz
Ext. Wireless Protocol	LoRa	LoRa	LoRa	LoRa
AI / ML	Yes	Nil	Nil	Yes

Note: Specifications are subject to change.

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IOT Workbench

Order Code - 53000: **IoT Workbench** is designed to provide a seamless plug-and-play experience, making it effortless to establish connections and enabling students, hobbyists, enthusiasts, and professionals to focus more on program and application development. Equipped with onboard I/Os, communication interfaces, and peripherals, this workbench is an all-in-one solution for IoT projects, prototyping, and experimentation. It eliminates the need for soldering, allowing users to design, test, and experiment with circuits quickly and efficiently. Widely adopted in educational institutions and R&D labs across the globe, this workbench is the perfect platform for innovation.

Raspberry Pi 4

At the heart of this IoT Workbench is the Raspberry Pi 4, a powerful single-board computer that delivers exceptional performance. It features a quad-core ARM Cortex-A72 processor, up to 8GB of RAM, dual 4K HDMI outputs, USB 3.0 ports, and Gigabit Ethernet. With its robust processing power and extensive connectivity options, the Raspberry Pi 4 is ideal for developing advanced applications, from home automation and multimedia systems to AI and machine learning projects.

ESP32-S3

The ESP32-S3 is a standout component of this workbench, offering enhanced features for IoT and wireless applications. As the successor to the popular ESP32, it combines Wi-Fi and Bluetooth 5 (LE) capabilities, making it perfect for connected projects. Its dual-core processor ensures efficient multitasking, while its low power consumption makes it suitable for battery-operated devices. With a rich set of peripherals and GPIOs, the ESP32-S3 is a powerhouse for IoT development, enabling seamless integration with sensors, actuators, and cloud platforms.

Raspberry Pi Pico W

The Raspberry Pi Pico W adds a compact yet powerful dimension to this IoT Workbench. Built around the RP2040 microcontroller, it features a dual-core ARM Cortex-M0+ processor and 2.4GHz Wi-Fi connectivity. This tiny but mighty board is perfect for projects requiring a small footprint and wireless communication, such as sensor networks, wearable devices, and smart home applications.

Arduino Pro Micro

The Arduino Pro Micro 5V 16M is a compact and versatile microcontroller development board that brings the power of the ATmega32U4 microcontroller to your IoT Workbench. Designed for projects requiring a small form factor and USB connectivity, this board is an excellent choice for hobbyists, students, and professionals alike. Its integration of USB functionality directly into the microcontroller eliminates the need for an external USB-to-serial converter, making it ideal for projects where space and efficiency are critical.

Main Highlighting Features of 53000-IoT Workbench

- Beginner-Friendly & Versatile: IoT Workbench offers a range of development kits and boards designed for ease of use, making them ideal for beginners and professionals alike. The platform is supported by a large community, ensuring ample resources for learning and troubleshooting.
- Connectivity & Performance: Equipped with Wi-Fi and Bluetooth-enabled microcontrollers, IoT Workbench provides cost-effective, high-performance, and energy-efficient solutions for IoT applications .
- comprehensive Learning Resources: The platform includes extensive tutorials and resources to facilitate hands-on learning, enabling users to build and prototype IoT solutions quickly.

Note: Specifications are subject to change.

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- Modular & Scalable: IoT Workbench integrates a modular approach with Grove sensors, streamlining IoT prototyping through plug-and-play components that simplify hardware
- integration.
- End-to-End IoT Ecosystem: Beyond hardware, IoT Workbench offers an end-to-end IoT platform, including connectivity, device management, and cloud integration for seamless deployment.
- Cloud & AI Integration: By leveraging the power of Azure IoT Cloud, IoT Workbench enables seamless data processing and real-time analytics. Additionally, its AI-powered edge computing capabilities makeit ideal for advanced IoT applications.
- Industrial & Consumer Applications: Whether for industrial automation or consumer IoT projects, IoT Workbench provides high-performance development kits tailored to diverse needs.
- Cost-Effective & Flexible: Designed for both hobbyists and professionals, IoT Workbench delivers modular IoT solutions that balance affordability with powerful functionality.
- Robust Sensor & Hardware Technology: With a strong foundation in sensor technology and hardware development, IoT Workbench ensures reliable performance across various IoT environments.

