



## Scaling-Friendly Tiny Fully-Integrated IoT Enabling Dynamically Environmental-Adaptive Time-Space Augmentation

Principal Investigator : Kiichi Niitsu ( Kyoto University ▪ Graduate School of Informatics ▪ Professor )

Principal Co-researcher : Yuriko Higuchi ( Kyoto University )

**Take on the Grand Challenge ▪ Goals to be achieved in R&D tasks :**

Co-evolution with semiconductor miniaturization will break the space-time barrier and realize a tiny IoT that is small but can communicate wirelessly over long distances.

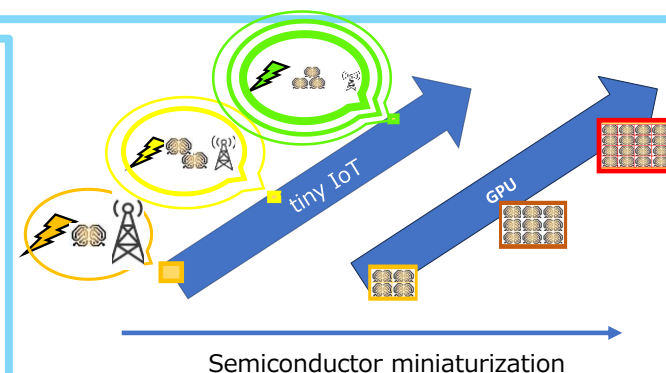
Achieve 3m communication of semiconductor integrated circuits of less than 1mm-square and demonstrate its effectiveness in drug efficacy testing for drug discovery.

### **Research Outline :**

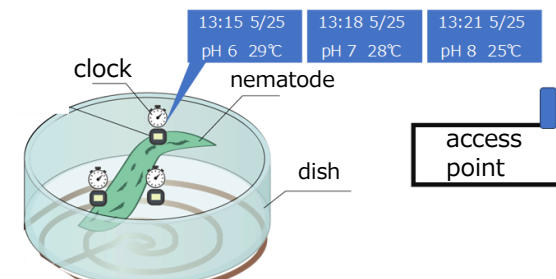
- Establish an IoT design technology that actively leverages the power of miniaturization
- Develop “minimum EMF energy harvesting integrated circuits” and “minimum standby power information processing circuits” to enable dynamic environmental adaptation time extension, and “maximum power output wireless transmission integrated circuits” to enable dynamic environmental adaptation space extension
- Developing new “supply voltage drive circuit technology” that integrates input signal voltage and supply voltage, replacing conventional separate input signal voltage and supply voltage circuits, to overcome the gate leakage problem and establish low-power technology for the FinFET era
- Pioneering IoT technology at 7nm and building scaling theory
- Establish new tiny IoT utilization and drug efficacy verification technology for drug discovery by integrating proprietary circuits and proprietary drug discovery

### **Anticipated social impact :**

- Dramatically increase the value of IoT and support sustained performance improvement
- Contribute to the drug discovery industry through novel cell evaluation in life science experiments
- Promote the use of semi-advanced processes and support the sustainable development of the semiconductor industry
- Establish methods to expand the application of tiny IoT by encouraging user development



**Take on the Grand Challenge :  
Miniaturization and co-evolution  
of the IoT**



**Image of social implementation :  
Validation of Drug Efficacy for Drug  
Discovery**