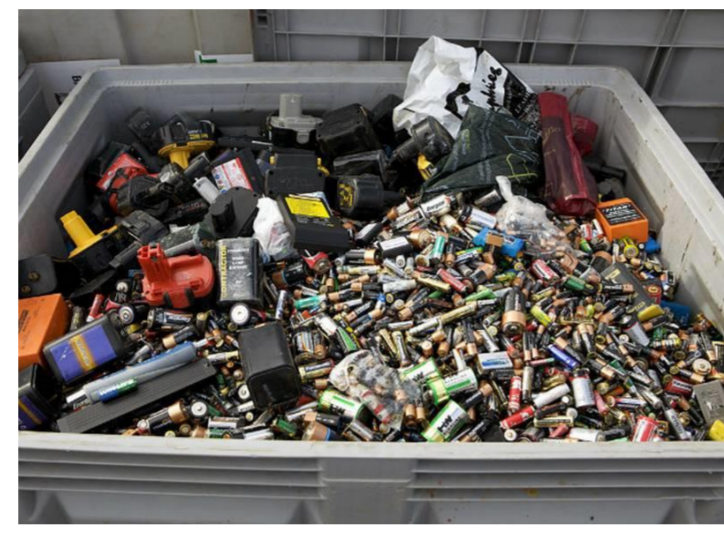
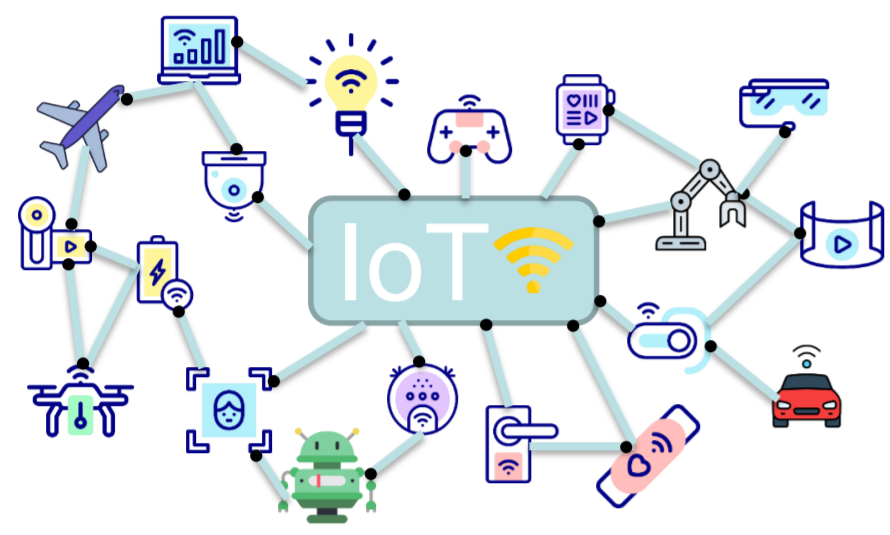


# PassiveLiFi Demonstration: Rethinking LiFi for Low-Power and Long-Range RF Backscatter

Dayrene Frometa Fonseca, Muhammad Sarmad Mir, Borja Genoves Guzman, Ambuj Vashney and Domenico Giustiniano

## 1 - Introduction

- 64 billion internet-of-things (IoT) devices by 2025.
- Most of IoT devices depend on batteries.
- Batteries have a negative environmental impact.



