



TDK_Robokit1

SmartRobotics™ Development Platform

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Sr. Manager, Business Development

January 6, 2022

Attracting Tomorrow



Robotics is HOT!

dbusiness

Home > Daily News

Daily News


North American Robot Sales Have Record Setting Q3

According to the Association for Advancing Automation (A3), a global advocate and promoter of the benefits of automation in Ann Arbor, robot sales in the third quarter of 2021 brought the total number of robot sales this year to nearly 29,000 units valued at \$1.48 billion, the best numbers ever recorded for the North American robotics market. By Jake Bekemeyer - November 12, 2021

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Third quarter robot sales saw record setting numbers both in total robot sales and the total value of the units. // Stock Photo

According to the Association for Advancing Automation (A3), a global advocate and promoter of the benefits of automation in Ann Arbor, robot sales in the third quarter of 2021 brought the total number of robot sales this year to nearly 29,000 units valued at \$1.48 billion, the best

AUTOMATION.COM

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ISA

A subsidiary of the International Society of Automation

Q3 Robot Orders Put 2021 on Track for Biggest Year Yet

November 12, 2021 | Association for Advancing Automation (A3) | News



Q3 Robot Orders Put 2021 on Track for Biggest Year Yet

Nov. 11, 2021 - Strong robot sales in the third quarter of 2021 bring the total number of orders so far this year to nearly 29,000 units valued at \$1.48 billion, the best numbers ever recorded for the North American robotics market. According to the Association for Advancing Automation (A3), these numbers show increases of 37% in units sold (up from 21,072) and 35% in value (up from

LSMedia

The Independent Liverpool Student Newspaper

Autonomous Robot Toys Market to Witness Huge Growth by 2026: Key Players – Robotical, RoboThink, Hamleys

By nidhi

NOV 11, 2021

Autonomous Robot Toys market analysis, Autonomous Robot Toys Market forecast, Autonomous Robot Toys Market growth, Autonomous Robot Toys Market Opportunity, Autonomous Robot Toys market size, Autonomous Robot Toys Market trends

Advance Market Analytics published a new research publication on "Autonomous Robot Toys Market Insights, to 2026" with 232 pages and enriched with self-explained Tables and charts in presentable format. In the Study you will find new evolving Trends, Drivers, Restraints, Opportunities generated by targeting market associated stakeholders. The growth of the Autonomous Robot Toys market was mainly driven by the increasing R&D spending across the world.

Some of the key players profiled in the study are:

MRT International Limited (Canada),Modular Robotics Incorporated (United States),Hamleys (United Kingdom),The LEGO Group (LEGO education) (Denmark),Robotical Ltd (United Kingdom),RoboThink (United States),Fischertechnik GmbH (Germany),Doro (Poland),DoroPlay Inc. (United

CISION

PR Newswire

Service Robotics Market to grow at a CAGR of 22.58% by 2025|Increasing Adoption of Robotics in Diverse Fields of Application to Boost Growth|17000+ Technavio Reports

NEWS PROVIDED BY Technavio

Nov 05, 2021, 22:30 ET

NEW YORK, Nov. 5, 2021 /PRNewswire/ -- The service robotics market is expected to grow by USD 35.27 bn from 2020 to 2025. Technavio's latest market research report estimates that the service robotics market will progress at a CAGR of 22.58%. This report offers an up-to-date analysis regarding the current market scenario, the latest trends and drivers, and the overall market environment.

