Introduction of SapinTech

ELECTRONICS SUBCONTRACTING

SERVICES AND DEMO PROJECTS

Outline

I. Background

II. Services

III. Demo projects

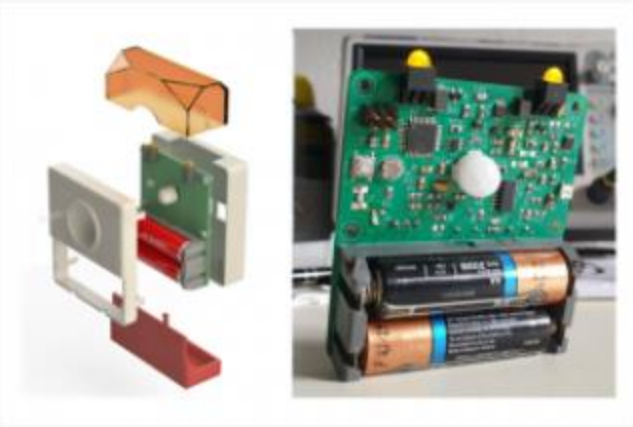
Background

- Solid background on electronics: from kHz to microwave and optics, electronic system architecture, microcontroller 32 bits (STM32) and 8 bits (AVR), antennas to RF circuits
- Skills and experiences on a wide area: electronics and micro-controller, sensors, programming, microwave circuit design, antenna design.
- Technical environment:
  - Embedded: STM32, STM32CubeIDE, AVR, Atmel Studio
  - PCB design: Altium, Eagle and circuit simulation with LTSpice, ADS
  - Electronic system design: sensor, analog chain and signal conditioning, ADC, 32-bit MCU, real-time DSP, digital filter, low power design (µA consumption), battery-powered application.
  - Measurement: oscilloscope, spectrum analyzer, signal generator, noise factor measurement, CEM, anechoic chamber, RF generator, spectrometer, VNA
  - Desktop programming: C#, Visual Studio
  - Cad: SolidWorks
  - 3D EM simulation: HFSS, CST