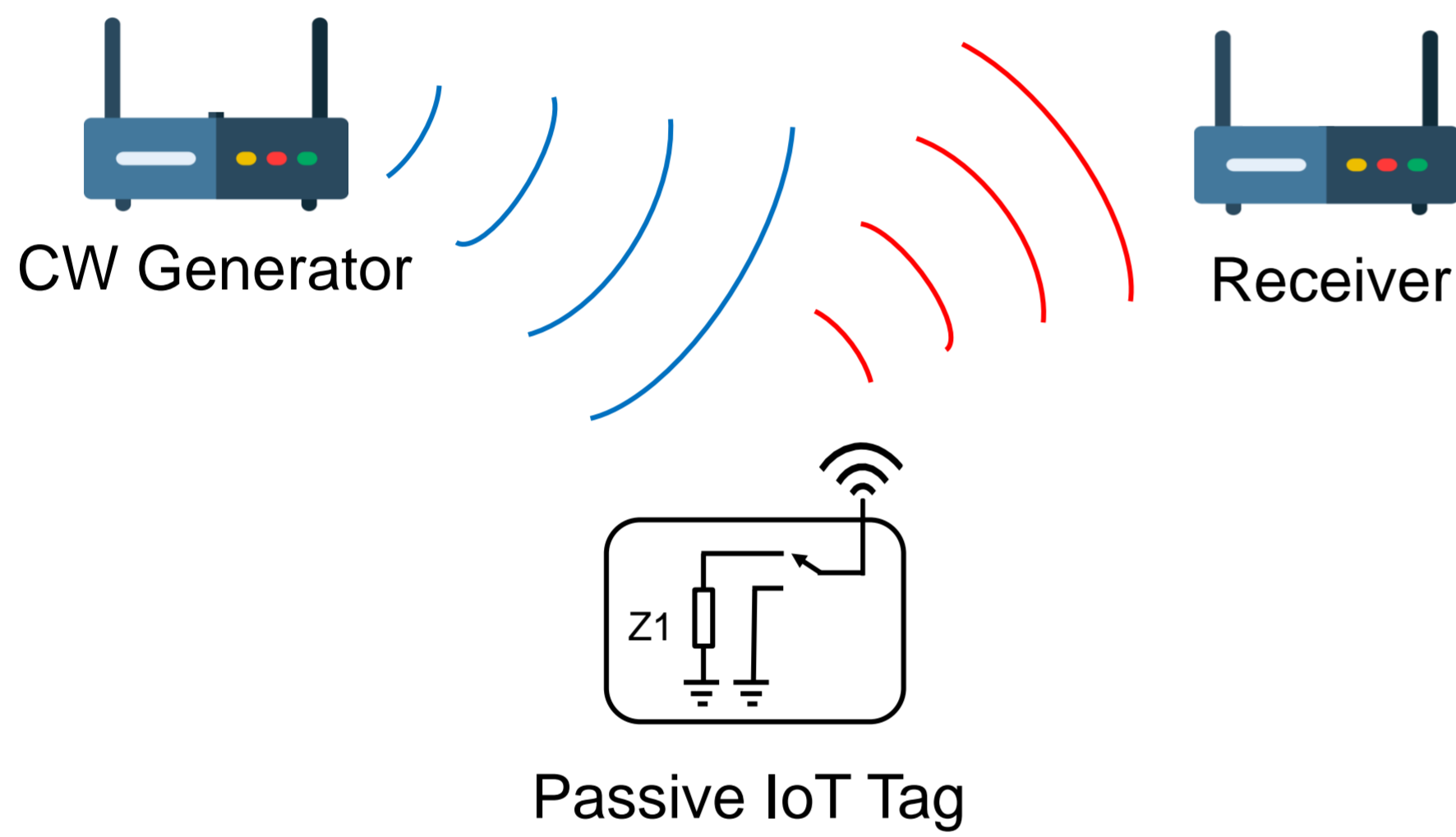
## 2 - LiFi Technology

- Simultaneous illumination and communication with LEDs

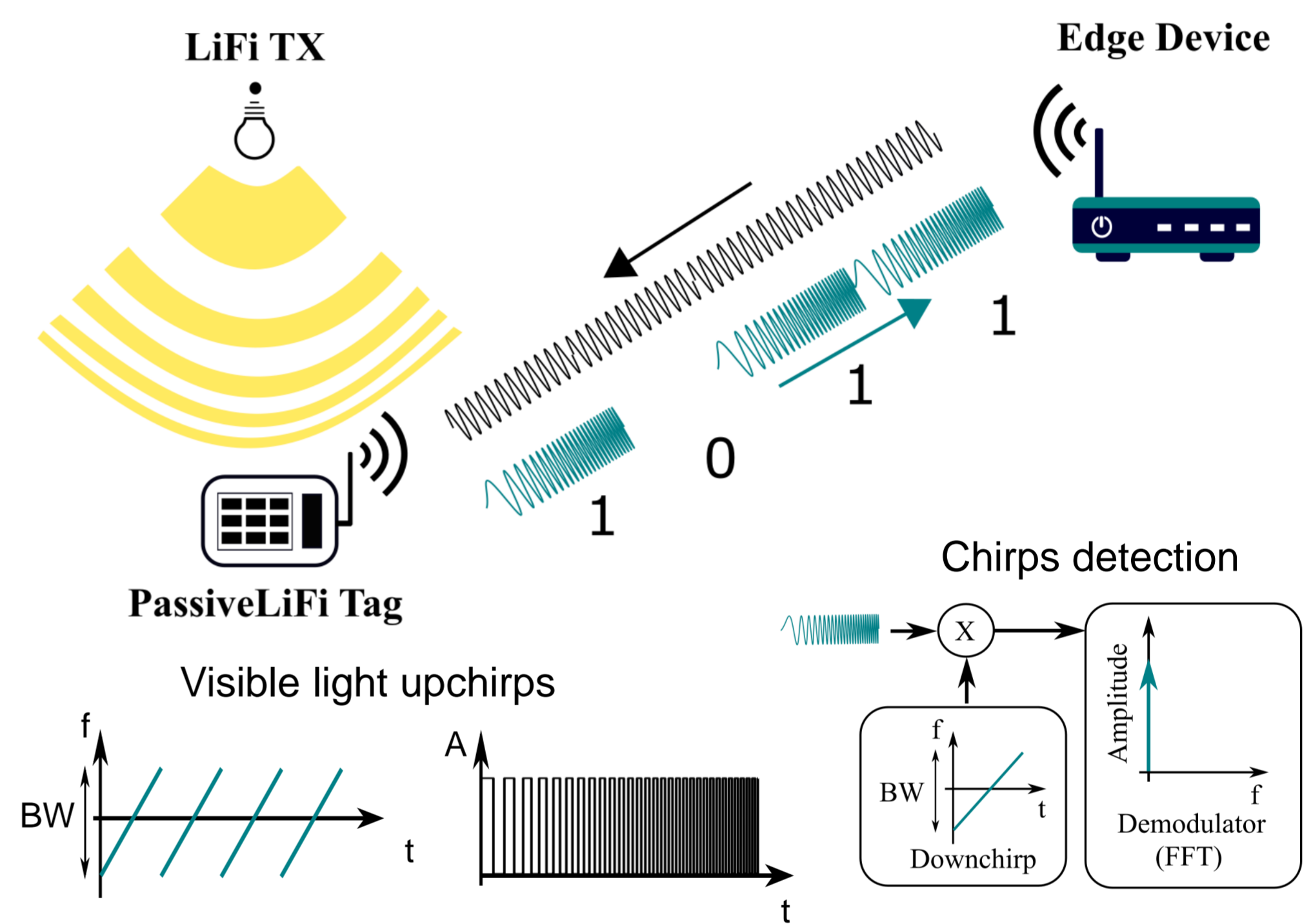


## 3 - RF backscatter technology

- **RF backscatter:** Absorb and reflect RF carriers to transmit data with extreme low-power consumption