List of Experiments

1. Experiments for IoT Workbench
2. Blinking the Onboard LED of ESP32-S3 and Raspberry Pi Pico W
3. Learn basic GPIO control by blinking the built-in LEDs on both microcontrollers.
4. Interfacing the LM35 Temperature Sensor with ESP32-S3
5. Measure ambient temperature and display it on the serial monitor.
6. Dual-Core Processing on ESP32-S3
7. Explore multitasking by running two independent tasks on the dual-core processor.
8. Controlling WS2812 RGB LED Matrix with Raspberry Pi Pico W
9. Create dynamic lighting patterns using the 5x5 RGB LED matrix.
10. Interfacing the MCP4725 DAC with Raspberry Pi 4
11. Generate analog signals using the I2C DAC module.
12. Reading Analog Signals with ADS1115 16-Bit ADC
13. Measure precise analog inputs using the ADS1115 module.
14. Creating a Web Server on Raspberry Pi 4
15. Host a simple web server to control GPIO pins remotely.
16. Bluetooth Communication Between ESP32-S3 and Mobile Phone
17. Send and receive data over Bluetooth using the ESP32-S3.
18. Interfacing the 20x4 LCD Display with I2C
19. Display sensor data or system information on the LCD.
20. OLED Display with ESP32-S3
21. Show text, graphics, and sensor readings on the Waveshare OLED display.
22. Fingerprint Authentication with R307 Sensor
23. Implement a fingerprint-based security system using the R307 module.
24. RFID-Based Access Control with Rc522
25. Use RFID cards and tags to create an access control system.
26. Stepper Motor Control with ULN2003A and 28BYJ-48
27. Control the stepper motor using the ULN2003A driver.
28. Servo Motor Control with Raspberry Pi Pico W
29. Use the SG90 servo motor for precise angle control.
30. Interfacing the HX711 Weight Sensor
31. Measure weight using the HX711 module and a load cell.
32. Real-Time Clock (RTC) with Ds3231
33. Implement a precise clock using the DS3231 module.
34. Human Motion Detection with HLK-LD2420 Radar Sensor
35. Detect human presence using the 24GHz radar sensor.
36. Interfacing the MAX7219 LED Dot Matrix
37. Display scrolling text and patterns on the 4-in-1 LED matrix.
38. Sound Detection with Sound Sensor Module
39. Detect sound levels and trigger actions based on thresholds.
40. MP3 Playback with DFPlayer Mini
41. Play audio files using the DFPlayer Mini module.
42. Interfacing the pH Sensor for Water Quality Monitoring
43. Measure pH levels using the analog pH sensor kit.
44. TDS Sensor for Water Conductivity Measurement
45. Monitor water quality using the TDS sensor module.
46. Waveform Generation with AD9833 DDS Module
47. Generate sine, square, and triangle waves using the AD9833 module.
48. Interfacing the MAX6675 Thermocouple Sensor
49. Measure high temperatures using the K-type thermocouple.
50. Current and Power Monitoring with INA219
51. Measure current, voltage, and power consumption using the INA219 module.
52. Interfacing the PS2 Joystick Module
53. Use the joystick to control motors or other

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peripherals.

54. Interfacing the 4x4 Keypad Matrix
55. Create a password-based system using the keypad.
56. Interfacing the NTC Thermistor for Temperature Measurement
57. Measure temperature using the 100K NTC thermistor.
58. Interfacing the A3144 Hall Effect Sensor
59. Detect magnetic fields using the Hall effect sensor.
60. Interfacing the IR Sensor for Object Detection
61. Detect objects using the infrared sensor module.
62. Interfacing the Capacitive Proximity Sensor
63. Detect nearby objects using the M12 capacitive sensor.
64. Interfacing the Dry Reed Magnetic Switch
65. Use the magnetic switch for door/window monitoring.
66. Interfacing the LDR Module for Light Sensing
67. Measure light intensity using the digital LDR module.
68. Interfacing the Relay Module for High-Power Control
69. Control AC/DC devices using the 5V 10A relay module.
70. Interfacing the MX1508 Motor Driver
71. Control DC motors using the MX1508 dual H-bridge module.
72. Interfacing the PT Pan/Tilt Camera Platform
73. Control the 2-axis camera platform using servo motors.