For Insights on Service Robotics Market

Robotic Market Verticals

Industrial



Consumer



Surveillance



Service

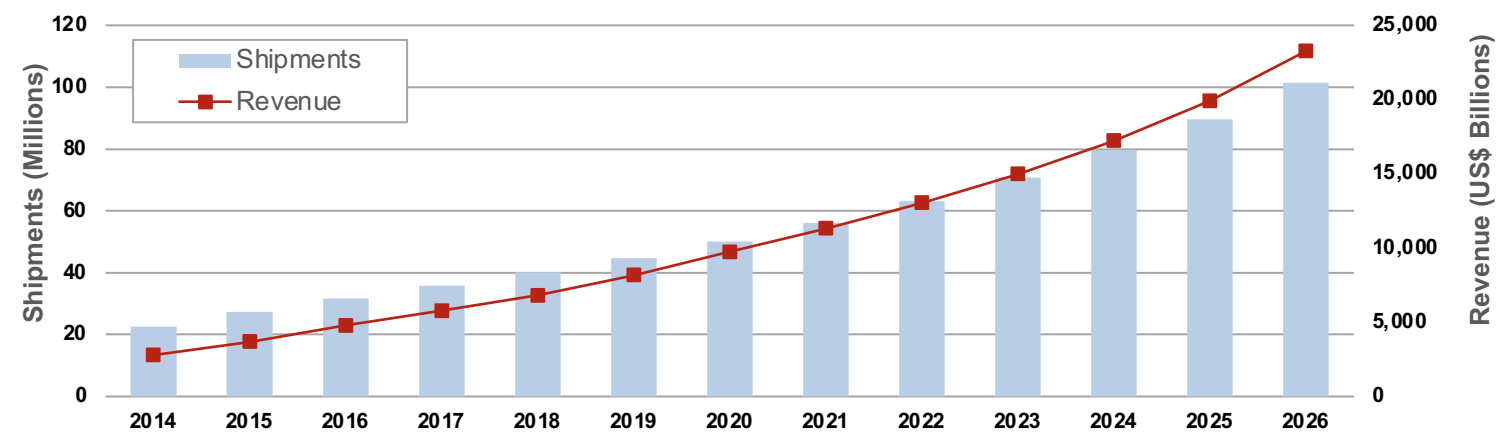


Companion

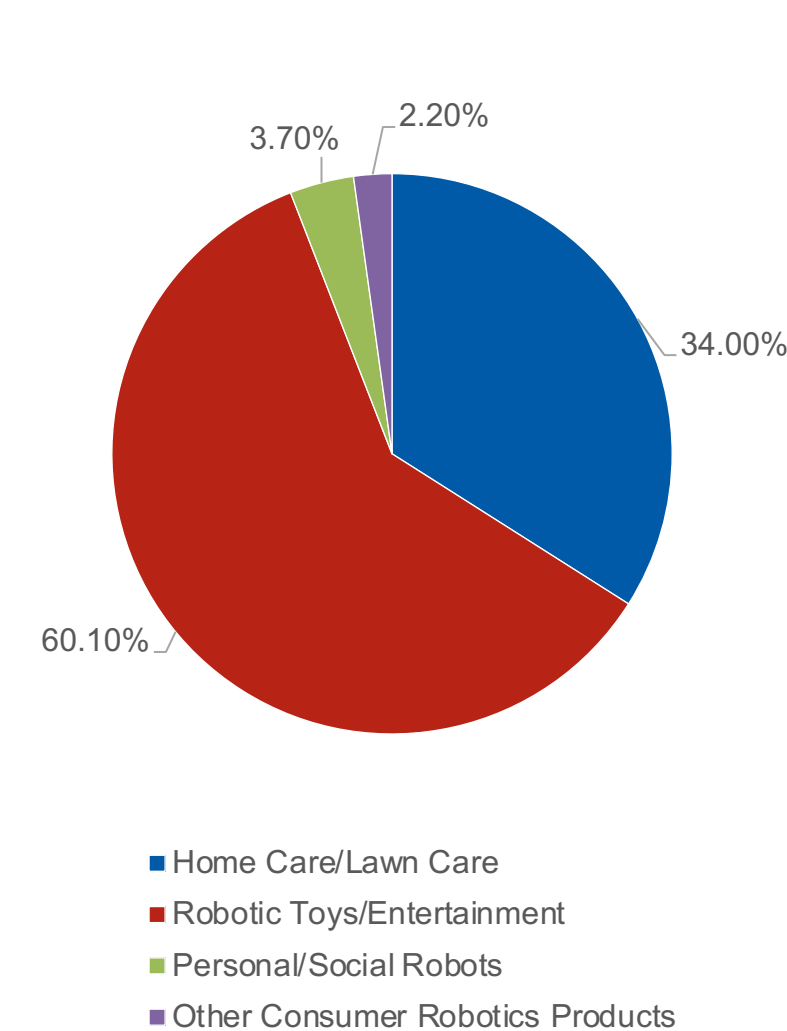


Consumer Robotics Market Size

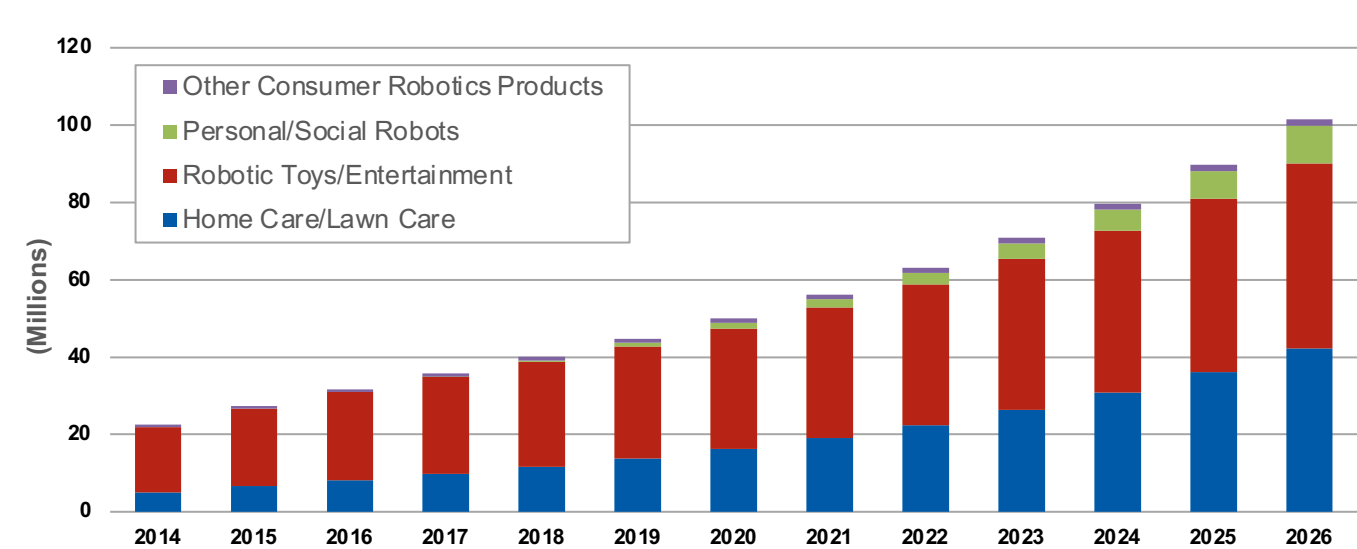
Consumer Robotic Shipments: 60 to 100 Million units: 12.3% CAGR



% Shipments by Type (2021)

