

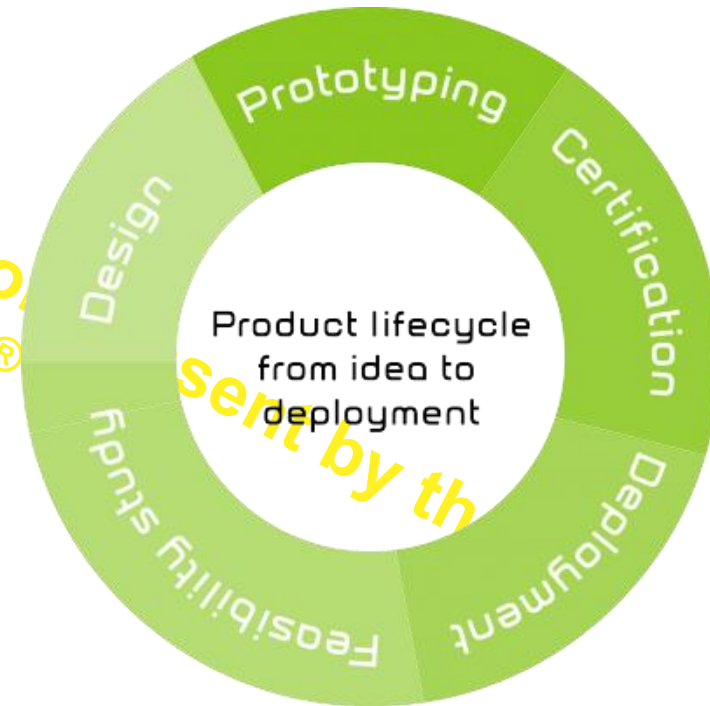
LoRaWAN® MODULE FOR

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- Embit, Who We Are
- IoT Everywhere
- IoT Everywhere Next Step: Massive Integration
- Massive IoT
- Develop your own LoRaWAN[®] IoMe solution
 - First Prototype
 - Design your LoRaWAN Solution
- Conclusion
- Q&A session!
-

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- Embit was born in Modena (Italy) in 2004
- Development of innovative ideas and Wireless Solutions
- Embedded Wireless Module
- Strong RF Know-How
- Microchip Partner
- LoRa Alliance™ Member since 2016



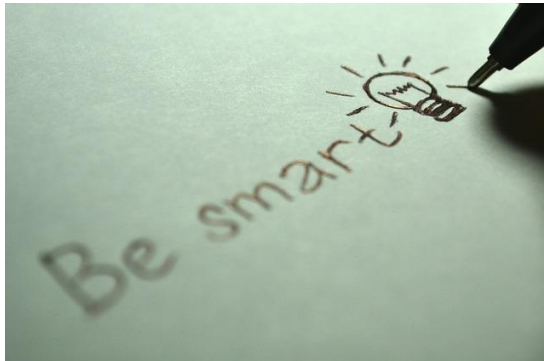
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Everything surround us will be smart and connected!

The Fridge will remember us to buy the dinner



Lights will know when staying On or Off



Our Plants will suggest us the best moment to water them



- IoT is going to be part of our lives
- IoT is going to be part of us!
- Massive Integration: from Internet of Things bringing people into **Internet of Me**



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- Massive Integration: **Internet of Me**^[1]
- **People**-centered
- Changing **life**-style
- Improvement of the **Quality-of-Life (QoL)**
- Wearable Devices
 - Wrist-Fitness Tracker
 - Health-Care Monitoring
 - Wellness and Fashion

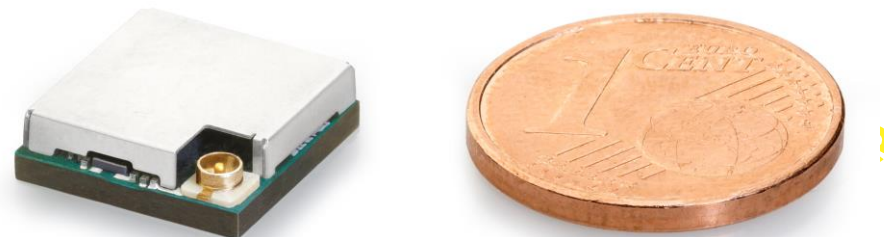


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- Wearable IoT devices' technical challenges:
 - **Small form factor, size matters!**
 - **Wireless Connectivity**
 - Low power
 - Security