IoT Board Narration

1. Raspberry Pi 4 Model-B with 8 GB RAM.
2. Raspberry Pi Pico WH.
3. WeAct Studio ESP32-S3-DevKitC-1 ESP32-S3 WiFi Bluetooth-compatible BLE 5.0 Mesh Development Board Wireless Module Micro python.
4. Pro Micro 5V 16M Mini Leonardo Microcontroller Development Board for Arduino.
5. Amazon Basics 32GB Micro SDHC Memory Card with Adapter, Upto 98MB/s, IPX6.
6. NHP 12V 5A 60W Plastic Case Single Output SMPS.
7. DC-DC Step-Down Buck Converter Power Supply Module 24V 12V 9V to 5V 5A 25W.
8. Mini 360 Step-Down Buck Converter Power Module.
9. WS2812 5050 5x5 Digit RGB LED Matrix.
10. MAX7219 Digital Tube Display Module Control Module.
11. MAX7219 LED Dot Matrix 4 In 1 Display with 5P Line Module.
12. LCD2004 Parallel LCD Display with IIC/I2C Interface.
13. Waveshare 2.42inch OLED Display Module, 128×64 Resolution, SPI / I2C Communication.
14. CJMCU MCP4725 I2C DAC Breakout Development Board.
15. I2C ADS1115 16 Bit ADC 4 channel Module with Programmable Gain Amplifier.
16. T Type GPIO Breakout board with 40 pin Cable and 400pt Breadboard for Raspberry Pi 3.
17. Tactile Push Button Switch 6x6x5 (Pack of 10).
18. 5V Active Electromagnetic Buzzer (Pack of 5).
19. DIP Switch 8 Way Slide Type Red - DS-08R.
20. Self-Lock Switch-KFC-8X8-A.
21. MTS-103R-Miniature Toggle Switch-3 Pin (ON-OFF-ON).
22. PS2 Joystick Module Breakout Sensor.
23. BF350 High Precision Resistance Strain Gauge / Pressure Sensor / Weighing Sensor.
24. 10k Sliding Adjustable Linear Potentiometer.
25. LM35 TO-92-3 Board Mount Temperature Sensors.
26. A3144 Hall Effect Sensor Module.
27. Correlation Photoelectric Infrared Count Slot Sensor Module 10 mm.
28. CRJ-A12-5ANB NPN M12 Pro-Range Capacitive Proximity Sensor Detection Distance(5mm).
29. Dry Reed Pipe Magnetron Magnetic Switch Module.
30. ULN2003A Driver Module Stepper Motor Driver.
31. 28BYJ-48 Stepper Motor DC 5V.
32. MX1508 Dual H Bridge DC PWM Stepper Motor Driver.
33. Techtonics Servo bracket PT pan/tilt camera platform 2-Axis FPV for SG90 MG90.
34. Transparent 830 Points Solderless Breadboard.
35. R307 Optical Fingerprint Reader Sensor Module.
36. RFID Reader/Writer RC522 SPI S50 with RFID Card and Tag.
37. 5V 10A Relay Module.
38. NTC MF52 100K ohm 3950 Thermistor 1% (Pack of 5).
39. Sound Detection Module Sensor for Intelligent Vehicle Compatible with Arduino.
40. DFRobot DFPlayer -A Mini MP3 Player.
41. DS3231 RTC Module Precise Real Time Clock I2C AT24C32 without cell.
42. HX711 Dual-Channel 24 Bit Precision A/D weight Pressure Sensor.
43. Digital LDR Module.
44. CJMCU-219 INA219 I2C Interface No Drift Bi-directional Current / Power Supply Monitoring Module.
45. Walk On Air USB Type-C Breakout Female Connector (Receptacle) | 6 Pin USB C Female Socket to 2.54mm Breakout Board | Type C PCB Development Board (Pack of2).
46. Amazon Brand - Solimo Fast Charging Braided Type C Data Cable Joint, Suitable For All Supported Mobile Phones (1 Meter, Black).