Services

Antenna Design

RF & Microwave circuits

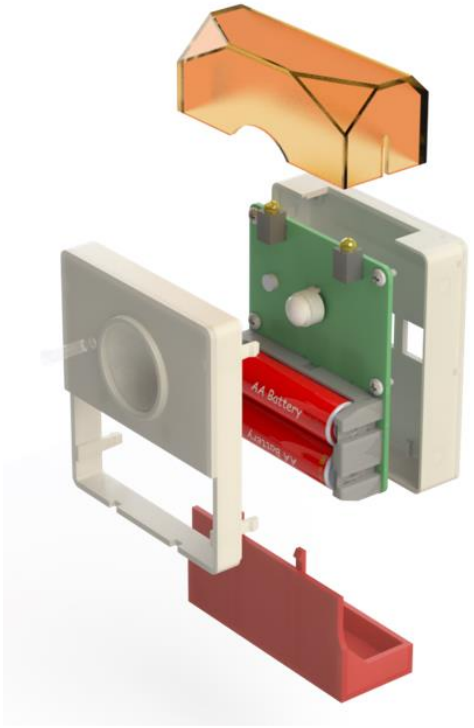


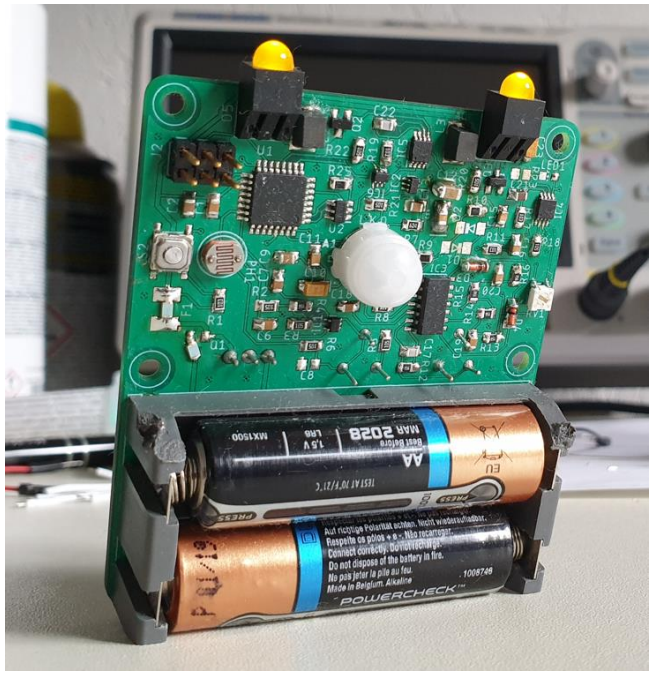
Embedded electronics

For more information, please visit https://www.sapintech.com/services/

Demo projects

Gesture-control night light

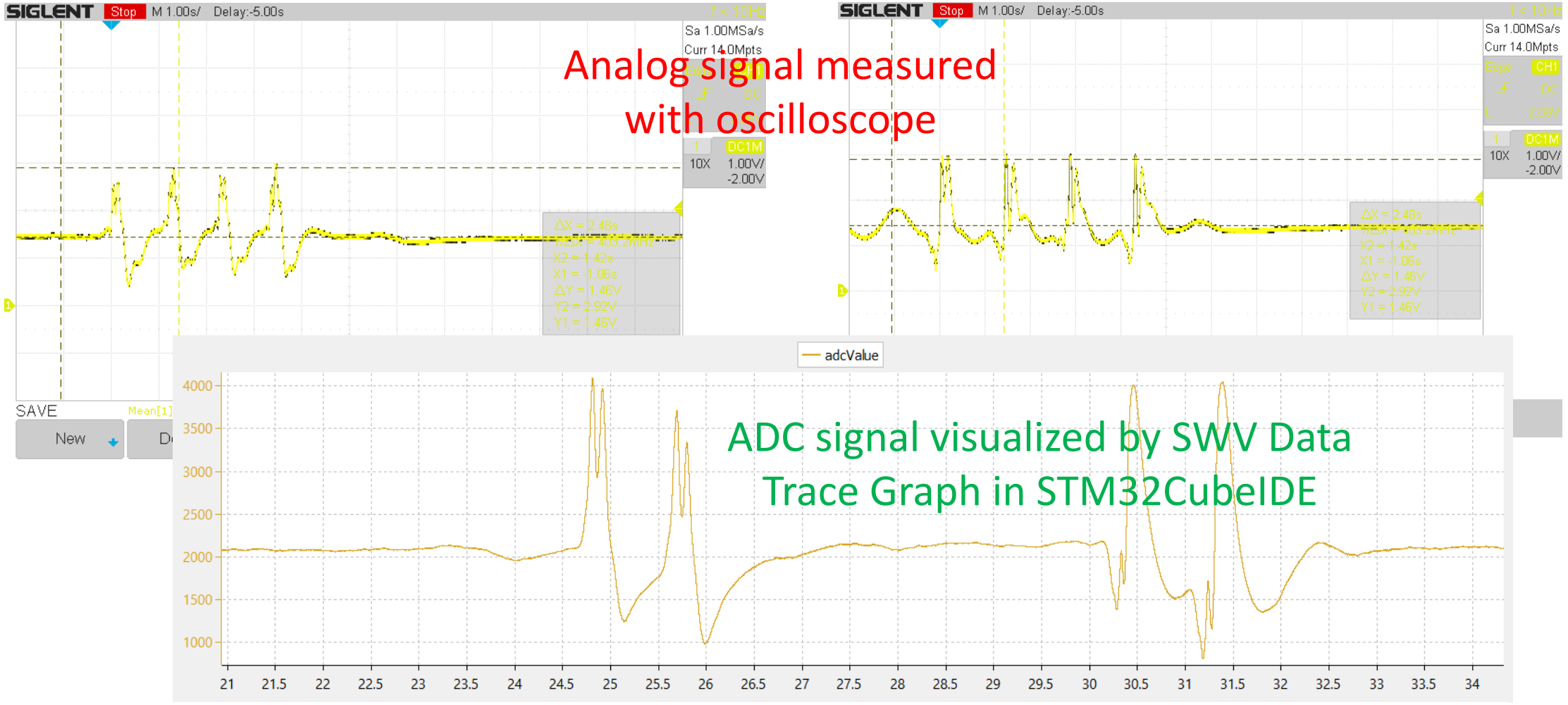




- Super easy to find/activate in the dark
- Lighting luminosity is controlled by gesture to not make user lose sleep