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- **Embit's purpose is to create the smallest LoRaWAN[®] module on the market**
- **Size today:** 11.5x11.5 mm, smaller than 1 cent
- Minimize size and routing while improving connectivity: U.FL
- Antenna tuning at 50 Ω
- 17 digital I/O



EMB-LR1276S

- **The smallest LoRaWAN® module!**
- Full LoRaWAN Class A and Class C end-device protocols
- Full compatibility with TTI secure system
- Interoperability tested with:

✓ A2A Smart City



✓ Lorient

✓ LoRaServer

✓ The Things Network



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- **The smallest LoRaWAN[®] module!**
- LDO supplier mode or switching mode to save power
- Extreme low power mode: 1 μ A

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- **The smallest LoRaWAN® module!**
- Crypto Unit to protect communication (ATECC608A)
- The secure element can contain a secure identity, root keys compatible with LoRaWAN 1.0.x and 1.1
- Possibility to use open-software crypto, libraries integrated
- Authentication
- Provisioning

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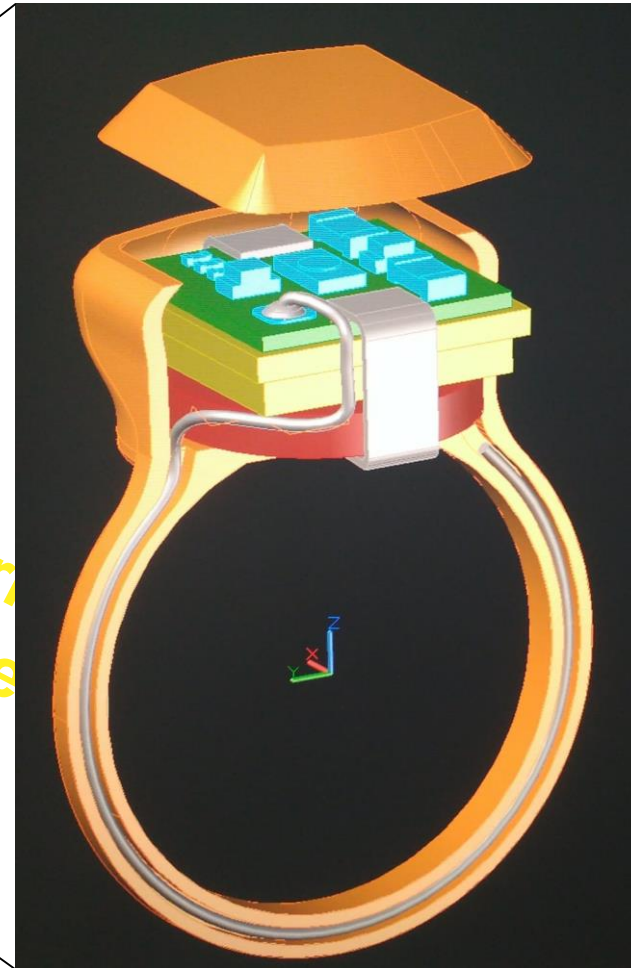
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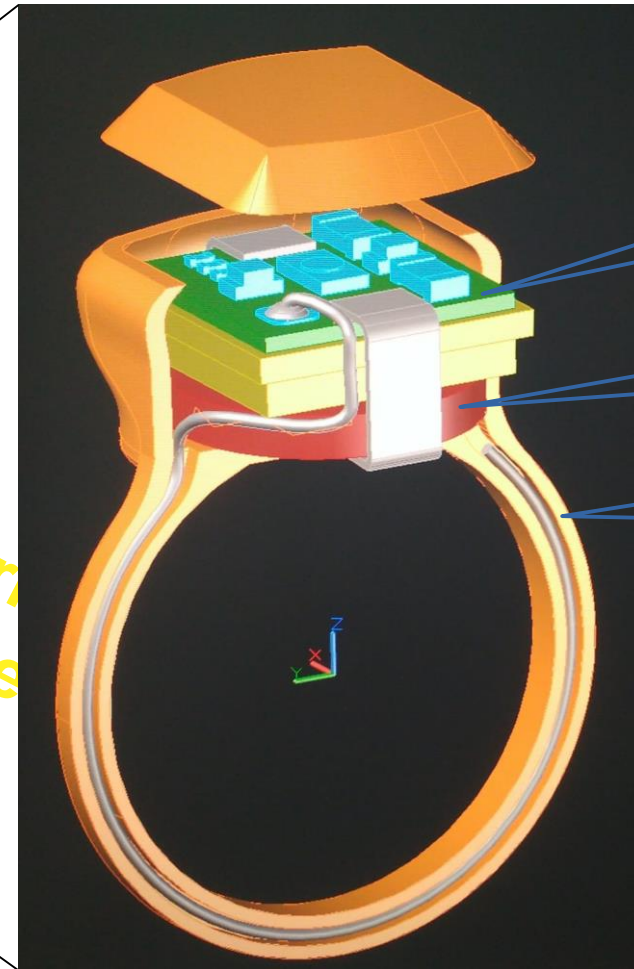