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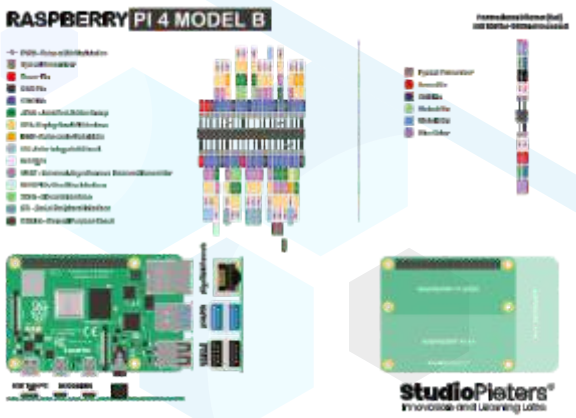
47. USB TYPE C Male Plug Soldering Connector PCB Board.
48. PD65W Fast Charging Adapter Module Dc5521.
49. Multipurpose PCB Ruler Engineering Measuring Tool-1Pcs.
50. DC JACK-005.
51. PD65W Fast Charging Adapter Module Mini Board.
52. Digitek (DCR-007) USB-A 3.0 & Type C High-Speed Multi-Card Reader Supports All Standard SD/SDHC/SDXC and Micro SD/Micro SDHC/Micro SDXC Cards.
53. Hi-Link HLK-LD2420 24Ghz Human Body Micro Motion Sensing Detection Radar Sensor Module HLK-LD2410.
54. MCU-3221 INA3221 Three Way I2C Output Current Power Monitor.
55. NA226 IIC Interface Bidirectional Current Power Monitoring Sensor.
56. GY-9833 AD9833 Programmable DDS Signal Waveform Generator.
57. MAX6675 Module+K Type Thermocouple Sensor Measure.
58. xcluma Analog pH Sensor Electrode Kit with Amplifier Circuit.
59. Techtonics Analog TDS Water Conductivity Sensor Module, 0~1000ppm Water Quality Monitoring TDS Meter Board.
60. Robodo TB6600 Stepper Motor Driver Controller 4A 9~42V TTL 16 Micro-Step CNC 1 Axis.
61. PC System (High Performance Computing System) with Windows 7, 8, 8.1 or 10 with 32- or 64-bit Operating System.
62. DSO

Accessories

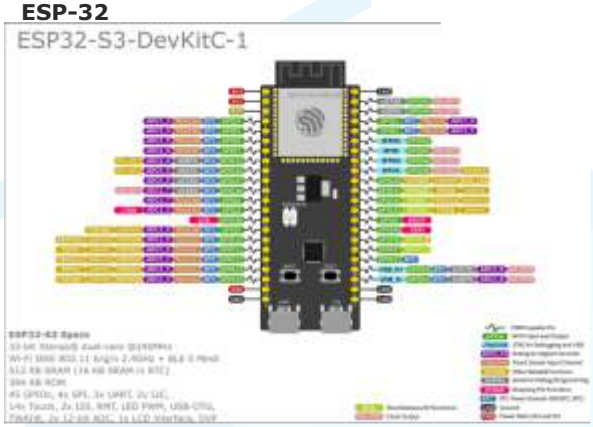
1. MicroSD card with programs and software for raspberry pi
2. Mains Lead.
3. Operating Instruction Manual.
4. Data Cable