Use STM32 platform to implement sophisticated algorithm

Demo projects



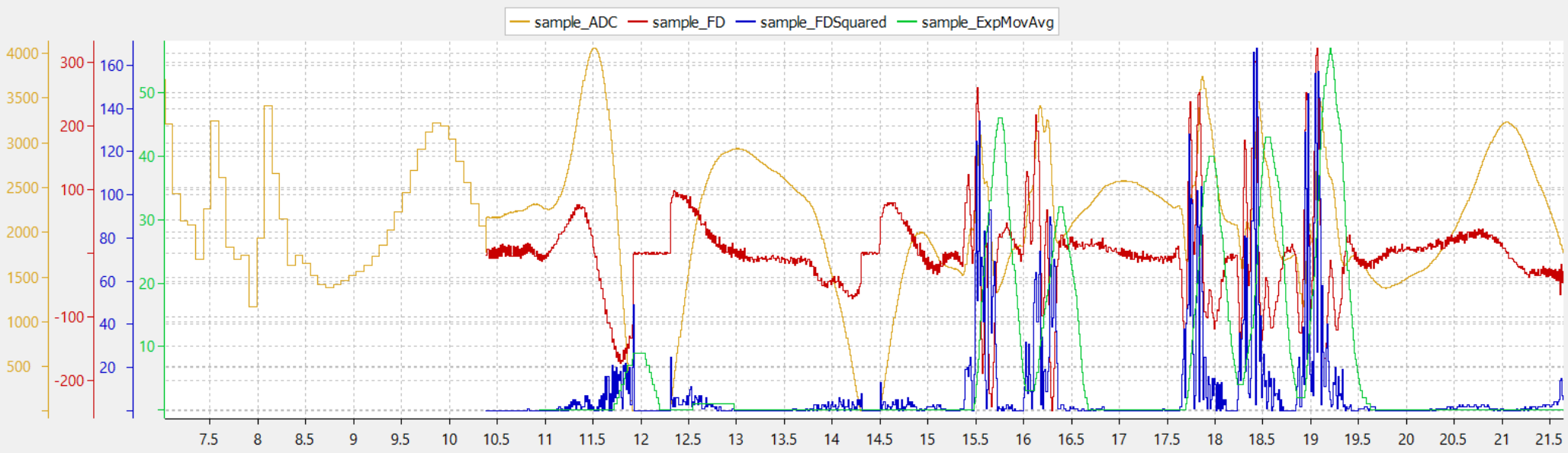
Analog signal measured with oscilloscope

ADC signal visualized by SWV Data Trace Graph in STM32CubeIDE

Demo projects

Real-time DSP

Gesture detection from PIR signal



First difference → Squaring → First difference + absolute → One-side moving average → Exponential moving average

- Remove DC
- High pass

- Increase SNR

- Treat body moving signal (slow vs PIR)