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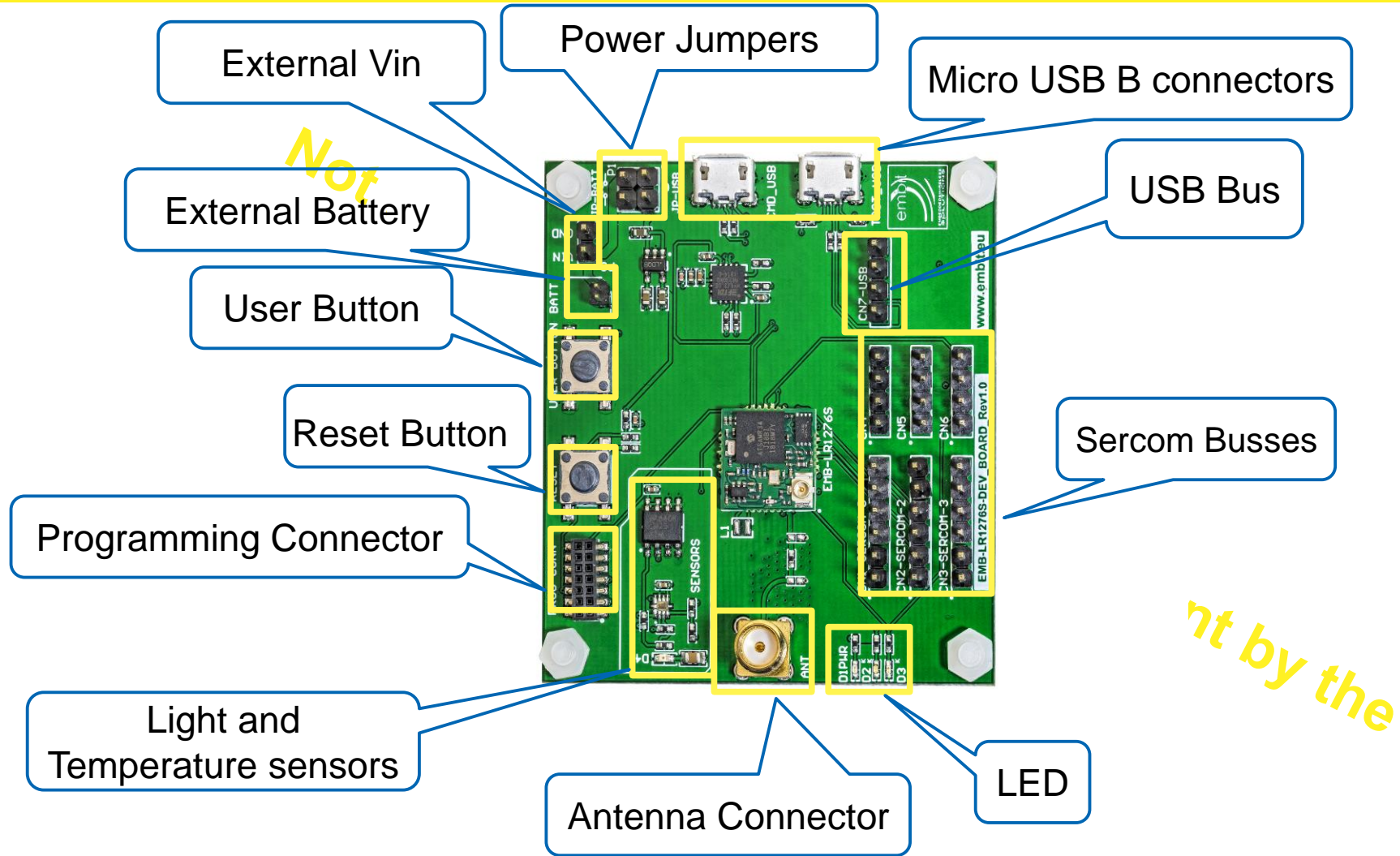
- EMB-LR1276S
- Coin Battery
- ANTENNA

