Green and Smart IoT Tech.

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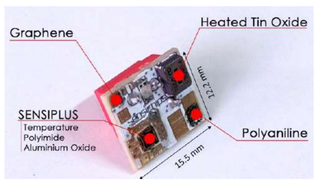
Introduction

- SENSIPLUS smart sensor capable of impedance spectroscopy for substance detection:
  - Used to calssify substance in water
  - Gas measurement sensors are bulky and not very versatile
  - Distributed sensing measurements

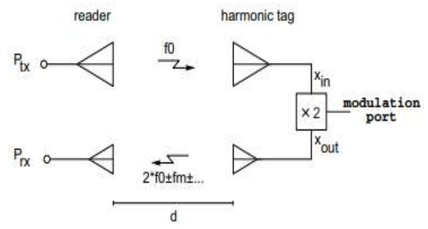


Microcontroller unit

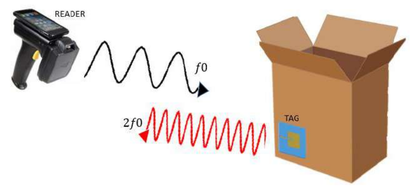
- Distributed sensing measure:
  - Use of fast reading protocol for data acquisition from sensor arrays
  - Use SENSIPLUS to study gases

Introduction

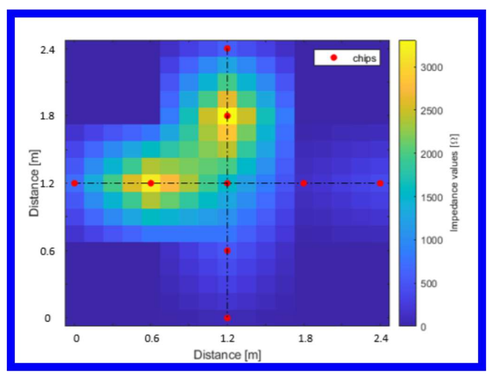
- Harmonic transponders using non-linear components for the production of higher harmonics :
  - Robust harmonic tag to clutter
  - RFID tag with omnidirectional radiation pattern
  - RFID can transmit single bit information

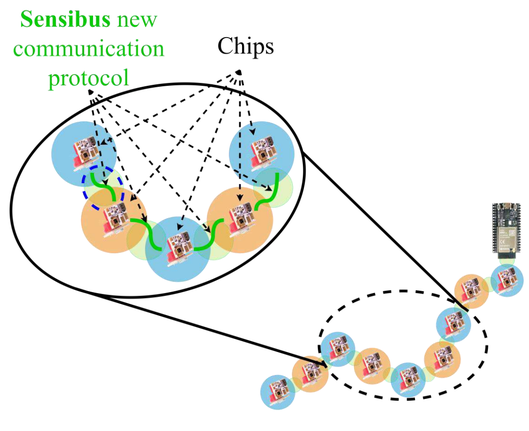


- Harmonic transponders, to be implemented :
  - Harmonic transponders implementation with a single antenna
  - Developement of transponders on green materials that can be directly integrated into the usage environment



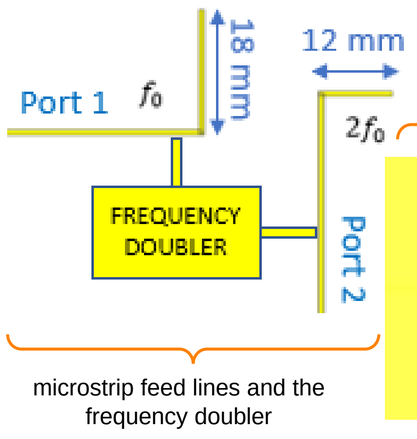
Our Contribution



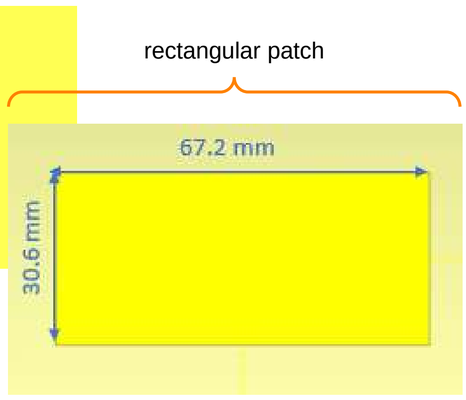


- **Development of a fast, single-wire communication protocol that can also effectively implement the data reading part from multiple sensors.**
- **Spatial mapping of the substance using the SENSIBUS protocol**