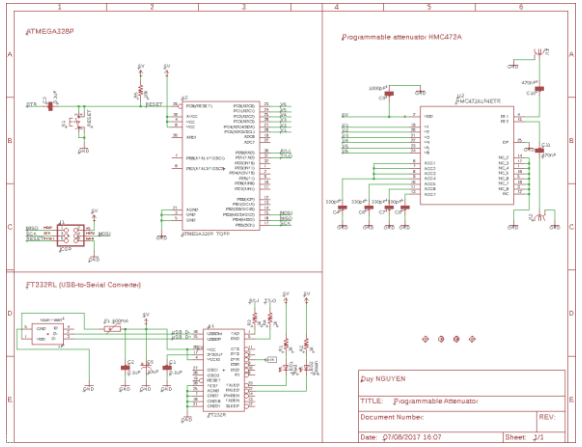
- Facilitate threshold application

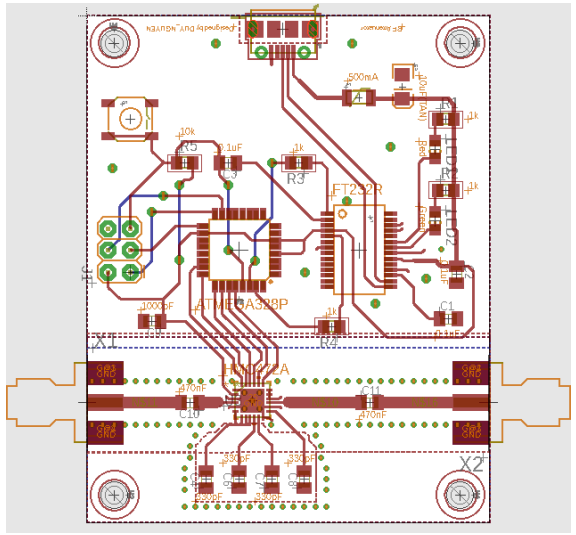
Demo projects

PIR signal -> pulse detection -> hand gesture detection

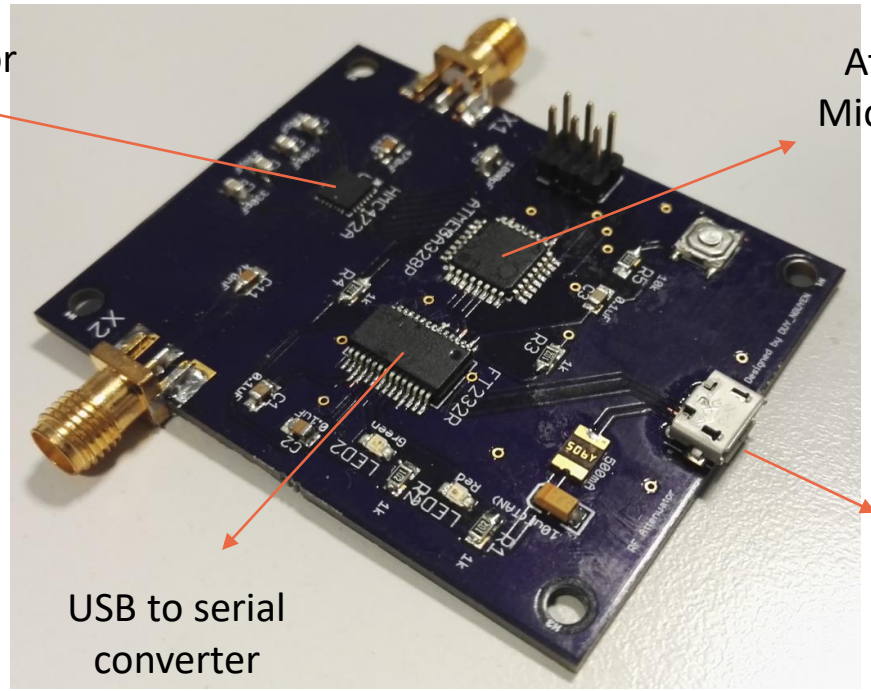
Demo projects

Programmable RF attenuator





Programmable RF attenuator



Period: 2017

Programing µ-controller

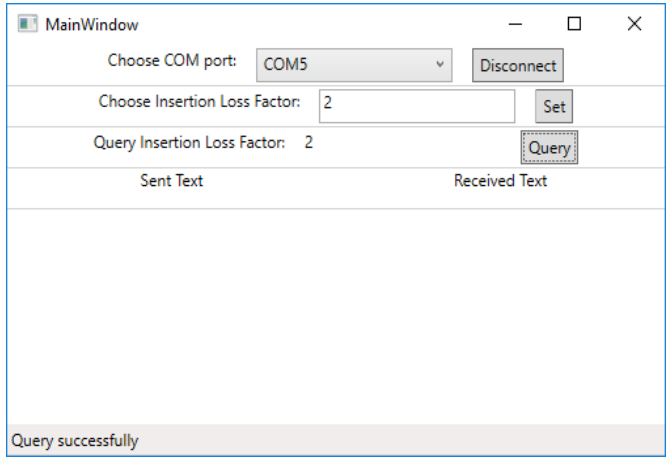
Visual Studio

Programing software

Demo projects

Programmable RF attenuator

Program C# and firmware



Control 6 bits

Feedback ACK, ERR, status

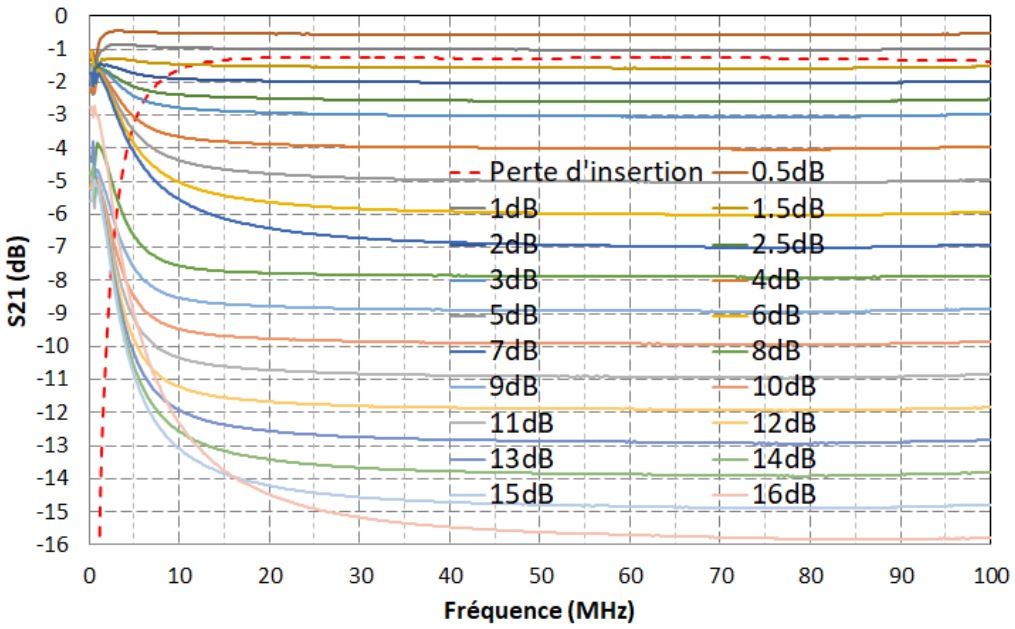
```
int main(void)
{
    //-----init-----//
    // config PC0 -> PC5 to output
    DDRC = 0b00111111;
    //initial IL factor = 0
    PORTC = (~current_IL_factor);
    // Turn on USART hardware (RX, TX)
    UCSR0B |= (1 << RXEN0) | (1 << TXEN0);
    // 8 bit char sizes
    UCSR0C |= (1 << UCSZ00) | (1 << UCSZ01);
    // Set baud rate
    UBRR0H = (BAUD_PRESCALE >> 8);
    UBRR0L = BAUD_PRESCALE;
    // Enable the USART Receive interrupt
    UCSR0B |= (1 << RXCIE0 );

    // Globally enable interrupts
    sei();
    //-----event loop-----//
    while(1) {
        if (command_ready == TRUE) {
            copy_command();
            process_command();

            command_ready = FALSE;
            usart_ok();
        }


    }
```