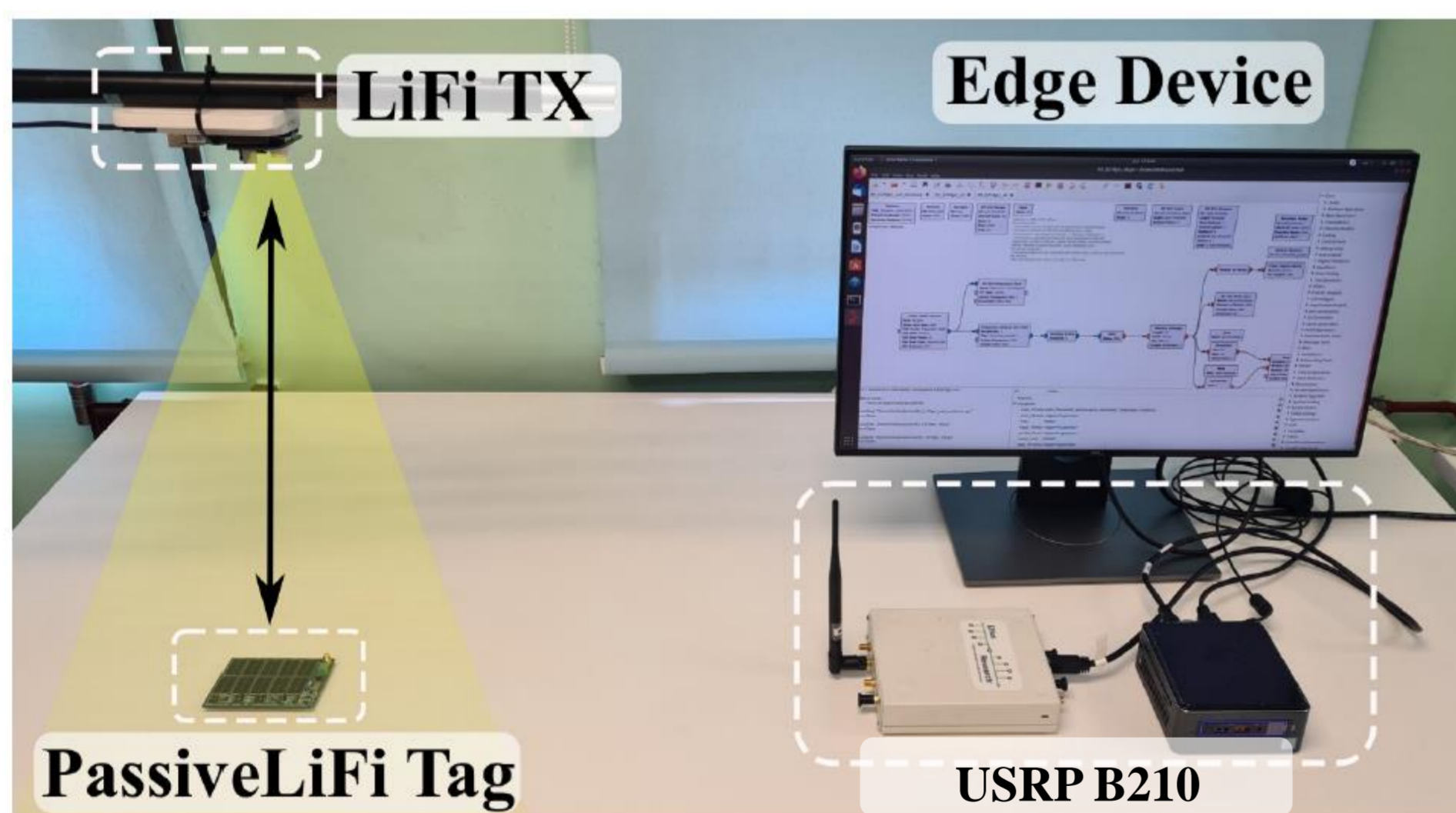


## 4 - PassiveLiFi system overview

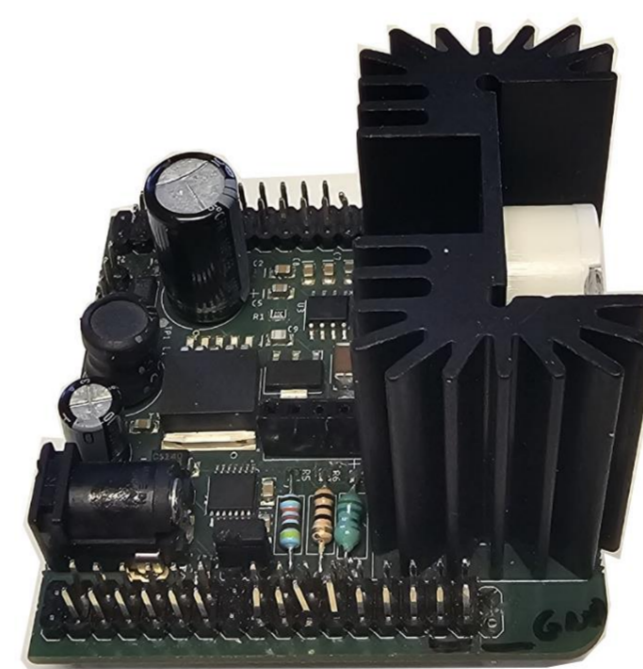


## 5 - PassiveLiFi demonstration

### Demonstration