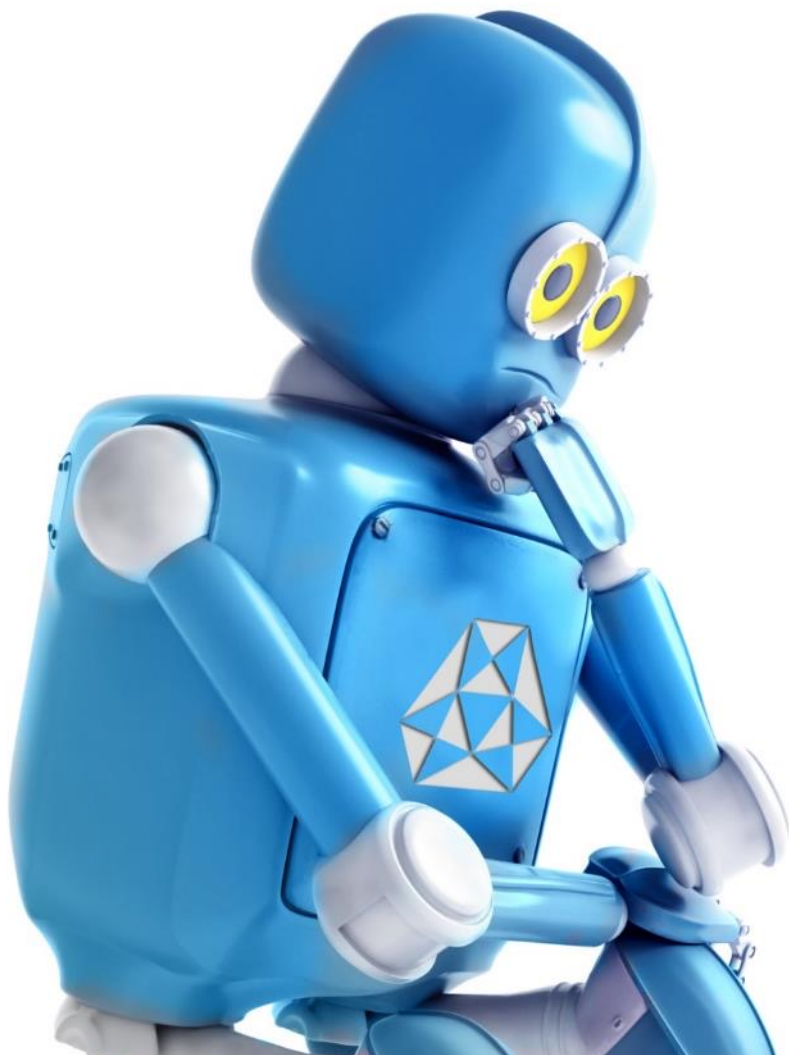


Consumer Robotic Shipments by Application Type



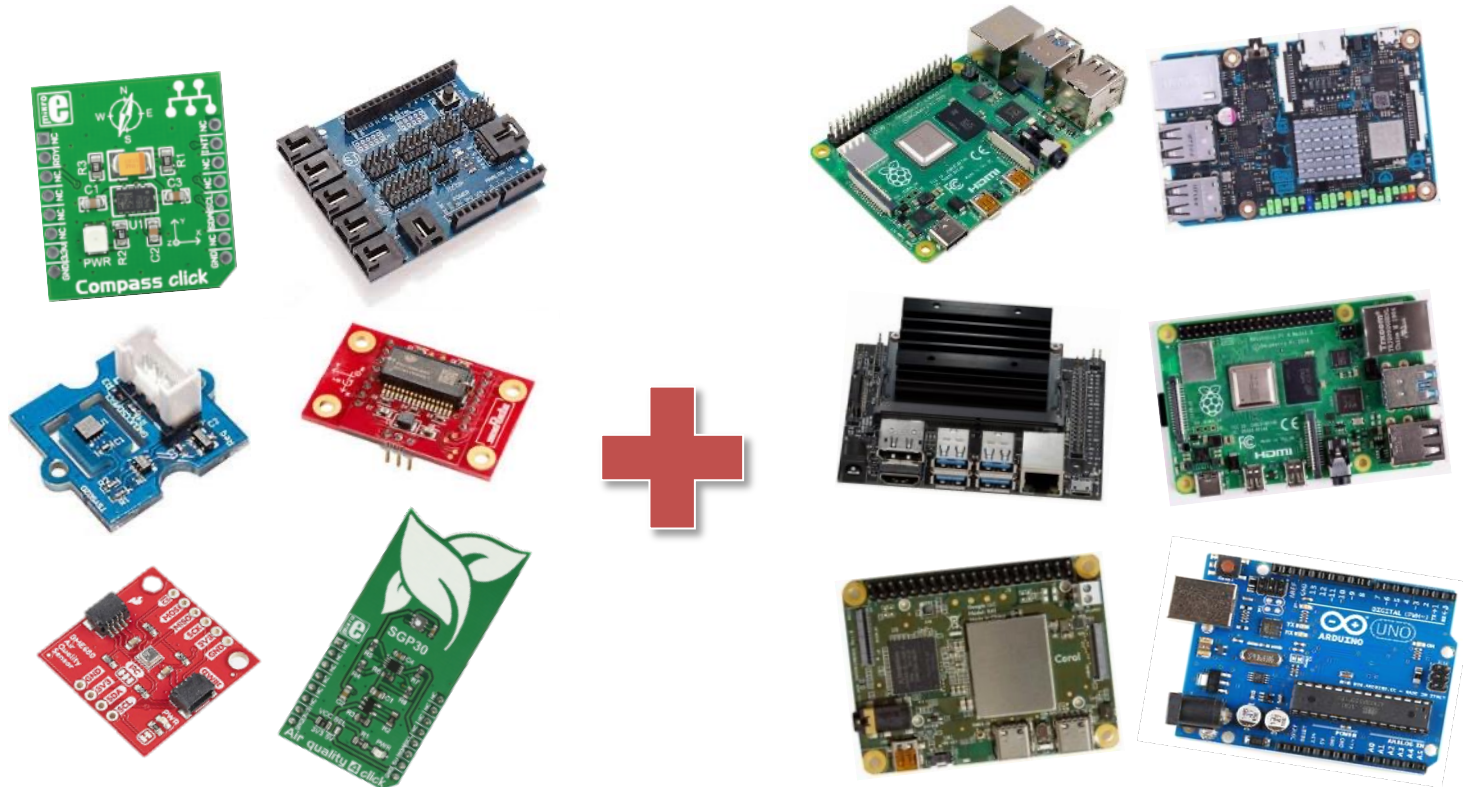
(Source: ABI Research)

Technologies found in general robot applications



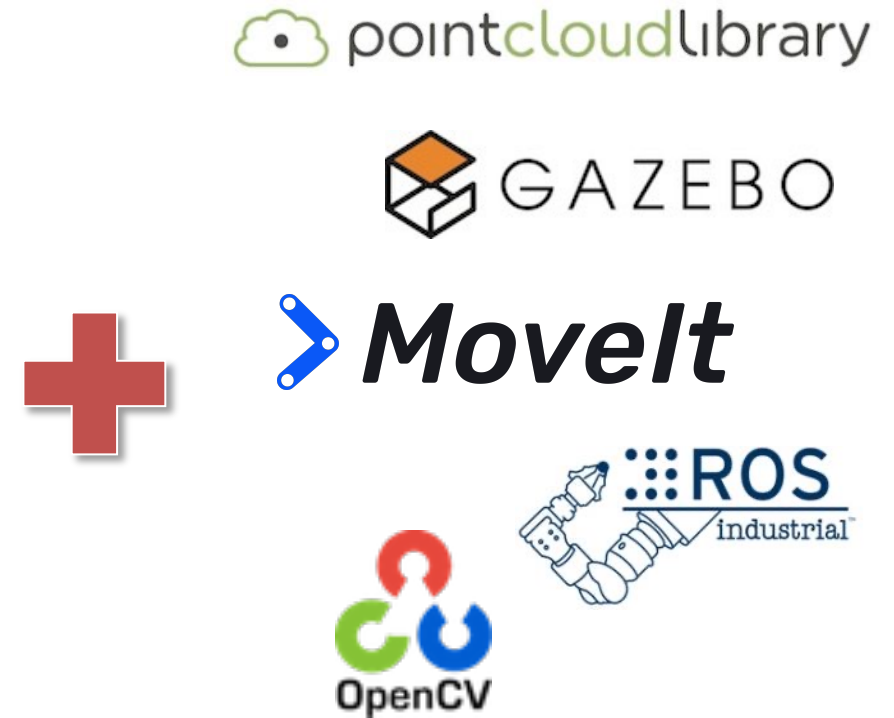
Gyroscopes	Accelerometers	Pressure Sensors
Motors	Embedded Motor Controllers	A.I. and Machine Learning
Microphones	Cameras	Lidar
BTLE	Actuators	Infrared
Time-of-Flight	Gas Sensors	Proximity Sensors
Passives	Connectivity (WiFi, Modem, etc.)	Many More...

