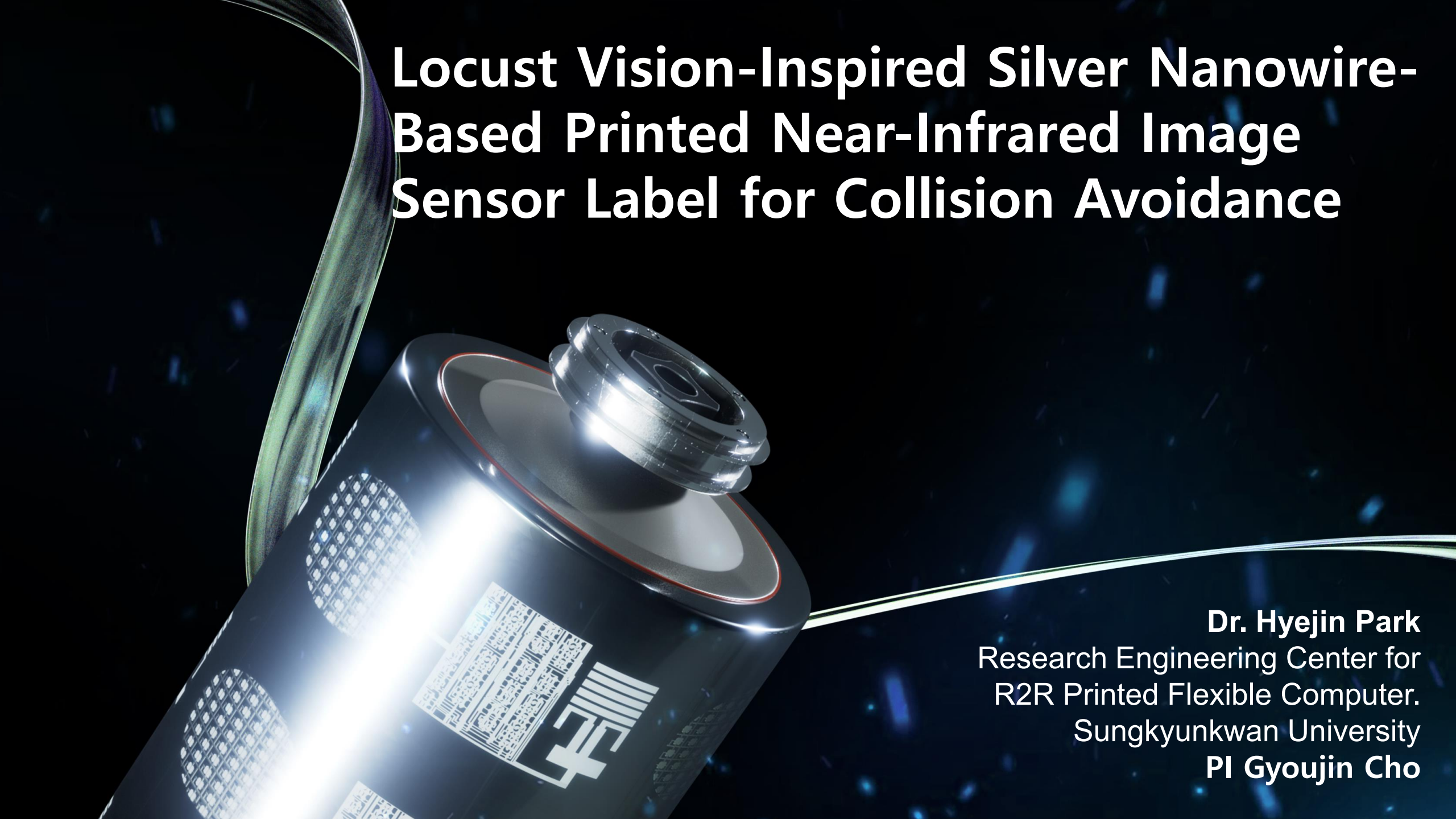


Locust Vision-Inspired Silver Nanowire-Based Printed Near-Infrared Image Sensor Label for Collision Avoidance

