STMicroelectronics
DIGIFED Project: IoT bootcamp

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STMicroelectronics

- Among the world’s largest semiconductor companies
- Serving over **100,000** customers across the globe
- 2019 revenues of **$9.56B**
Global Presence

- Approximately **46,000** employees worldwide
- Approximately **7,400** people working in R&D
- **11** manufacturing sites
- **Over 80** sales & marketing offices
Where You Find Us

Making driving safer, greener and more connected

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

Making homes & cities smarter, for better living, higher security, and to get more from available resources

Making everyday things smarter, connected and more aware of their surroundings
IoT is a movement where any system is able to leverage the Internet and its eco-system

The leading provider of products and solutions for the Internet of Things

IoT Strategic Focus
Everything for the Internet of Things

- Sensing & Actuating: Full range of sensors and actuators
- Signal Conditioning & Protection: Nano Amps to Kilo Amps
- Power & Energy Management: Nano Watt to Mega Watt

- Application Processing
- Connectivity
  - 10 cm to 20 km
- Security
  - Scalable Security solutions

- Ultra-Low Power to High Performance

- STM32

- Smart Things
- Smart Home
- Smart City
- Smart Industry
Smart Things

Making Everything Smarter

A Smart Thing …

- Understands the environment
- Manages data and transforms it into information
- Connects to the world
- Protects your data
- Is energy efficient
Enabling smarter, safer and more efficient factories and workplaces

- Factories that produce in a more efficient manner
- More flexibility and customization possibilities in the supply chain
- More sustainable production with less waste and less energy used
- Safer working environments for people
- Better man-machine cooperation in the work place
- Optimized usage of machines and tools
Smart City

- Smart city infrastructure to improve traffic and municipal services
- Smart Grid
- Intelligent, adaptive street lighting
- Smart Buildings

Smart Home

- Smart control of heating, air conditioning, appliances, locks and alarms
- Smart meters to connect homes to the smart grid
- More energy efficiency, convenience, comfort and security
State-of-the-Art STM32 Ecosystem
Key Criteria for MCU/MPU Choice by OEMs

Software Development Tools
- STM32 Cube
- STM32 CubeMX
- STM32 CubeIDE
- STM32 CubeProgrammer
- STM32 CubeMonitor

Hardware Development Tools
- STLink

Flexible Prototyping
- EVAL Dev Kit
- NUCLEO

Wide Portfolio
- STM32
- STM32L
- STM32H
- STM32MP

User Application
- Vertical application + AI
- Graphics – Audio - Motor
- Control – Cloud*
- Communication**
- HAL – File System- RTOS***

* Open Source
** & Framework
*** Complete offer
Partner
Open Source & Framework
STM32MP1: a General Purpose MPU
Suitable for all Developer Types and Multiple Applications

- Developer profile
  - MCU users new to MPU
  - Mixed MCU and MPU users
  - Pure MPU users

- Possible applications
  - Industrial
  - Consumer
  - Health & Wellness
  - Home
A Fully Integrated Design Suite
Leveraging the STM32Cube Environment
X-LINUX-AI Expansion Package

X-LINUX-AI
OpenSTLinux
Expansion Package

STM32 MP1
X-LINUX-AI v2.0.0
released beg of July 2020

Features
- Coral Edge TPU accelerator support
- armNN 20.05
- TensorFlow Lite 2.2.0
- Python3 Pillow module
- OpenCV 4.1.x
- Support of STM32MP157F running @800Mz
- Image classification Application samples zoo
- object detection
- Python application for easy prototyping
- C++ application for performances

Compatible with:
OpenSTLinux v2.0.0
OpenSTLinux v1.2.0

https://wiki.st.com/stm32mpu/wiki/X-LINUX-AI_application_samples_zoo
System-on-Chip Made for Versatility

A Long-Range Wireless Microcontroller: one die, many IoT possibilities
Best Suited for Many LPWAN Market

- Worldwide compatibility 150 MHz to 960 MHz Linear Range
- Multi-protocol capable
- ST Longevity commitment: 10 years lifetime

- Up to +22 dBm output power for wide coverage
- -148 dBm sensitivity with LoRa: Robust RF Link
- Reduced BOM cost