Today's Robotic System Challenges



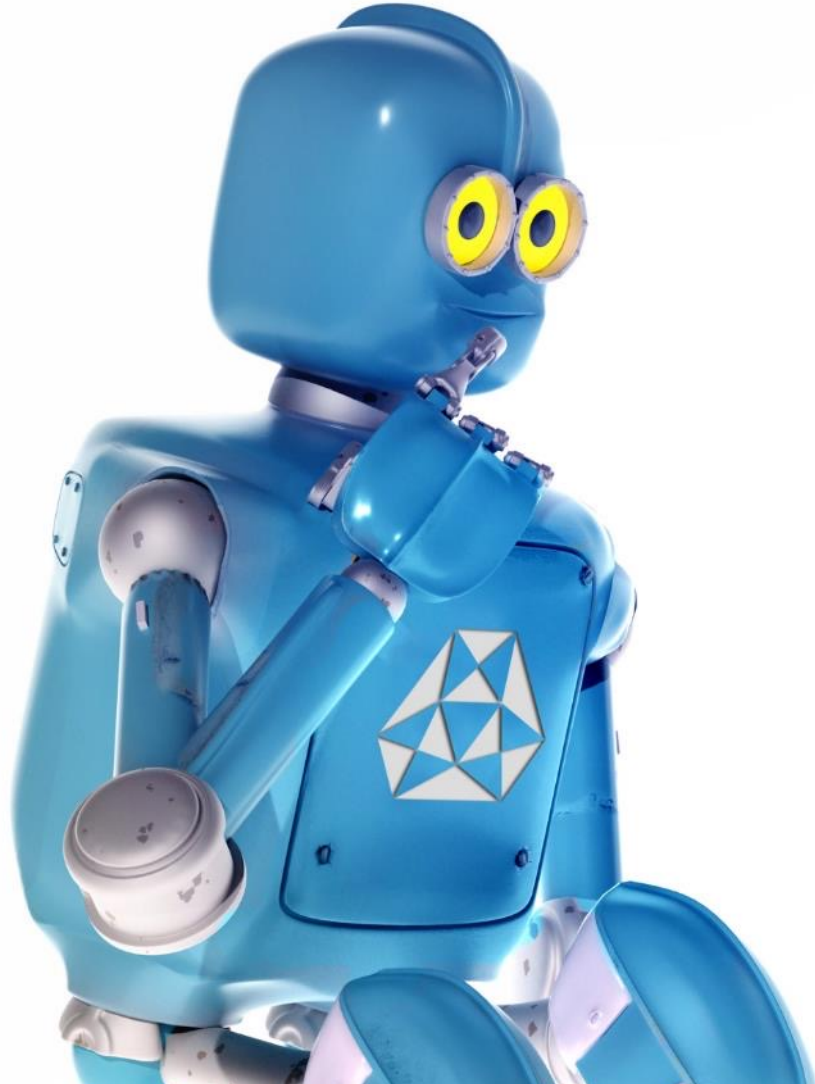
Multiple Sensor Boards

Multiple Processor Boards



Multiple Open-Source SW

TDK owns a vast majority of the technology that's found in robotics!



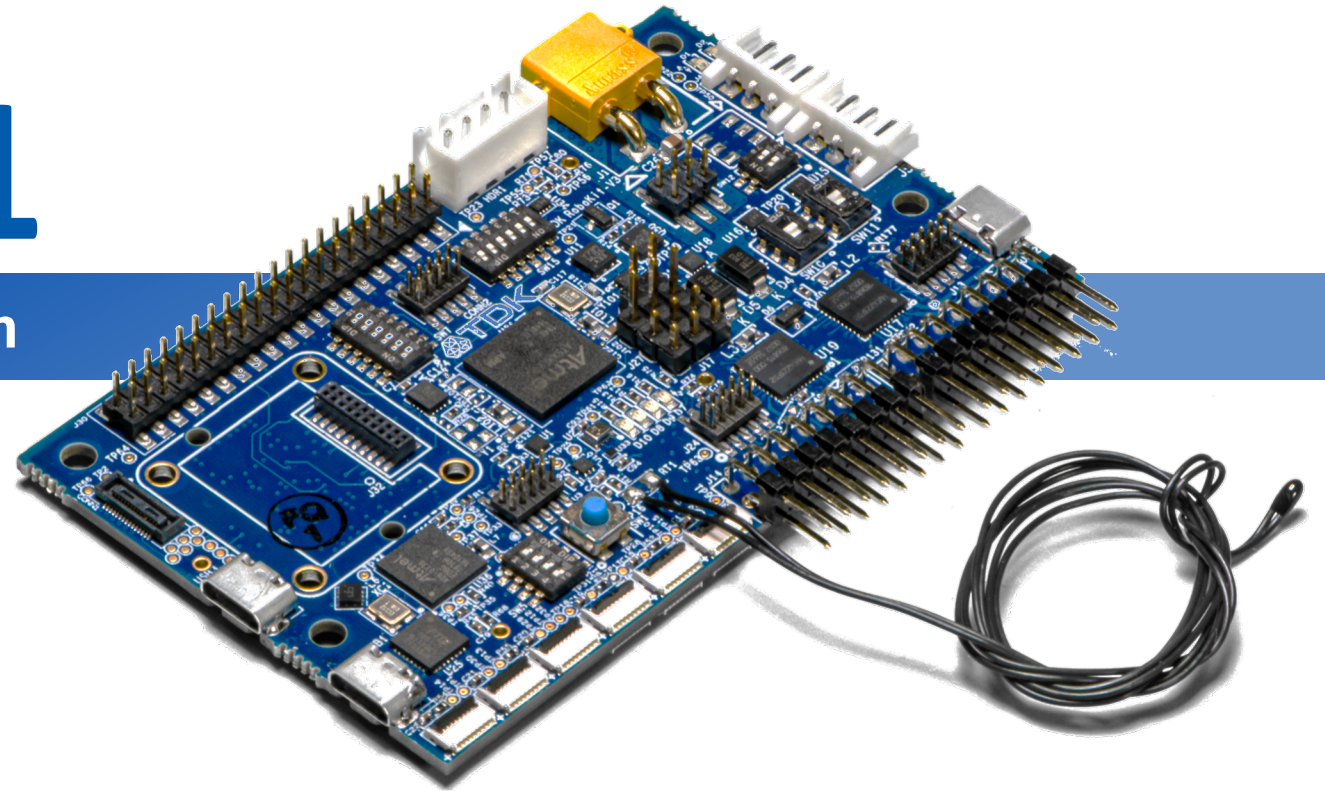
10+ technologies provided by a single supplier!