Our Contribution

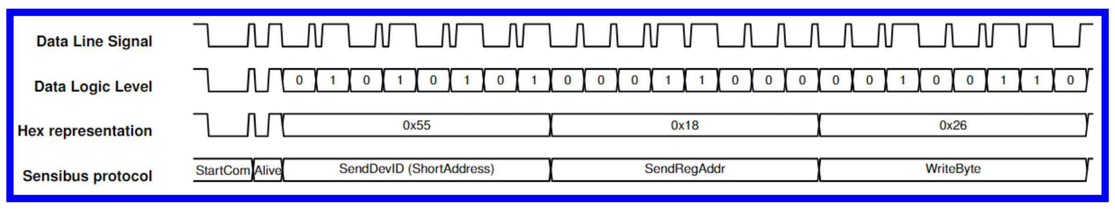


- f_0 = 1.2 GHz
- $2f_0$ = 2.4 GHz

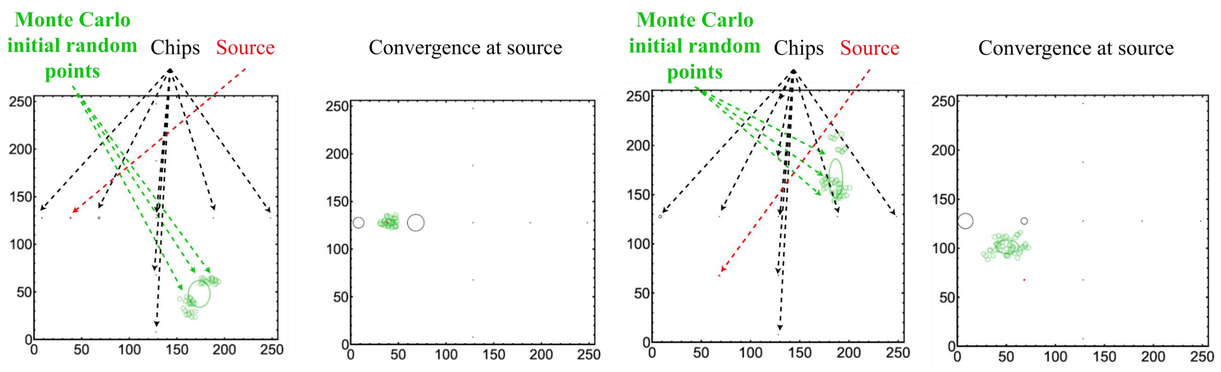


- **The developed harmonic antenna consists of a rectangular microstrip patch antenna which is fed with two orthogonal microstrip lines coupled with the patch through H-slots**

Implementation and Results

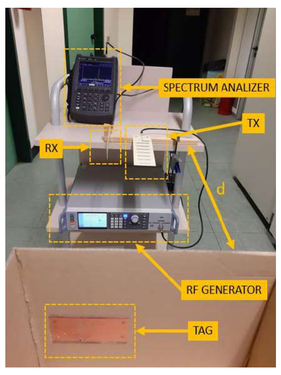


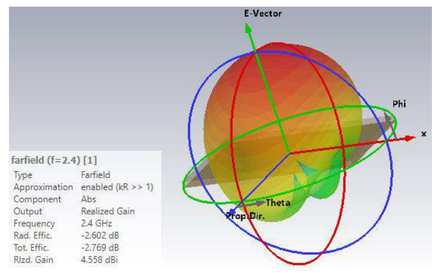
- **Communication protocol capable of implementing BROADCAST, MULTICAST and READCAST with a single wire**



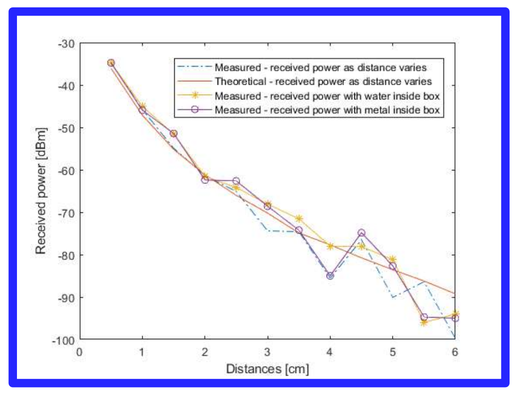
- **Source search using the Monte Carlo Markovian method**

Implementation and Results





- **Tag realisation using acid etching technique on copper foil**



- **Directional radiation diagram**
- **Robustness of the signal to objects transported inside the box**

Conclusions

- Make the protocol wired wireless (IR first)
- Also estimate the displacement of the substance

Conclusions

- Development of new passive wireless sensors capable of measuring quantities other than temperature and thus adding multibit information to the single RFID tag
- Improving tag efficiency thereby reducing conversion loss and increasing readership

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