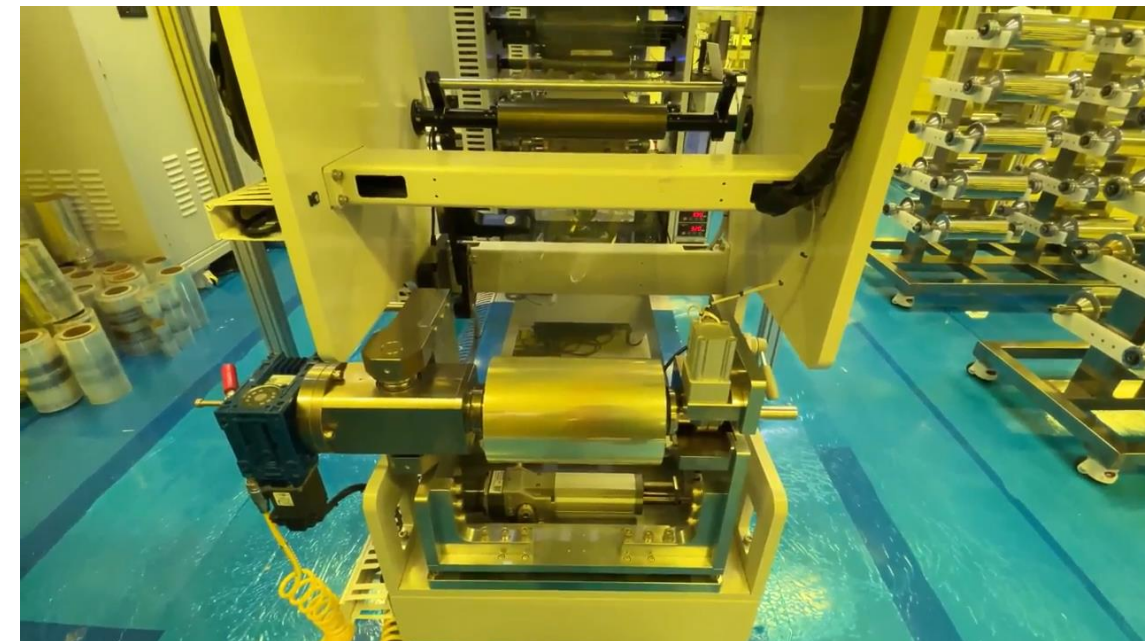
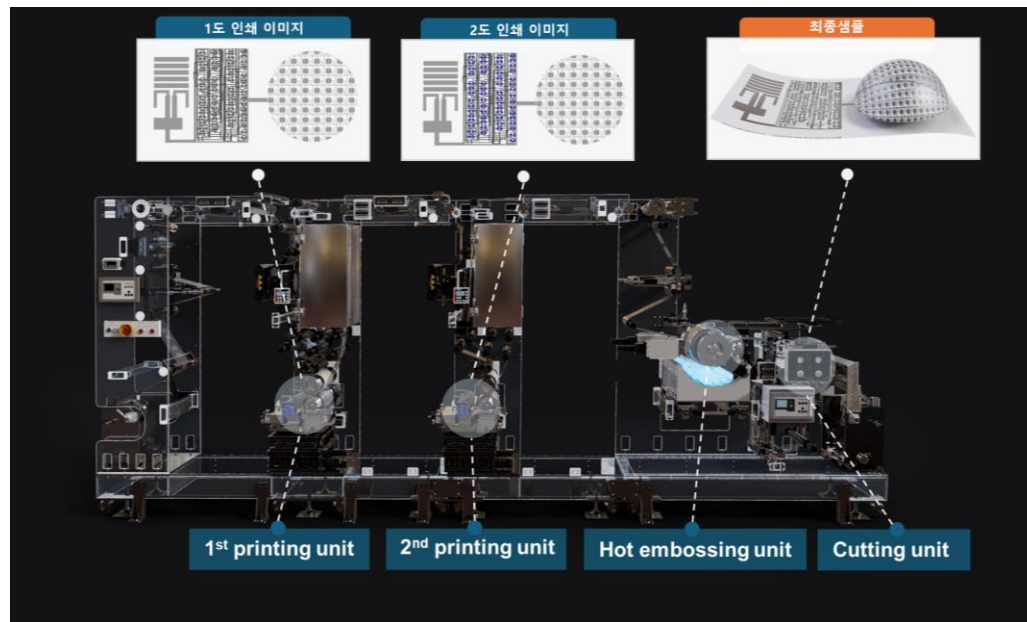