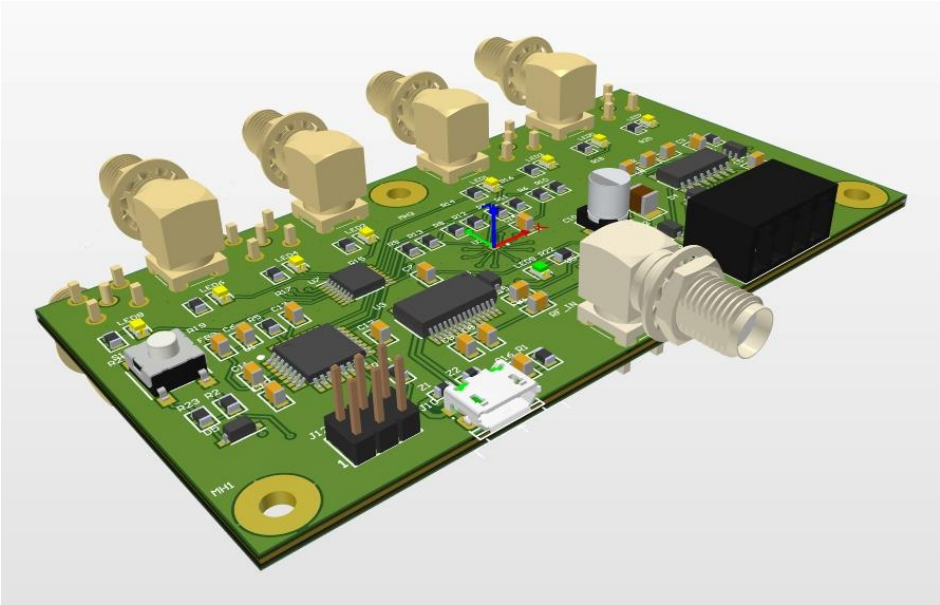
Perte d'insertion calibrée

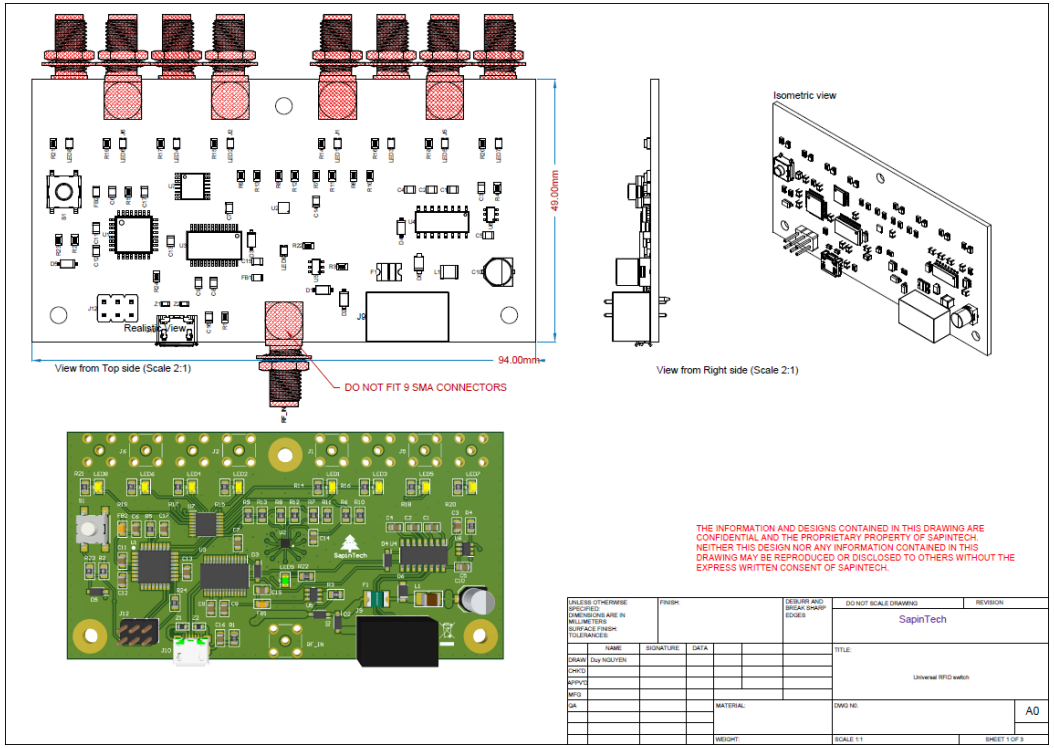


System level design: RF circuit, embedded, PC software

Demo projects