- EMB-LR1276S is small, LoRaWAN® ready, low-power and secure and can be adopted for a plethora of solutions.
- It reduces drastically time-to-market in IoMe projects: where small size is a requirement
- It is reliable for applications directly involving the person
- Creating a wide area network of micro LoRaWAN nodes, people-centered and life-style-changing
-

- Create a prototype using EMB-LR1276S
 - Dev Board 1276S
 - Nano LoRa Click
- Design your LoRaWAN® IoMe Node
 - Speed-up your RF design
 - Software Integration

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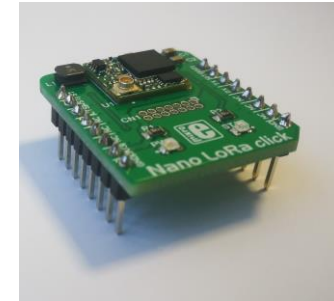
First Prototype: EMB-LR1276S Dev Board

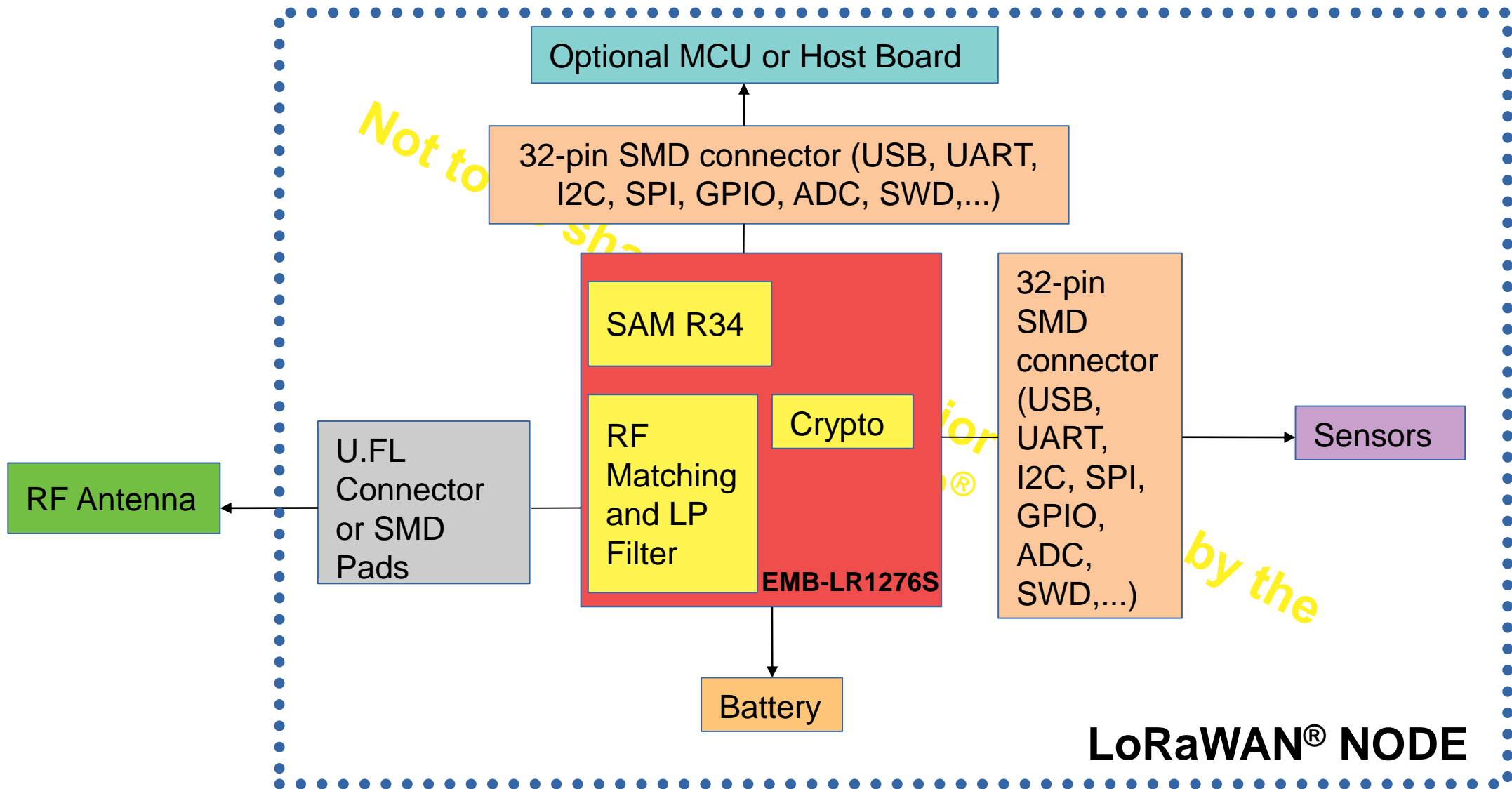


EMB-LR1276S Dev Board

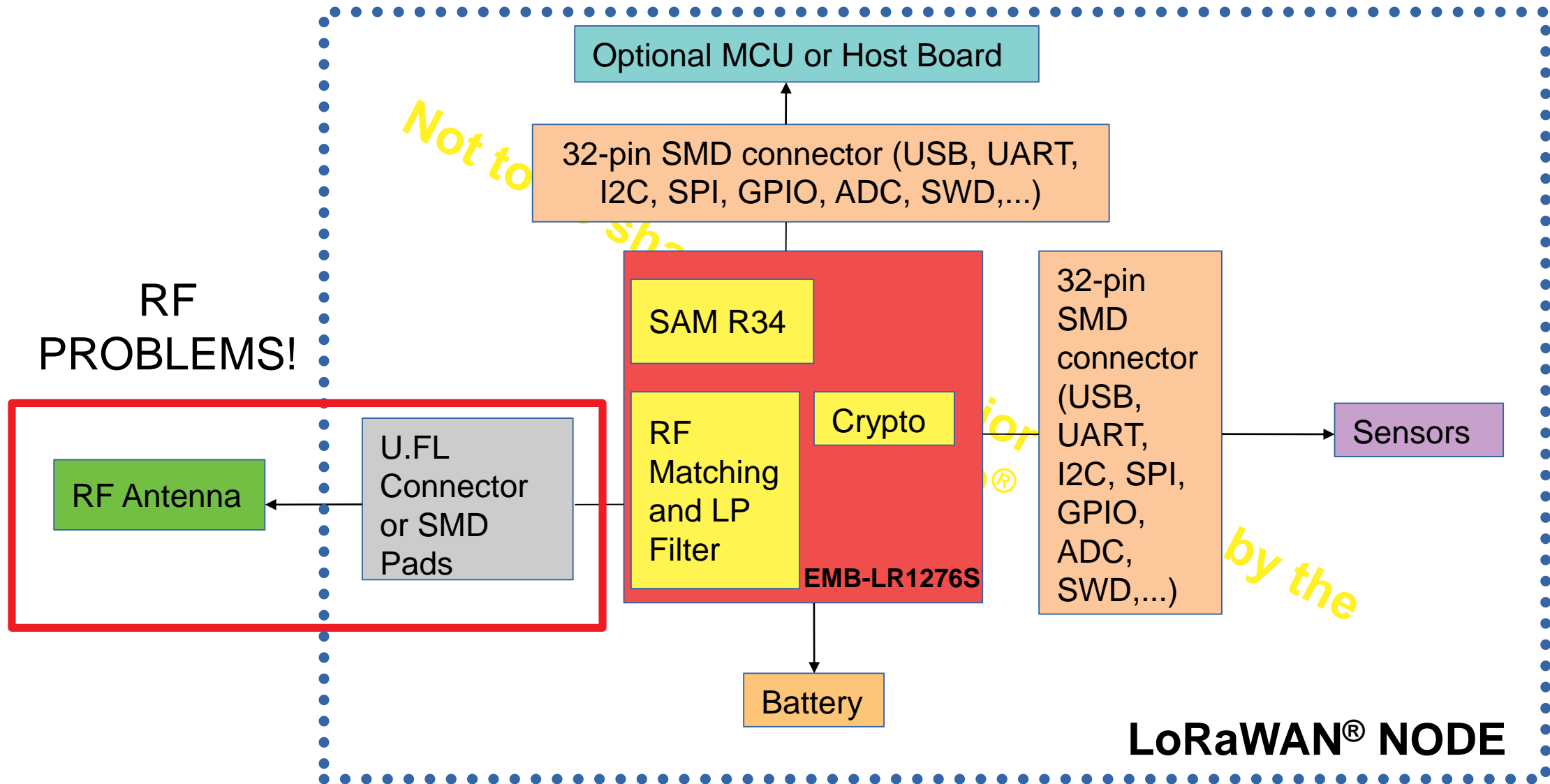
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- Nano Click Board in collaboration with Mikroe
- Board compatible with mikroBUS™
- MikroBUS™ supplies LoRaWAN® board and enables data exchange through UART
- Host sends EBI commands to Nano Click to make it join the LoRaWAN network for sending and receiving data
- Sensors can be plugged-in seamlessly