Dr. Hyejin Park
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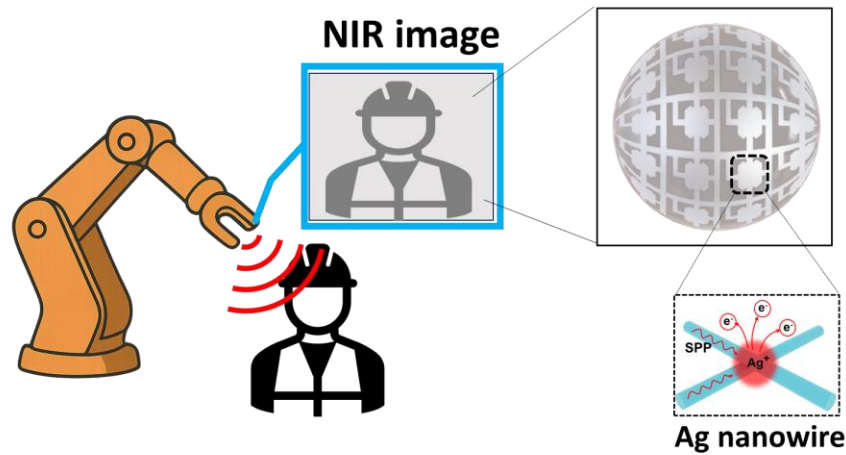
1. Introduction of Research Engineering Center for R2R Printed Flexible Computer

Final Goal of the R2R Printed Flexible Computer Research Center

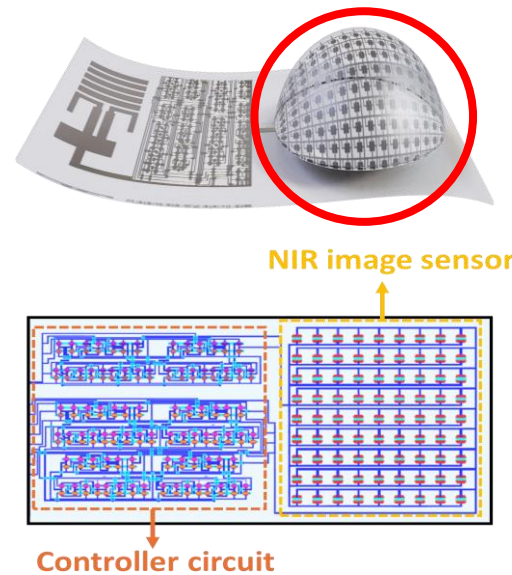
To secure core technologies in materials, components, equipment, and device design for next-generation R2R printed electronics foundry, and to demonstrate the world's first fully roll-to-roll printed 4-bit flexible computer (CPU + ROM + RAM + I/O + 13.56 MHz module) and flexible printed sensors.



3. Motivation



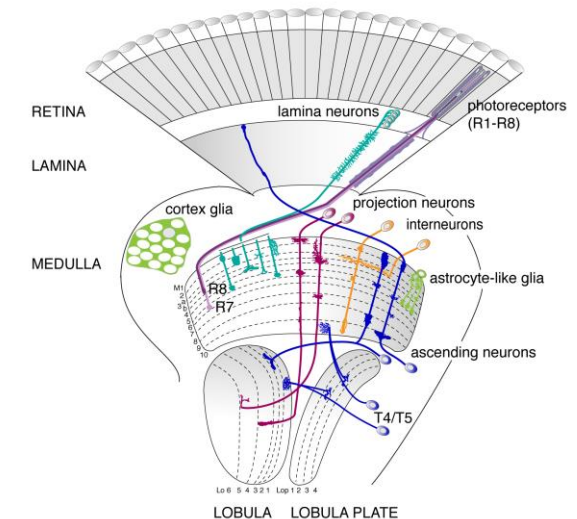
Printed NIRIS label



Locust Vision (Compound eye)