Microcontrollers

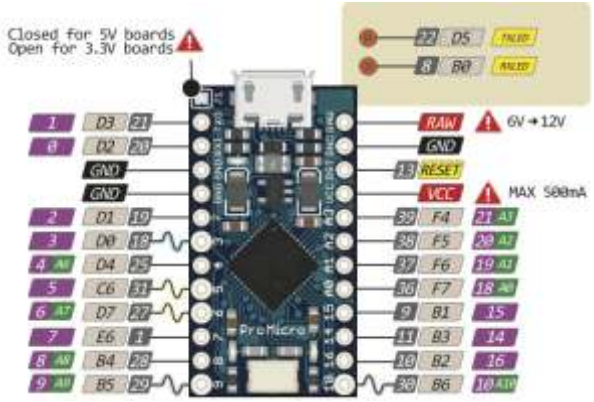
Respberry Pi



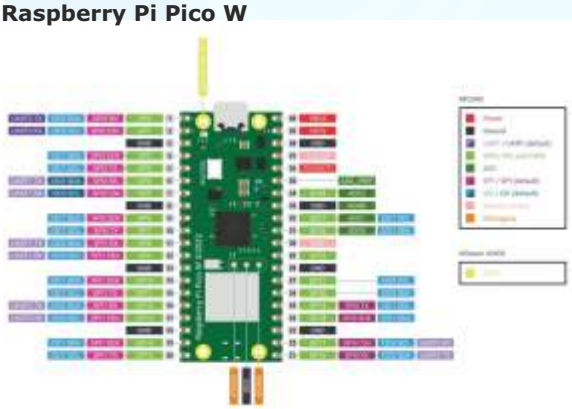
ESP-32



Arduino Pro Micro



Raspberry Pi Pico W



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Technical Specification		
Name of Components	**Specifications**	**Common Applications**
Raspberry Pi 4 Model-B	64-bit Quad-Core Cortex-A72 @ 1.5GHz, 8GB LPDDR4 RAM	IoT, Robotics, AI, Embedded Systems, Computing
Raspberry Pi Pico WH	RP2040 dual-core processor, Wireless connectivity	Embedded Systems, Prototyping
WeAct Studio ESP32-S3-DevKitC-1	-	IoT, Wireless Projects
Pro Micro 5V 16M	-	DIY Electronics, USB Projects
Sensor Type	-	Common Applications
Card Reader	-	Data Transfer
GPIO Breakout Board	Compatible with Raspberry Pi 3/4	GPIO Expansion
Raspberry Pi PoE HAT	Supports IEEE 802.3af/802.3at PoE	Power over Ethernet Supply
Amazon Basics 32GB MicroSDHC Memory Card	Up to 98MB/s, IPX6	Data Storage for Raspberry Pi
NHP 12V 5A 60W Plastic Case SMPS	Single Output	Power Supply for Electronics
DC-DC Step-Down Buck Converter	24V 12V 9V to 5V 5A 25W	Voltage Regulation
Mini 360 Step-Down Buck Converter	Compact Module	Voltage Regulation for Prototyping
WS2812 5050 5x5 Digit RGB LED Matrix	Addressable RGB LEDs	Lighting, Displays
LCD2004 Display with I2C	20x4 LCD Display	Text Output for Projects
MAX7219 Digital Tube Display Module	LED Dot Matrix Control	Display Applications
Waveshare 2.42-inch OLED Display	128×64 Resolution, SPI / I2C Communication	Small Display for IoT Devices
CJMCU MCP4725 DAC Module	I2C, 12-bit DAC	Analog Output for Microcontrollers
I2C ADS1115 16-bit ADC Module	4-channel ADC with PGA	Sensor Data Acquisition
T Type GPIO Breakout Board	40-pin Cable & Breadboard	GPIO Expansion for Raspberry Pi
Tactile Push Button Switch	6x6x5 (Pack of 10)	Manual Input for Circuits
5V Active Electromagnetic Buzzer	Pack of 5	Audio Alerts & Alarms
DIP Switch 8 Way Slide Type	DS-08R	Configurable Switching for Circuits
Self Lock Switch	KFC-8X8-A	Toggle Switch for On/Off Applications
PS2 Joystick Module	Analog Joystick	Robotics, Game Controllers
BF350 Strain Gauge Sensor	High Precision	Weight & Pressure Measurement
LM35 Temperature Sensor	TO-92-3 Package	Temperature Sensing
ULN2003A Driver Module	Stepper Motor Driver	Motor Control
MX1508 H-Bridge DC Motor Driver	PWM Control	Stepper & DC Motors
R307 Optical Fingerprint Sensor	Biometric Sensor	Security & Authentication
RFID Reader/Writer RC522	SPI, S50 RFID Card	Contactless Authentication
DS3231 RTC Module	I2C, AT24C32 without Cell	Real-Time Clock for Projects
HX711 Load Cell Amplifier	24-bit ADC	Weight Measurement
Digital LDR Module	Light Detection	Light Sensing & Automation
CJMCU-219 INA219 Power Monitoring	Bi-directional Current/Power Monitoring	Power Management
MAX6675 Thermocouple Module	K-Type Sensor	Temperature Measurement
xcluma Analog pH Sensor	With Amplifier Circuit	Water Quality Monitoring
Techtonics Analog TDS Sensor	0-1000ppm Conductivity Measurement	Water Quality Testing
Robodo TB6600 Stepper Driver	4A, 9-42V, 16 Micro-Step	CNC Motor Control

Note: Specifications are subject to change.