setup

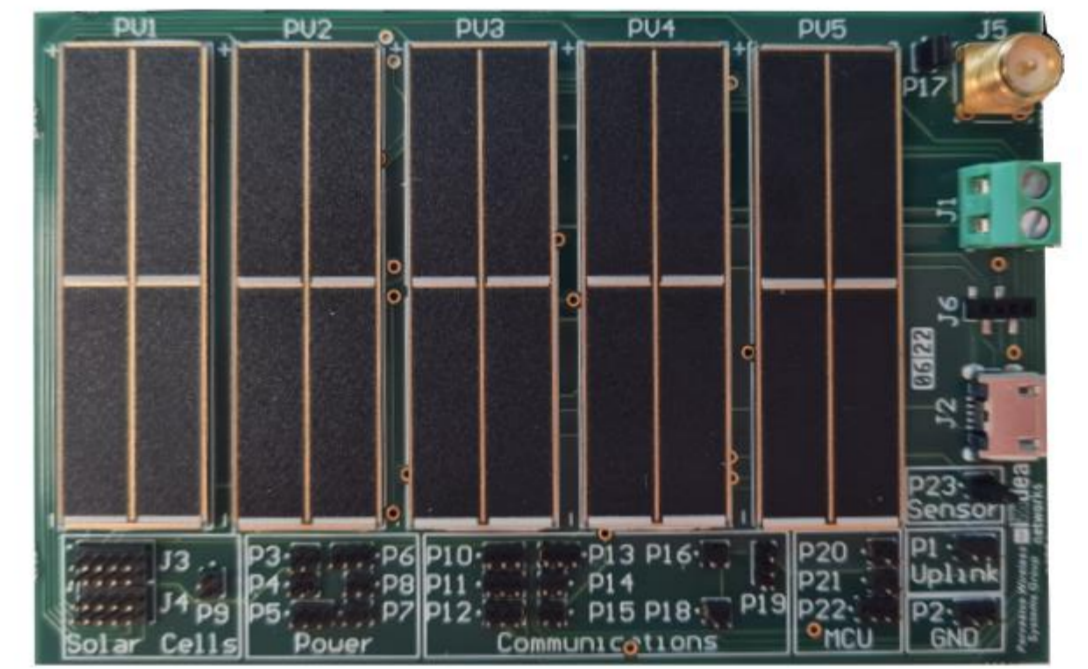


### LiFi TX



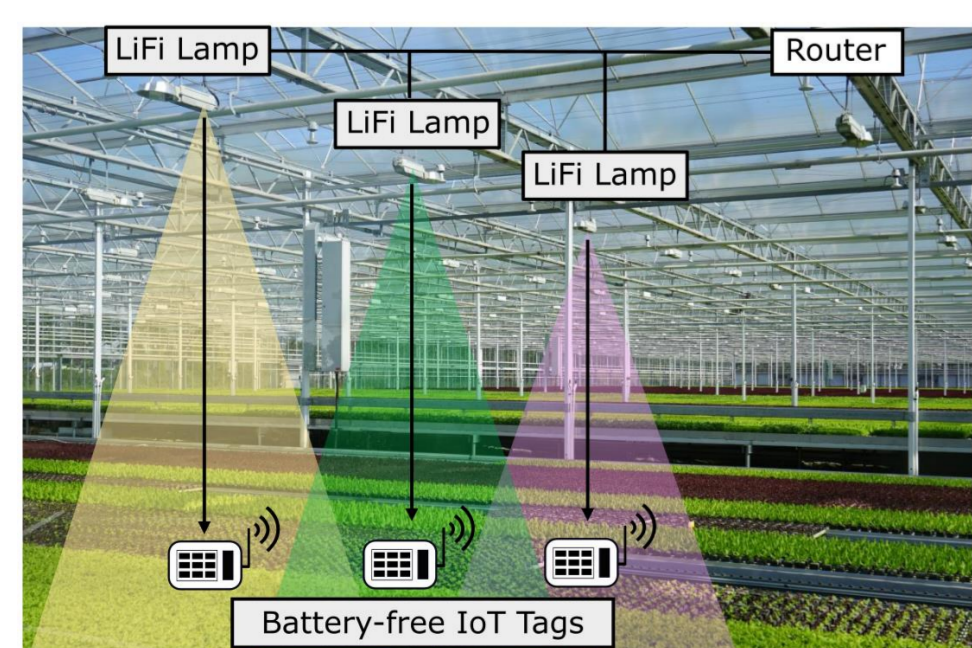
- Upchirp parameters:
- Spreading factor
  - Bandwidth