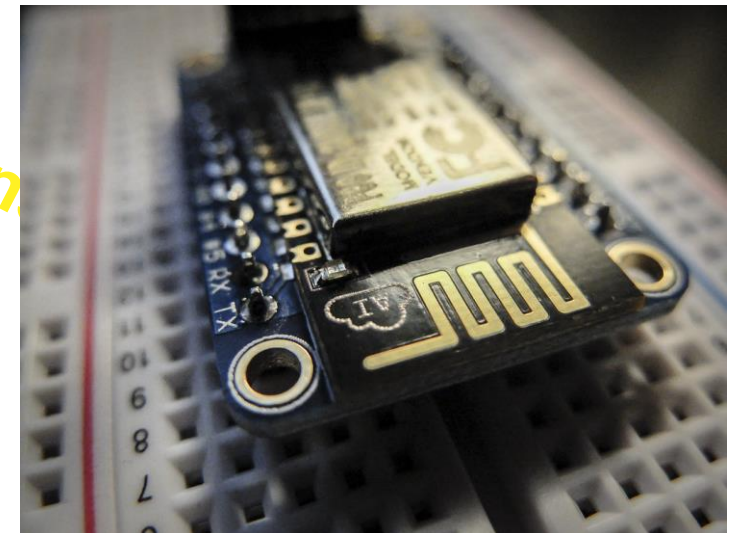
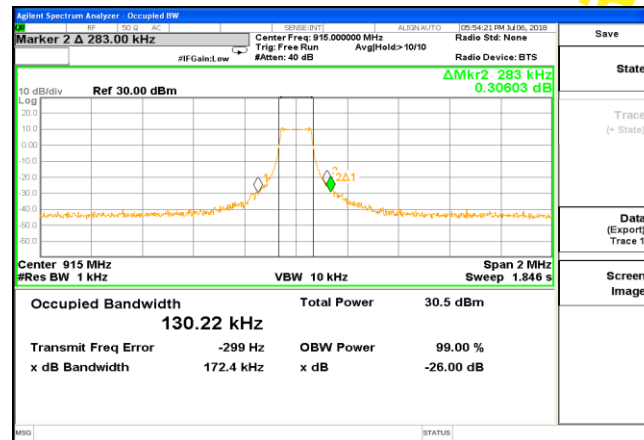
LoRaWAN[®] NODE

