Ready-to-go eco-system for IoT and Wearable innovators

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Where You Find Us

**Smart Driving**
Making **driving** safer, greener and more connected

**Smart Industry**
Enabling the evolution of **industry** towards smarter, safer and more efficient factories and workplaces

**Smart Home & City**
Making **homes** smarter, for better living, higher security, and less waste
Enabling **cities** to make more of available resources

**Smart Things**
Making everyday **things** smarter, connected and more aware of their surroundings
IoT Devices Come in Many Form Factors
…but Their Needs are the Same

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<tbody>
<tr>
<td>Ultra-Low Power to High Performance</td>
<td>Scalable security solutions</td>
<td>Full range of sensors and actuators</td>
<td>10 cm to 10 km</td>
<td>Nano Amps to Kilo Amps</td>
<td>Power conversion Monitoring Drivers</td>
<td>Nano Watt to Mega Watt</td>
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Smart Things

Smart Home & City

Smart Industry
A Complete Portfolio

- Sensors & actuators
- Microcontrollers
- Connectivity solutions
- Energy management
- Analog products
- Secure solutions
- Motor drivers

Internet of Things
ST offering for IoT/Wearables

- **32-bit ULP MCUs**
  - Digital sensors
  - Security
  - Power management

- **Secure MCUs**
  - Microcontroller
  - User interface
  - Connectivity
  - Protections

- **Display Power Supplies and LED Drivers**
  - Audio amplifiers

- **BlueNRG**
  - Sub-GHz RF
  - NFC & RFID
  - ESD Protections
  - EMI Filters & RF-IPD

- **Power management ICs**
  - Battery management & monitoring ICs

- **Current sensing**
  - Smart reset

- **Signaling transducers**
  - Audio amplifiers

- **Analog sensors**
  - Analog front-end

- **Switches**
  - MEMS microphones

- **Motion & environmental sensors**
  - Proximity Sensors
Low Power Sensors & RF Connectivity

**Smart motion sensors**
for better accuracy and longer battery life

**All-in-one eCompass**
for high-precision Pedestrian Dead Reckoning applications

**Time-of-Flight sensor**
with boosted range and speed, in industry’s smallest footprint

**Bluetooth Smart and Sub-1GHz connectivity**
for ultra-low-power Sensor-to-Cloud connectivity

- **LIS2DS12 3-axis accelerometer**
  - LSM6DSL/M 6-axis IMU

- **LSM303AGR eCompass**

- **VL53L0X FlightSense™ ranging sensor**

- **BlueNRG and SPIRIT Low-Power RF Products**
Comprehensive Offering for IoT devices

- **Ultra low-power microcontrollers**
  for energy-sensitive applications

- **Highly secure turnkey solution**
  providing authentication and data management services

- **Motor drivers for battery-powered applications**
  with superior energy efficiency and accuracy in a tiny package

- **Highly-efficient wireless battery-charging**
  for smaller, simpler, sealed wearables

- **STM32 L series MCU**

- **STSAFE-A100**

- **STSPIN™ family**

- **STWBC-WA transmitter, STWLC04 receiver**
Bluetooth Low Energy
for smart innovators

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<tr>
<th>Wearable</th>
<th>Beacon / Retail</th>
<th>Diagnostic</th>
<th>Medical</th>
<th>Toys / Gaming</th>
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- **Wearable**: Wearable devices for everyday use.
- **Beacon / Retail**: Beacons for retail and location-based services.
- **Diagnostic**: Diagnostic equipment for medical applications.
- **Medical**: Medical devices and equipment.
- **Toys / Gaming**: Toys and gaming accessories.

**Processes and Applications**

1. Sensors
2. BlueNRG-1 Bluetooth IC
3. Bluetooth
4. Mobile device

- **Automotive**: Cars and transportation systems.
- **ePayment**: Electronic payment systems.
- **Smart Home**: Home automation and smart living.
- **Tags and Finders**: Tracking and item finding.
- **Industrial**: Manufacturing and industrial automation.
Sub-1GHz for Sensor to Cloud

Sensor to Cloud
world-wide connectivity

Sub-GHz Radio Transceiver
S2-LPQTR

Smart utilities
Smart home
Remote metering
Smart parking
Alarm & Surveillance

Smart living
Healthcare & Assistance
Smart agriculture

Sensors

SUB GHz
Combo-radio IoT Node
Dual-radio turnkey solution

Application scenarios
Wireless Sensor Nodes, Remote diagnostic, Smart Parking, Smart Objects

Smartphone
- User Interface
- Configurability
- Local monitoring
- Diagnostic
- Firmware upgrade

Cloud
- Remote monitoring
- Tracking and Positioning
- Notifications of events
- Data aggregation
- Diagnostic and assistance

2-chip programmable solution
- Bluetooth Low Energy processor
  BlueNRG
- Sub-GHz Radio Transceiver
  S2-LPQTR
All the Software Needed
to start application coding from day one

Sample applications

- STM32Cube middleware
- STM32Cube expansion middleware
- STM32Cube Hardware Abstraction Layer
- STM32 Nucleo development boards
- Microcontrollers

Function packs

- A set of key building blocks used in the most popular application domains

- Cloud
- Wearable
- IoT
- Home
- Building

Simplifying access to technology
Lowering the Barriers for Developers

A ready-to-go ecosystem, based on commercial components

- Complete portfolio of products
- Software building blocks
- Set of development boards
- Pre-integrated application frameworks
- Cloud-based solutions
- Partnership

Idea → Device Prototype → Form factor Device → Final Device → Market
Fast and Affordable Development & prototyping

- STM32 Nucleo development boards
- STM32 Nucleo expansion boards
- STM32Cube development software
- STM32Cube expansion software
- Function packs
- Developer community and support
STM32 Nucleo Development Boards

STM32 complete product range from ultra-low power to high-performance

12 processor boards from 9 families

STM32 Nucleo

Board power supply through USB or external source
Integrated debugging and programming ST-LINK probe
STM32 microcontroller
Morpho extension header
Arduino™ extension header
Going Beyond With STM32 Nucleo Expansion Boards

26 expansion boards covering all the key functions

- **Sense**
  - Motion & environmental sensors
  - Proximity sensor
  - Microphone

- **Connect**
  - BLE
  - Wi-Fi
  - Sub-GHz

- **Power Drive**
  - Power management
  - LED Boost

- **Move Actuate**
  - Motor driver
  - Actuator

- **Translate**
  - Audio
  - Op amp
From Prototype to End Device

Partnership with third parties - Form factor devices and customization

Modular Blocks
Prototyping

Form Factor
Field testing

Optimized Design
Volume Production

Easy porting of developed software to final Product

HW/SW optimization and support for production
SensorTile
IoT design lab on the tip of a pencil

- Motion sensors
- Environmental sensors
- MEMS Microphones
- Bluetooth Low Energy
- Low Power MCU
- Sensors Fusion

Sensors, Processing and Bluetooth Low Energy Connectivity
Featuring out-of-the-box vertical IoT Function Packs
Compatible with the STM32 Open development Ecosystem
Takeaways

• IoT devices should comply to a challenging mix requirements to match the targeted applications

• This first requires a set of powerful, compact, secure and low power components

• Pre-integrated hardware and software solutions and easy-to-use tools are key to ease developers' life

• ST offers a complete portfolio of products and ready-to-go ecosystem for IoT innovators