←
Insect compound
eye mimic sensor

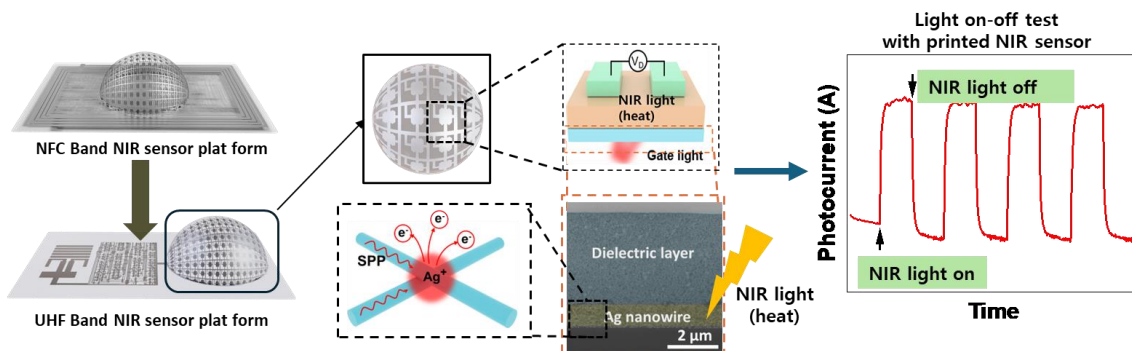


- ✓ **HIGH PERFORMANCE** Locust-inspired Near-Infrared Image Sensor (NIRIS) with embossed Ag-NW arrays enables fast and accurate collision detection through plasmonic enhancement and neuromorphic signal processing.
- ✓ **REASONABLE** Fully roll-to-roll printed NIRIS and neuromorphic controller provide a low-cost alternative to bulky computer vision systems for industrial robots.
- ✓ **FLEXIBLE** Thin, lightweight, and printable sensor labels can be easily attached to various robotic surfaces, enabling adaptable human-robot interaction across environments.

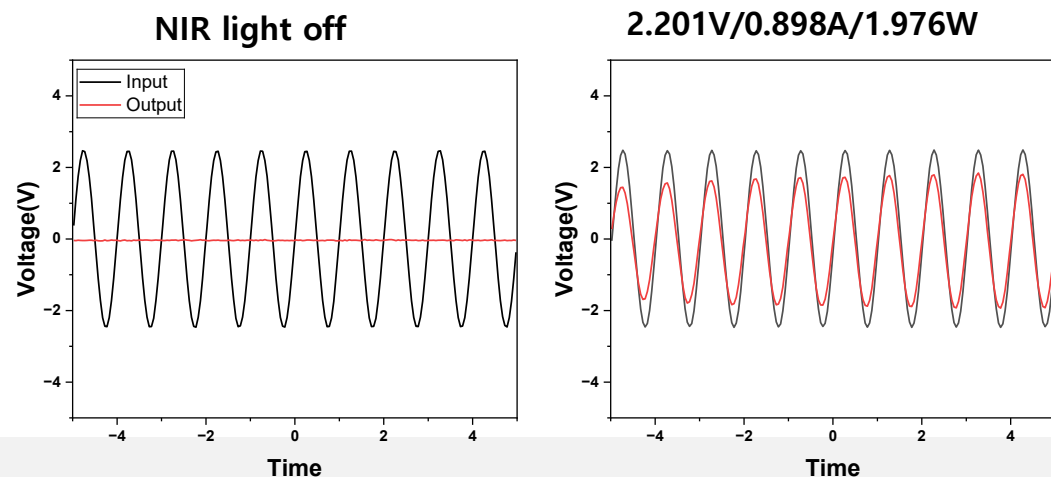
- ✓ Perspective-based collision detection signal processing of objects.
- ✓ Neuromorphic signal reception & transmission.