Gyroscopes	Accelerometers	Pressure Sensors
Motors	Embedded Motor Controllers	A.I. and Machine Learning
Microphones	Cameras	Lidar
BTLE	Actuators	Infrared
Time-of-Flight	Gas Sensors	Proximity Sensors
Passives	Connectivity (WiFi, Modem, etc.)	Many More...

Introducing...

ROBOKIT1

SmartRobotics™ Development Platform



The Ideal Robotic Platform

Comprehensive TDK solution showcase

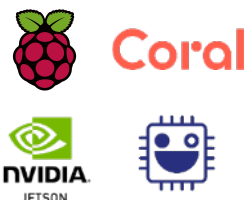
- IMU (ICM-42688-P)
- Industrial IMU Module (IIM-46230)
- Barometric Pressure (ICP-10111)
- Digital I²S Microphone (ICS-43434 x4)
- Temperature (B57861S0103A039)
- Ultrasonic ToF Connector (CH101/201) – 9 ports
- Magnetometer (AK09918C)
- Embedded Motor Controller (HVC4223F-D2)
- Battery port (11.1V)

Microchip SAME70Q21B MCU, 2048 KB flash, 348 KB SRAM

- ARM® Cortex®-M7 running up to 300Mhz
- Atmel Embedded Debugger (EDBG) over USB3 and SWD

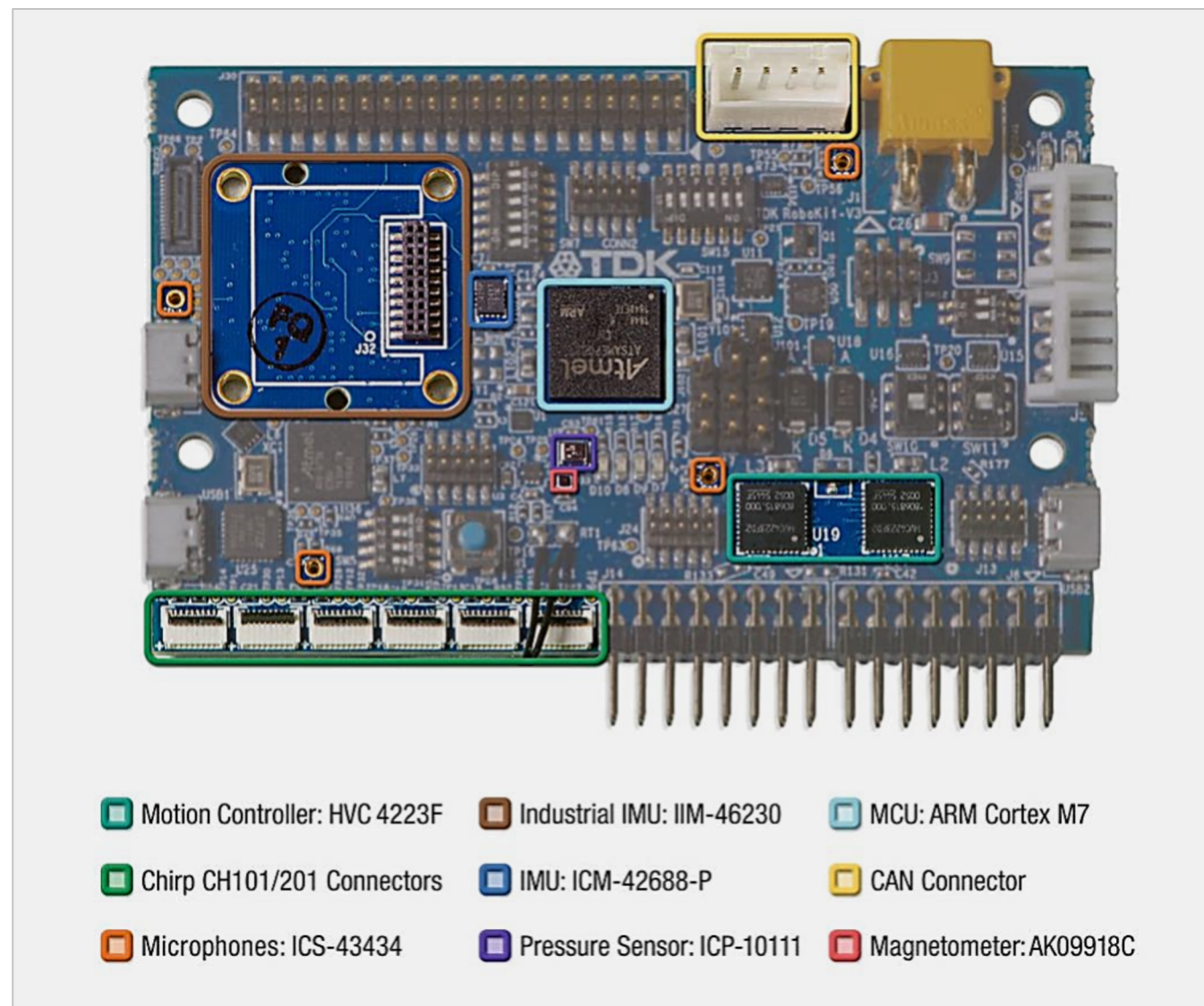
Compatible with multiple processor platforms

- Raspberry Pi
- Nvidia Jetson (coming soon)
- Google Coral Dev Board (coming soon)
- Asus Tinker Board 2/2S



Multiple interfaces:

- USB, auxiliary USB2, Header with 1.8, 3.3, and 5-volt power, 12 GPIO, serial connection, UART



Complete Solution: Not Just Another “Dev Board”

- Flex cables
- Chassis
- 3D printed housing
- User guides
- App notes
- BLE Module

“OUT OF THE BOX”

COMPLETE SOLUTION

SENSOR DRIVERS

DATA STREAMING

- Gyroscope
- Accelerometer
- Pressure
- MEMS Microphone
- Magnetometer
- Temperature
- Embedded Motor Controller
- Industrial IMU
- Passives
- ToF

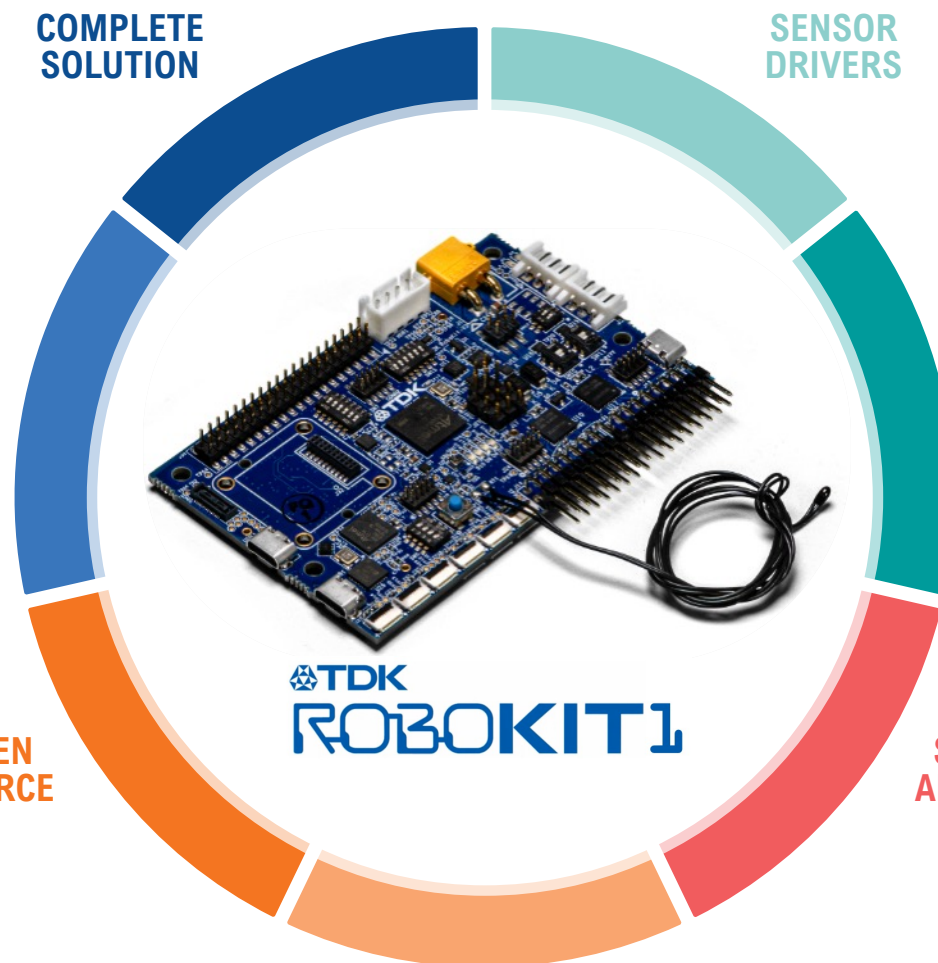
OPEN SOURCE

SOFTWARE ALGORITHMS

- Cliff detection
- Floor type detection
- Obstacle detection
- Voice audio commands
- Motor control APIs
- Sensor fusion

ROS 1/2 COMPLIANCE

- ROS 1/2 driver compatible
- Windows/Android app
 - Data collection
- MicroROS (*coming soon*)



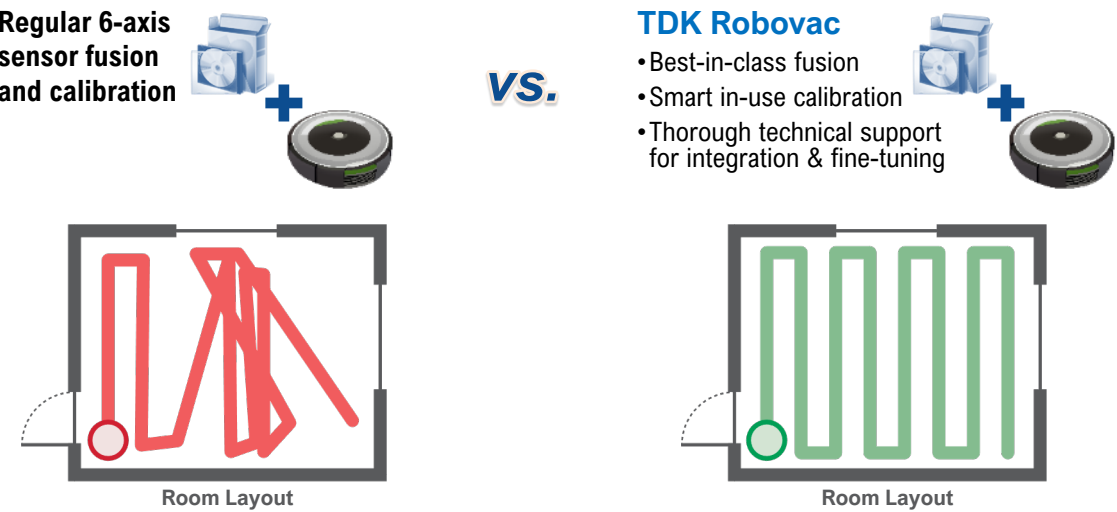
Valuable At Every Phase!