Universal 1to8 RFID switch



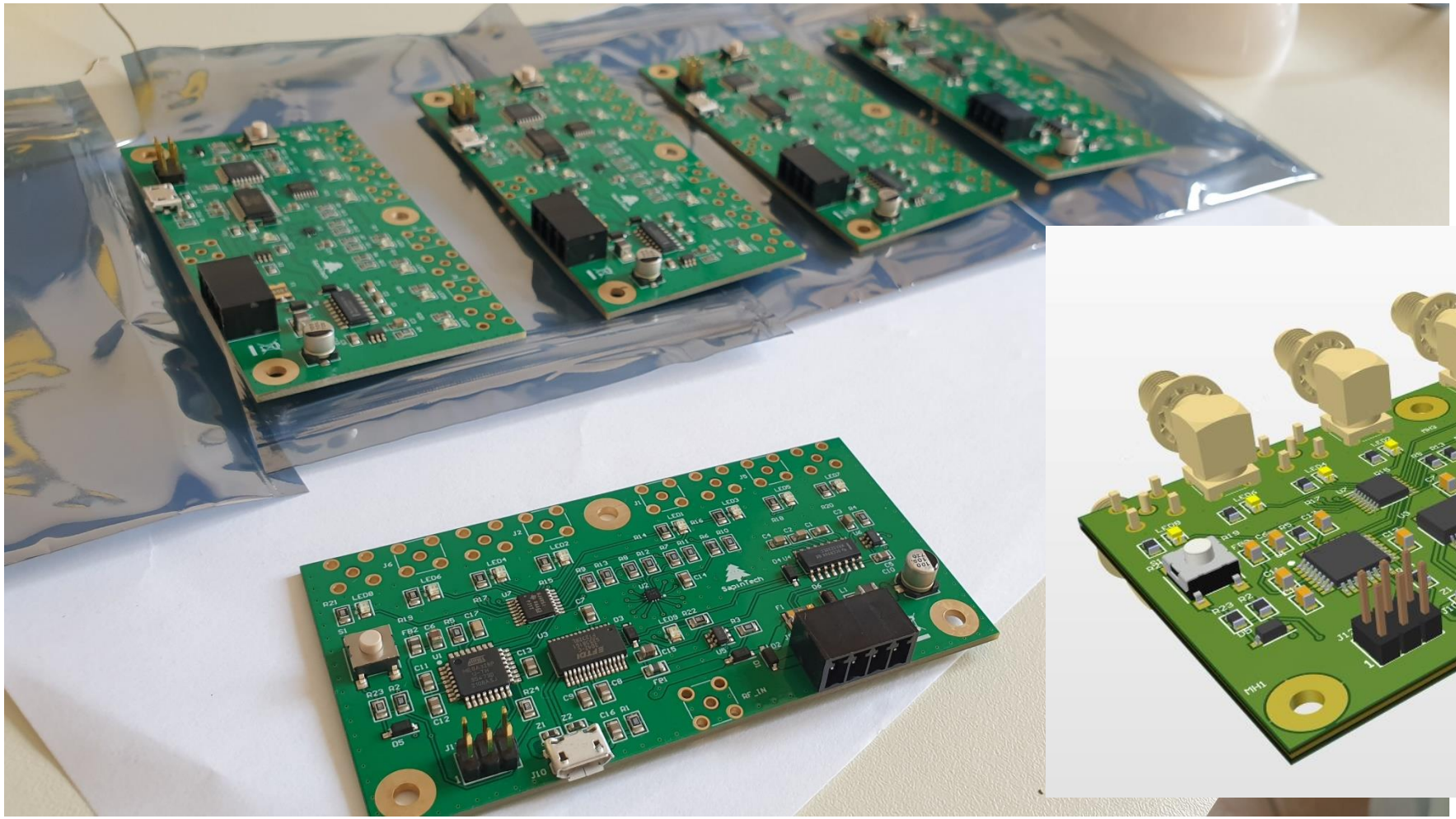


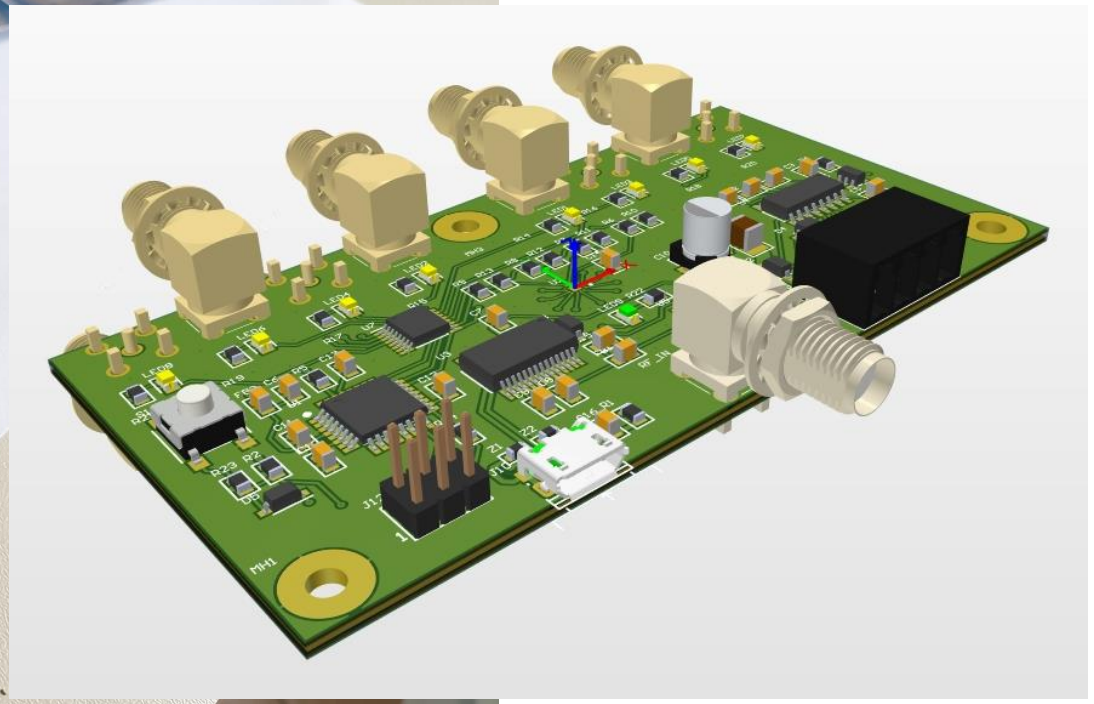
- PCB design with Altium: 4-layer, 90 components, mixed-signal routing between 8 RF traces and control lines (USB, RS-232, LEDs)

Outsourcing: manufacture and assemble in China

Demo projects

RFID multiplexer





Contact

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