### Battery-free PassiveLiFi Tag



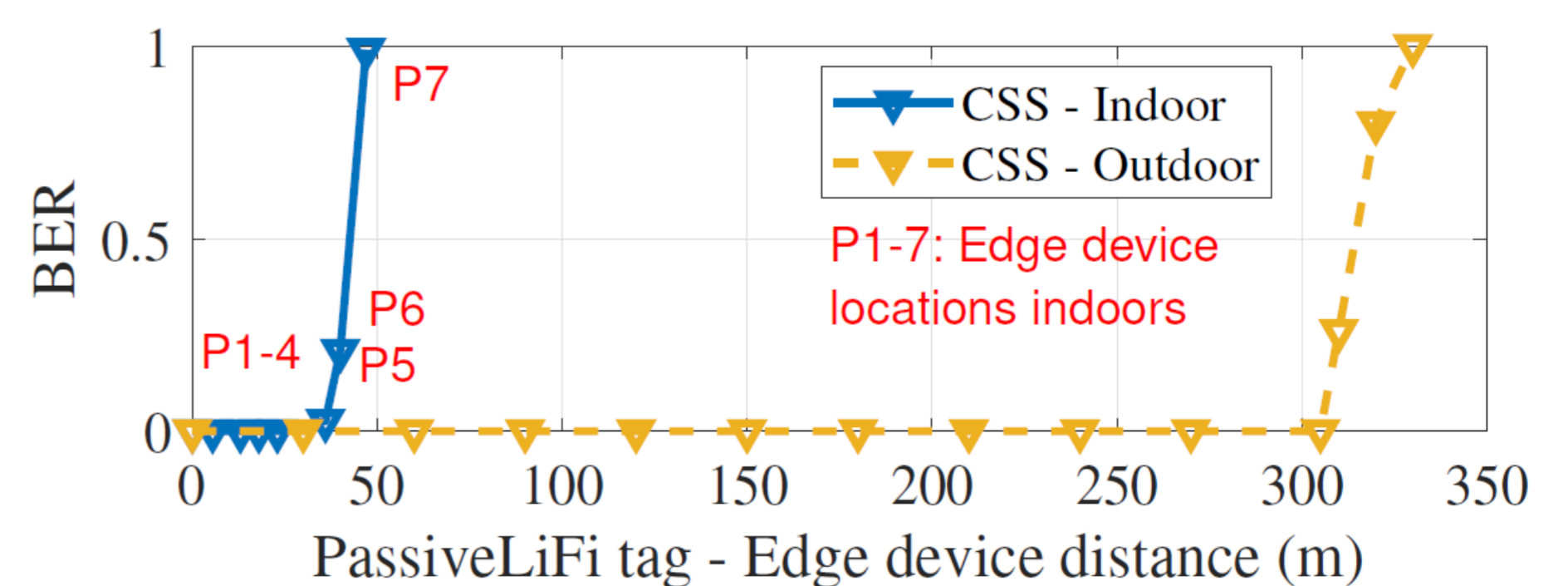
- Power consumption: few  $\mu\text{W}$
- Communication range: up to 300 m outdoors

## 6 - Applications



- Precision agriculture indoors
- Industry 4.0
- Smart homes

## 7 - Results



## References

M. Mir, B. Genoves, A. Varshney, D. Giustiniano, "PassiveLiFi: Rethinking LiFi for Low-Power and Long Range RF Backscatter", *ACM Mobicom* 2021.  
 A. Galisteo, D. Varshney, D. Giustiniano, "Two to Tango: Hybrid Light and Backscatter Networks for Next Billion Devices", *ACM Mobisys* 2020.