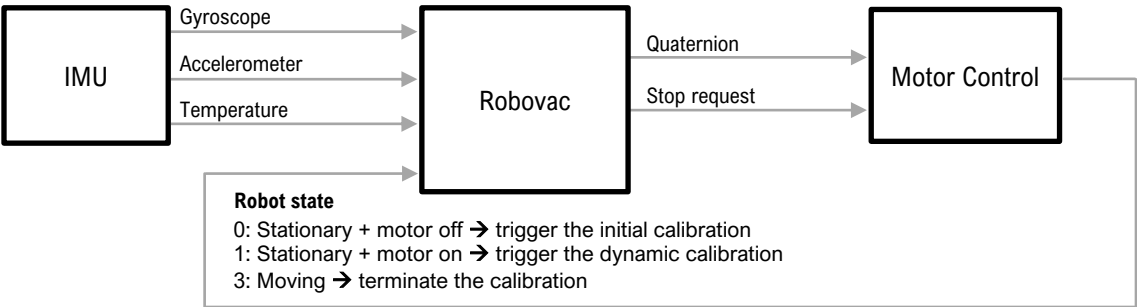
✓ TDK RoboKit1:


Use the TDK RoboKit1 across all different phases of robotic system development with special focus on software development and hardware prototype phases.

Vacuum Path Comparison




Block Diagram







Obstacle detection for any color object in any lighting condition




Floor type and cliff detection using ultrasonic sensors




Robovac Algo using IMU data for heading computation




Robot Motor Control APIs



“Hi TDK” keyword spotting with noise filter & noise cancellation

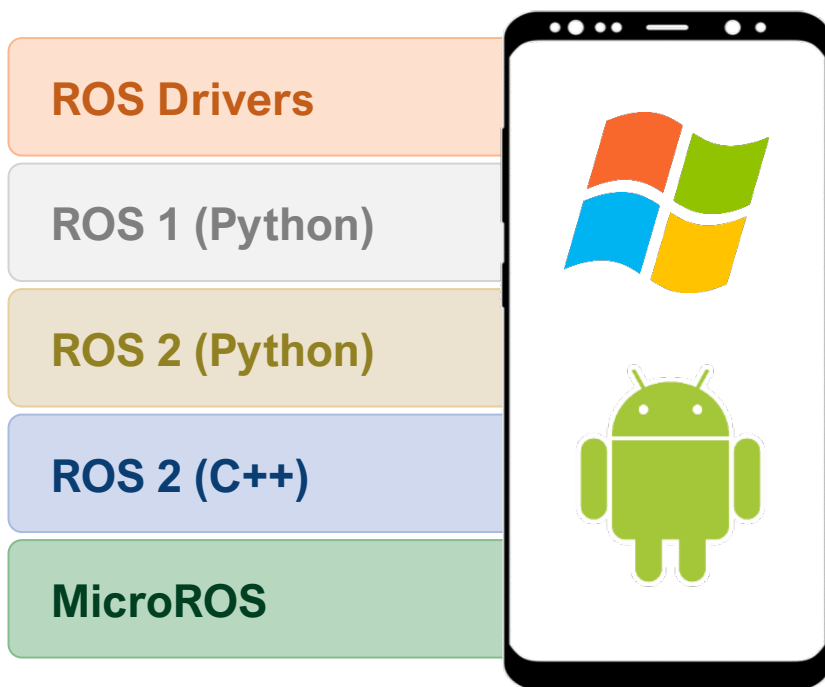






ROS1 and ROS2 drivers for all on-board sensors






BLE enabled Windows and Android apps for evaluation and data collection of sensors & algorithms

Software and Algorithms: Additional Features



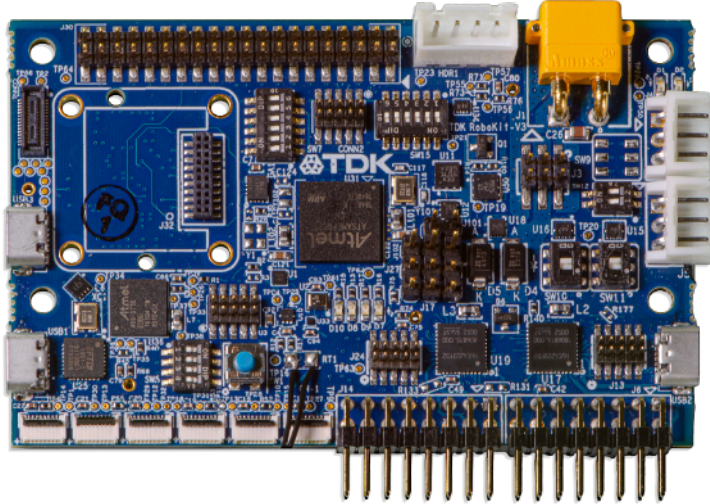
-  Obstacle detection for any color object in any lighting condition
-  Floor type and cliff detection using ultrasonic sensors
-  Robovac Algo using IMU data for heading computation
-  Robot Motor Control APIs

-  “Hi TDK” keyword spotting with noise filter as well as noise cancellation
-  ROS1 and ROS2 drivers for all on-board sensors
-  BLE enabled Windows and Android apps for evaluation and data collection of sensors & algorithms



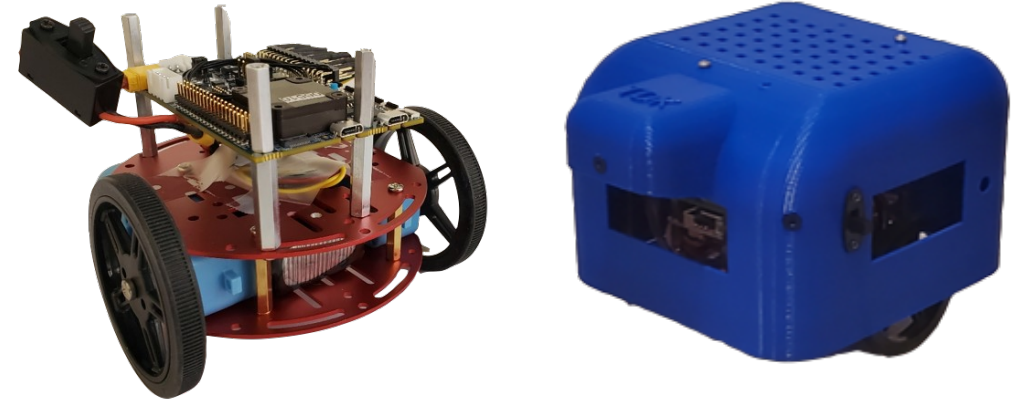
Two Product Offerings:

Development Board Package (TDK_RoboKit1-DK)



- TDK RoboKit1 Development Kit
- CH101 Ultrasonic Sensor (3x)
- Ultrasonic Connector Cables (3x)
- Windows & Android App for data collection
- Open-source board design files, firmware, and ROS drivers

Full Robot Package (TDK_RobotKit1)