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IOT Workbench

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1. ThinkPad Cloud
2. Microsoft Azure Cloud
3. AWS Cloud
4. IBM Cloud

Title: "Empowering IoT Development with ThinkPad, Azure, AWS, and IBM Cloud"

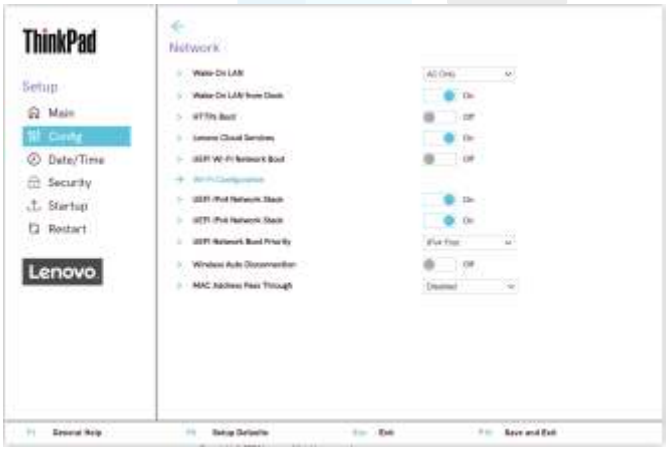
Tagline: "Innovative solutions for a smarter connected future."

Visuals: Include images of IoT devices, cloud infrastructure, and a ThinkPad laptop.

A. ThinkPad for IoT Development

- **Key Features**:
  - Powerful performance for IoT coding and prototyping.
  - Compatibility with development tools (Docker, VirtualBox, Node-RED, etc.).
  - Portability for on-site testing and debu-gging.

- **Role in IoT**:
  - Edge device configuration.
  - Development of IoT applications.
  - Running lightweight simulations locally.



B. Microsoft Azure for IoT

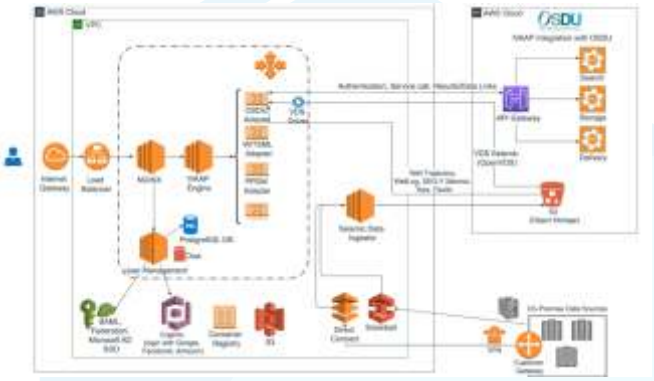
- **Key Features**:
  - **IoT Hub**: Secure device-to-cloud commu-nication.
  - **IoT Edge**: Cloud intelligence on local devices.
  - **Stream Analytics**: Real-time processing of IoT data.

- **Use Cases**:
  - Smart cities (e.g., traffic management).
  - Predictive maintenance in manufacturing.

C. AWS for IoT

- **Key Features**:
  - **IoT Core**: Scalable device connectivity and data routing.
  - **AWS Greengrass**: Local data processing and edge computing.
  - **SageMaker**: AI/ML for IoT data insights.

- **Use Cases**:
  - Connected healthcare.



  - Supply chain optimization.

D. IBM Cloud for IoT

- **Key Features**:
  - **Watson IoT Platform**: Device manage-ment and advanced analytics.
  - **Watson AI**: AI-powered insights and automation.
  - **Blockchain in IoT**: Ensures security and transparency in IoT ecosystems.

- **Use Cases**:
  - Autonomous vehicles.
  - Energy management systems.

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Benefits of Using All Components Together

- **Seamless Integration**: ThinkPad for development and Azure, AWS, or IBM Cloud for deployment and scalability.
- **Efficiency**: Real-time insights and edge computing reduce latency.
- **Scalability**: Cloud services ensure your IoT solutions grow with your business.
- **Security**: Industry-grade encryption and secure communication.