- Unique-IDs for enhanced traceability
  - Down to 390 nA mode with RTC and 32KB of RAM for extended Battery lifetime
  - Small form factor with UFBGA 5x5 package

- Link Budget > 160 dB = Very long ranges
- Excellent battery lifetime: Only 15 mA for LoRa TX consumption @ 10 dBm
- PCROP, ECC, TRNG, PKA, for best design robustness

- Down to 71 μA/MHz in Run mode for efficient action
- < 1 μA Stop mode with full RAM for battery life optimization
- 12-bit ADC & DAC for mixed applicative use cases
STM Italy: STM32 Open Development Environment
STM32 Open Development Environment

Fast, affordable prototyping with development continuity to final device
STM32 Open Development Environment

Your need

The building blocks

Our answer

ST I

Sensors
Connectivity
Translate
Move / Actuate
Power
Processing

Application Software and Development tools

ST F

Motion & Environ. Sensors
Bluetooth Low Energy
Sub-GHZ
NFC
Microphone
Motor control
Microcontroller

Integrated Development Environment and Middleware

25 Processor Boards (Nucleo 64)
43 Expansion Boards (X-Nucleo)

Function Packs (FP)
STM32 Nucleo Boards across STM32 Microcontroller families
STMicroelectronics Italy provides access to X-Nucleo to work in synergy with the STM32 environment to create the functionality required for the fast prototyping of advanced systems solution on smart industry, IoT, smart farm, motor control, Smart sensing (inertial, environmental, proximity, etc) addressing the STM32 Open Development Environment by means of STM32Cube expansion software provided free for use with the STM32 Nucleo expansion board and fully compatible with the STM32Cube software framework.

It provides abstracted access to expansion board functionality through high-level APIs and sample applications.

The X-Nucleo boards have been organized under five key functions, Sense, Connect, Power Drive, Move& Actuate and Translate,
X-NUCLEO™ family overview

43 expansion boards covering all the key functions

Sense
- Motion & environmental sensors
- Proximity sensor
- Microphone

Connect
- BLE
- Wi-Fi
- Sub-GHz
- NFC

Power
- Power management
- LED boost

Drive

Move
- Motor drive
- Actuator

Actuate

Translate
- Audio amplifier
- OpAmp
STM32 ODE Application Packages

- STM32 Nucleo Board
- MEMS Inertial and Environmental Board
- Bluetooth Low Energy Board
- Battery Management Board
- BLUEMICROSYSTEM MIDDLEWARE

ST based Fast Prototyping

- Battery MNGT
- MCU
- Blue Connectivity
- Motion & Env Sensors

Fast prototyping on stacked boards

Single & Compact Optimized Board (< 380 mm²)
STEVAL examples

SensorTile development kit
- 13x13 mm solderable module and connectable module
- SensorTile expansion Cradle board equipped with audio DAC, USB port
- SensorTile Cradle with battery charger, humidity and temperature sensor, SD memory card slot and USB port
- 100 mAh Li-Ion battery, UN38.3 tested and certified
- SWD programming cable, Fully tested and certified by FCC, IC, Japan

BlueCoin Development Kit
- BlueCoin module with STM32, Motion Sensors, Microphones and Bluetooth LE Connectivity
- Coin Station board equipped with Time-of-Flight sensor and Power Management stage
- BlueCoin Cradle with SD memory card slot, USB port and battery connector
- 130 mAh Li-Po battery, UN38.3 tested and certified
- Fully tested and certified by FCC, IC

Geo IoT Tracker
- Optimized tracker solution over LoRaWAN network with simultaneous multiconstellation
- GNSS positioning and Geofencing support
- Battery operated solution with smart power management architecture
- Environmental and motion sensors
- Data Logging
- High flexibility to cover different application profiles (pet-tracker, asset monitoring, …)
STEVAL Boards

The evaluation boards help to evaluate the features and performance of selected products, all of them have been published online fully tested schematics, BOMs, and Gerber files to facilitate the next hardware design and where appropriate, also firmware or demonstration software packages available as well.

STEVAL boards have been organized in four focus areas, Power, Led Lighting, Motor Control, IoT;
Thank you

Everywhere microelectronics make a positive contribution to people’s lives, ST is there