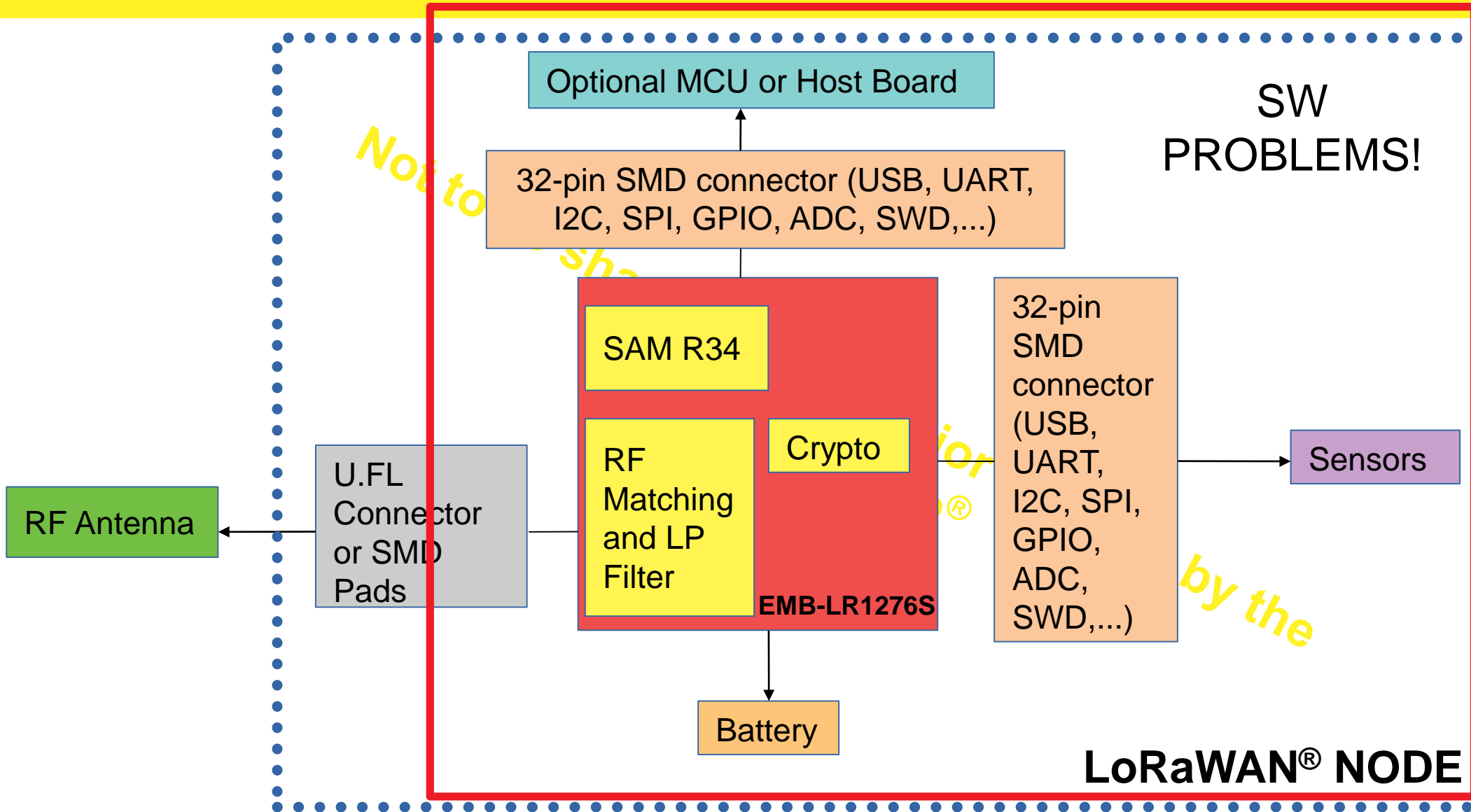


- Antenna size: Integrated Antenna or External Antenna
- Integrated Antenna available through Coplanar Waveguide with Lower Ground Plane (CPWG) design
- Integrated Antenna: PCB Antenna
 - Cheap, but
 - It needs ground plane
- Integrated Antenna: Chip Antenna
 - Small Size
 - Customizable, but
 - Easily to be detuned

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- Optional External Antenna Connection: 50 Ω single-ended U.FL connector
- Electro-Magnetic modelling
 - Challenge for small devices: Enclosure and Tuning
- Antenna Fabrication and Characterization





- Microchip SAMR34 System-In-Package
- Microchip LoRaWAN[®] Software Stack
- Integrated MCU + sub-GHz radio
- 256 KB Flash and 32 KB RAM

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- Libraries to deal with LoRaWAN[®] functionality
- Implementing software state machines to manage all LoRaWAN chain, to send Join Packet, to send Data etc.
- USB, UART, I2C, SPI, ADC interfaces to connect your sensors
- Uploading sensors' driver in your code to fetch data
- Save space and energy embedding your application directly inside the module
- Atmel Studio 7 IDE
- Or use commands to control the transceiver (EBI Commands) with another MCU

- Find your IoMe use cases
- Choose the right sensor
- Make a prototype
- Layout and Antenna Design
- Software Integration
- Your LoRaWAN[®] IoMe Solution is ready!

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- IoT Everywhere > The Internet of Me^[1]
- LoRaWAN[®] Network penetration
- Massive Integration > small form factor devices/ specific tech challenges
- Develop your micro IoMe LoRaWAN Solution according to your use case

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[1] 2015, The Developers Alliance, *Internet Of Things. Internet of Me: How wearable Tech is changing IoT*,
<https://www.developersalliance.org/internet-of-things/wearables>

[2] 2017, Mordor Intelligence, *Global Smart Wearables Market*
<https://www.mordorintelligence.com/industry-reports/smart-wearables-market>

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