Smart Sense IoT Starter – Basic IoT Lab
Order Code - 53000A

Key Components:

- ☑ **Microcontrollers**: ESP32 WROOM 32, Raspberry Pi 4 Model B (8GB RAM DDR4 64-bit), STM32 ARM based Board & Arduino Pro Micro.
- ☑ **Sensors**: Temperature & Humidity (DHT11), LDR, IR, Ultrasonic, Gas (MQ2), Soil Moisture, I^2C and SPI.
- ☑ **Connectivity**: Wi-Fi Modules, Basic Relay Modules.
- ☑ **Display**: OLED Display 2.42inch, RGB Matrix 5 x 5, 8 Digit Seven Segment Display-MAX7219, LCD (20 x 4) I^2C & Dot Matrix Display Module MAX7219.
- ☑ **Cloud Platform**: Free IoT Platforms (Blynk, ThingSpeak)
- ☑ **Software Tools**: Arduino IDE, Basic IoT Dashboard, Raspbian os,Putty,Real VNC Viewer & Advance IP scanner.

Ideal Applications:

- Basic Home Automation
- Temperature & Humidity Monitoring
- Water Level Sensing
- Gas Leakage Detection
- IoT Dashboard Prototyping

Smart Sense IoT Explorer – Intermediate IoT Lab
Order Code - 53000B

Key Components:

- ☑ **Microcontrollers:**ESP32 WROOM 32, Raspberry Pi 4 Model B (8GB RAM DDR4 64-bit), STM32 ARM based Board & Arduino Pro Micro.
- ☑ Sensors: I2C Sensor Pack (BMP280, SHT31, CCS811, MLX90614) Air Quality, CO2, Dust Sensors NPK Sensor (RS485 Modbus - DFRobot/Chilitag)
- ☑ **Connectivity:** Wi-Fi Modules, Basic Relay Modules & Web Server.
- ☑ **Display:** OLED Display 2.42inch, RGB Matrix 5 x 5, 8 Digit Seven Segment Display-MAX7219, LCD (20 x 4) I^2C & Dot Matrix Display Module MAX7219.
- ☑ **Cloud Platform:** Free Cloud (Google Firebase, ThingsBoard CE, Blynk)
- ☑ **Software Tools:** Node-RED, Python, MQTT Protocol.

Ideal Applications:

- Voice-Controlled Home Automation
- Smart Irrigation (NPK-based)
- Precision Agriculture Dashboard
- Weather & Air Quality Monitoring
- Cloud-Controlled Smart Systems
- Real-time IoT Dashboarding

Note: Specifications are subject to change.

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IOT Workbench
Order Code - 53000

Smart Sense IoT Master – Advanced IoT Lab
Order Code - 53000C

Key Components:

- ☑ **Microcontrollers**: ESP32 WROOM 32, Raspberry Pi 4 Model B (8GB RAM DDR4 64-bit), STM32 ARM based Board & Arduino Pro Micro & Radxa X4 (Single Board Computer).
- ☑ **Sensors**: Industrial Environmental Sensors (AQI, PM2.5, CO2, Gas, UV) Complete Industrial I2C Sensor Suite NPK Soil Sensors, AI-Enabled Surveillance Cameras
- ☑ **Connectivity**: Wi-Fi, Web Server, Bluetooth, ESP-Now & Zigbee.
- ☑ **Display**: OLED Display 2.42inch, RGB Matrix 5 x 5, 8 Digit Seven Segment Display-MAX7219, LCD (20 x 4) I^2C, Dot Matrix Display Module MAX7219 & 7" HDMI IPS Display with Touch.
- ☑ **Cloud Platform**: Paid Cloud Services (AWS IoT Greengrass, Azure IoT Enterprise)
- ☑ **Computing Power**: High-Performance Intel i7 Laptop (DDR5 RAM, SSD) For Edge Computing, Cloud Management, AI Model Training
- ☑ **Software Tools**: Node-RED, Python & MQTT Protocol.

Ideal Applications:

- AI-Based Soil Health Prediction
- Automated Fertilizer & Irrigation Control
- Precision Agriculture (NPK, pH, Moisture Analysis)
- Full-Scale Smart Home & Industrial Automation
- Energy Monitoring & Smart Metering
- Remote Monitoring
- Cloud-Based Data Analytics

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