4. Development of NIRIS

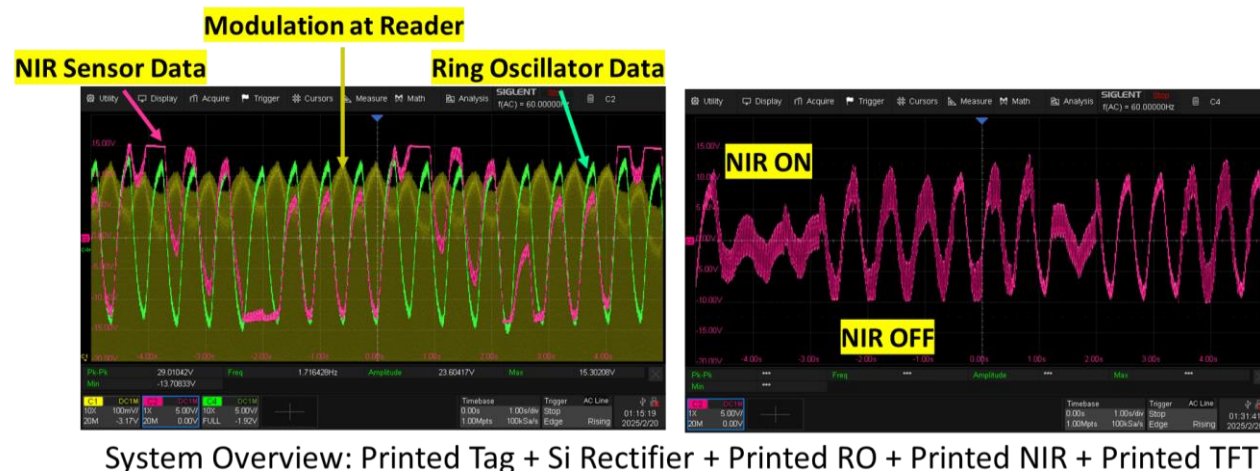
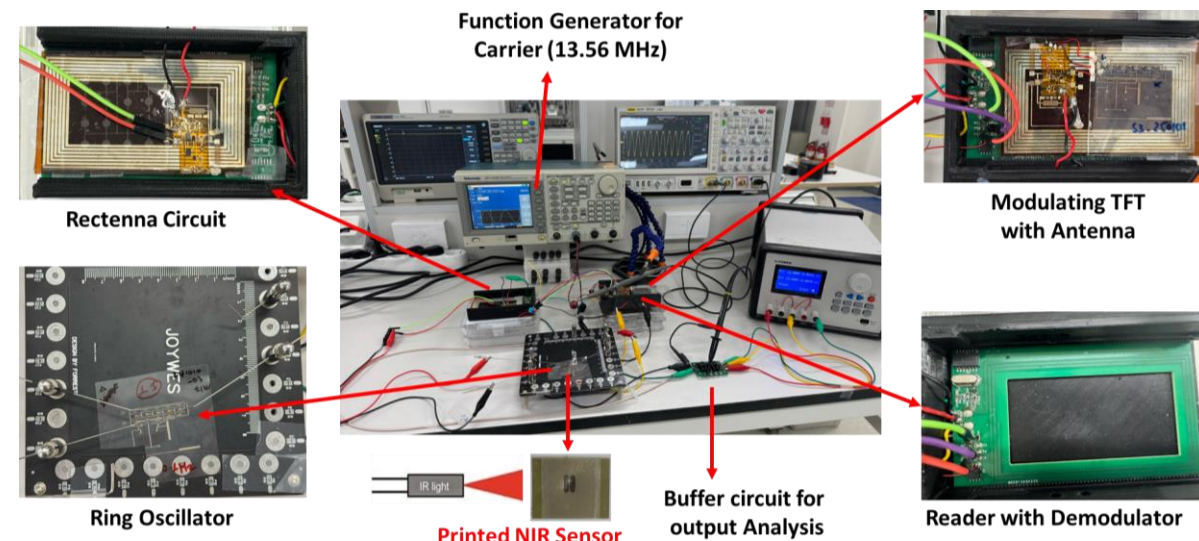
- ◆ Development of NIRIS Platform through NIR sensor part based on NFC band



- ◆ Testing of the NIR sensor using a 1 Hz signal from a function generator



- ◆ Testing of the NIR sensor using printed RO, TFTs and antenna



System Overview: Printed Tag + Si Rectifier + Printed RO + Printed NIR + Printed TFT

5. Conclusion

- Omnidirectional detection sensor in the form of insect compound eyes
- NIR wireless sensor label in single chip form
- Ultra-low-cost mass production possible based on R2R gravure printing
- Lightweight compared to silicon-based sensors.

Thank you.