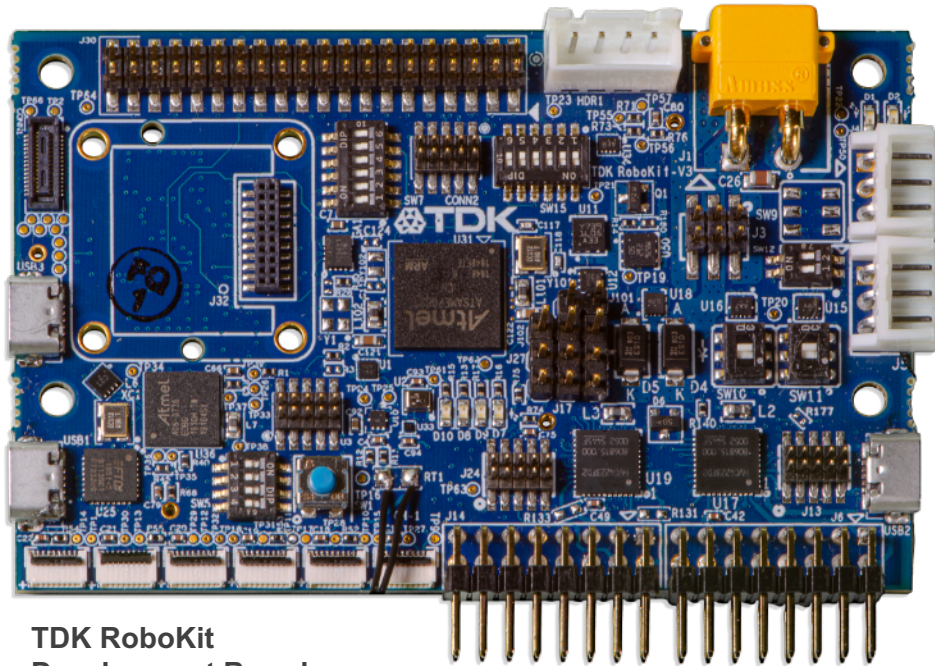


Complete Development Board Package **and**:

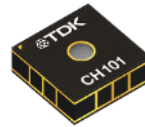
- 3D printed robot shell with sockets for ToF sensors
- Industrial IMU (IIM-46230)
- Chassis with metal plates, standoffs, wheels and motors
- On/off switch
- ESP32 BLE module for Bluetooth connectivity

TDK_RoboKit1-DK: \$199

TDK RoboKit Development Board



TDK RoboKit
Development Board



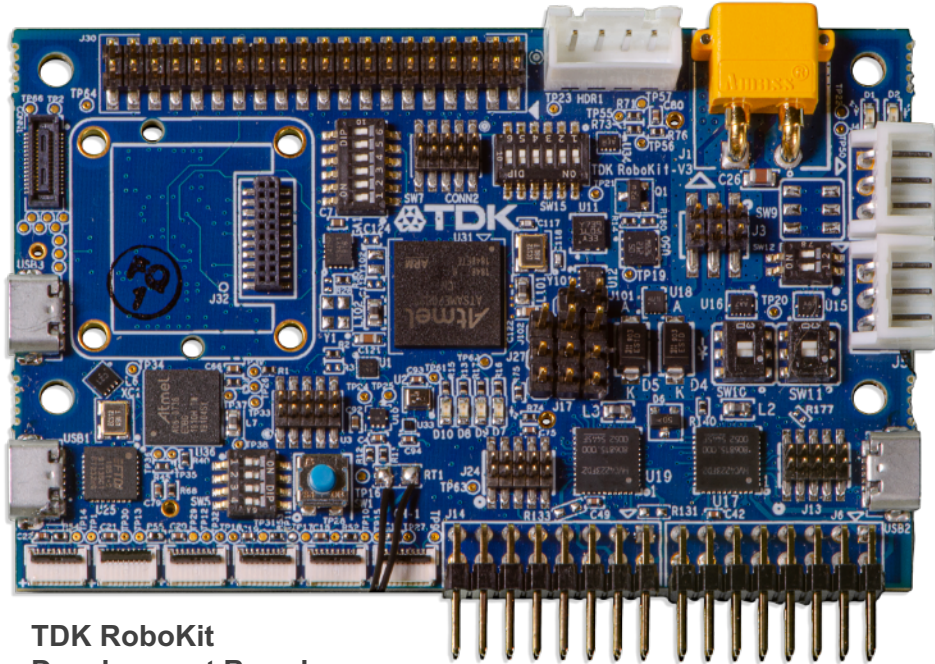
CH101 Ultrasonic
Time-of-Flight sensor

Available via TDK Franchise Distributors Jan 2022:

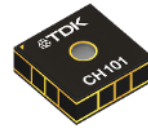


TDK_RoboKit1: \$299

TDK RoboKit Full Robot Reference Design



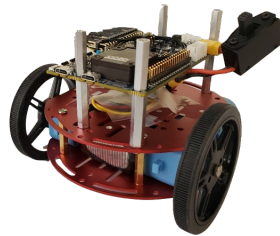
TDK RoboKit
Development Board



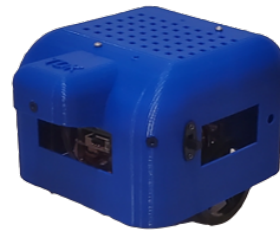
3x CH101 Ultrasonic
Time-of-Flight sensor



IIM-42630 Industrial IMU



Robotic Chassis



3D Printed Shell

Available via TDK Franchise Distributors Jan 2022:





TDK InvenSense

Solutions Applications Developers Sustainability

TDK Product Center Login Register

TDK ROBOKIT



Key Features

Hardware features:

- Multiple ToF modules (connected via flex cable)
- Industrial IMU module (connected via flex cable)
- 6 axes IMU
- Digital I²S Microphone
- Pressure Sensor
- Temperature Sensor
- Embedded Motor Controller
- AKM Magnetometer

Software features:

- Range finder
- Obstacle detection
- floor type detection
- Cliff detection
- Robovac/Heading
- Motor control

Legend:

- Motion Controller: HVC 4223F
- Industrial IMU: IIM-46230
- MCU: ARM Cortex M7
- Chirp CH101/201 Connectors
- IMU: ICM-42688-P
- CAN Connector
- Microphones: ICS-43434
- Pressure Sensor: ICP-10111
- Magnetometer: AK09918C

Visit:
invensense.tdk.com/robokit

Attracting Tomorrow



Questions?