

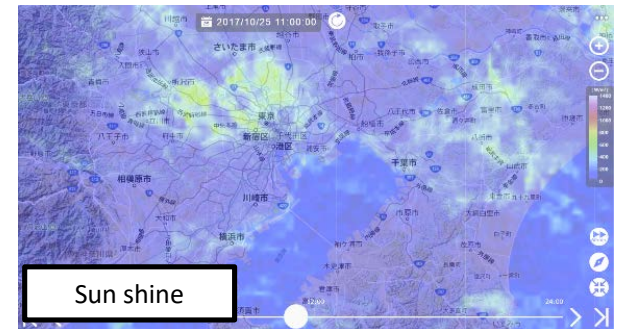
Visual IoT and sensor IoT for disaster mitigation using industry-oriented Raspberry Pi

Ken T. Murata, Sakae Muroho, Motoaki Yasui, Praphan Pavarangkoon, Kazunori Yamamoto, and Nobuyuki Asai
*National Institute of Information and Communications
Technology (NICT/Japan)*

Contact:

asai@nict.go.jp

sc-operation@ml.nict.go.jp



NICT Himawari real-time Web:
for weather and disaster mitigation
<http://amaterass.nict.go.jp>

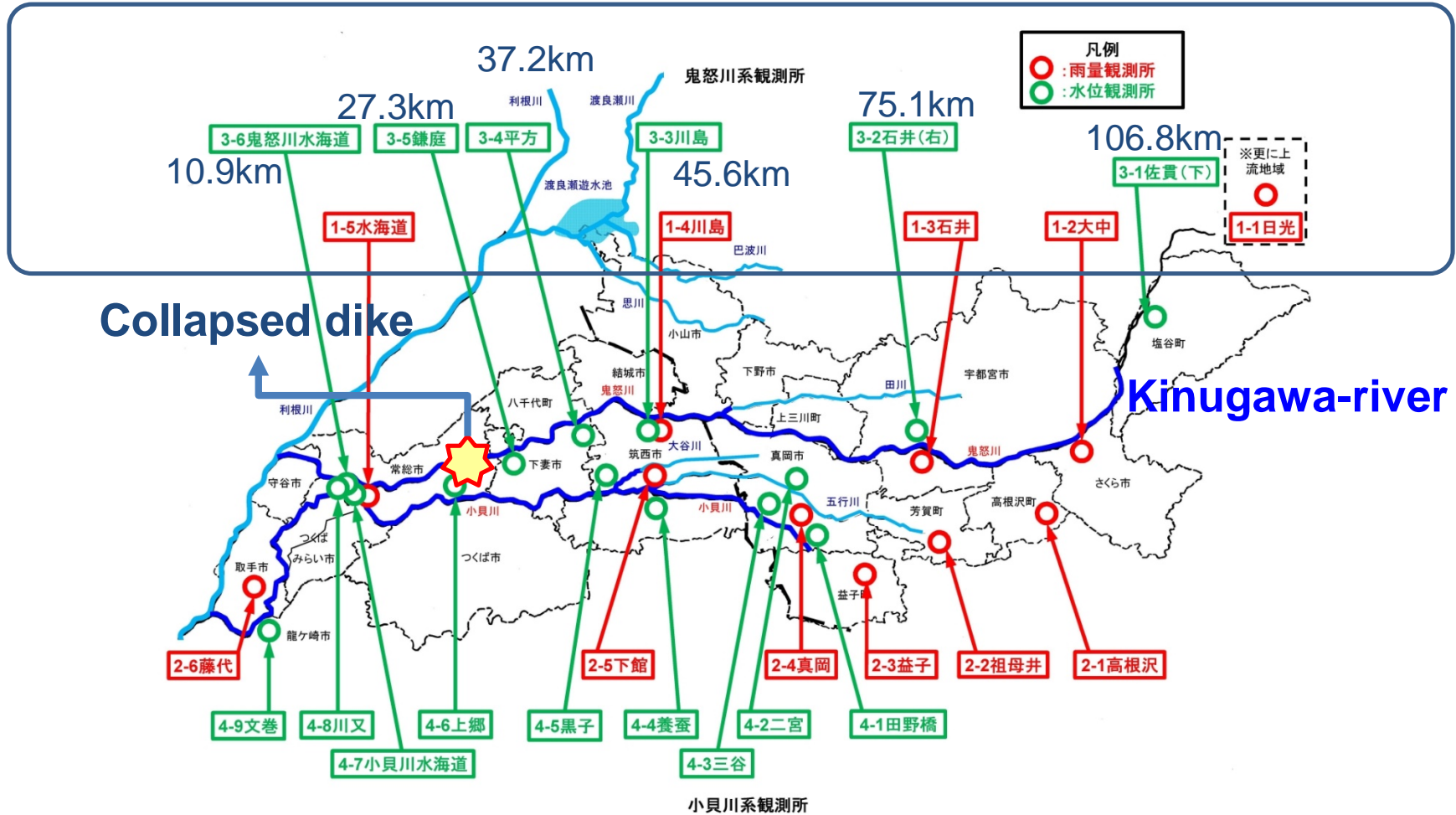
September 2015

Collapsed section of dike for Kinugawa-river in Japan



ISSUE:

Collapsed section of dike for Kinugawa-river in Japan 2015



Only... 5 rain gauges and 6 water level meters on 100km river

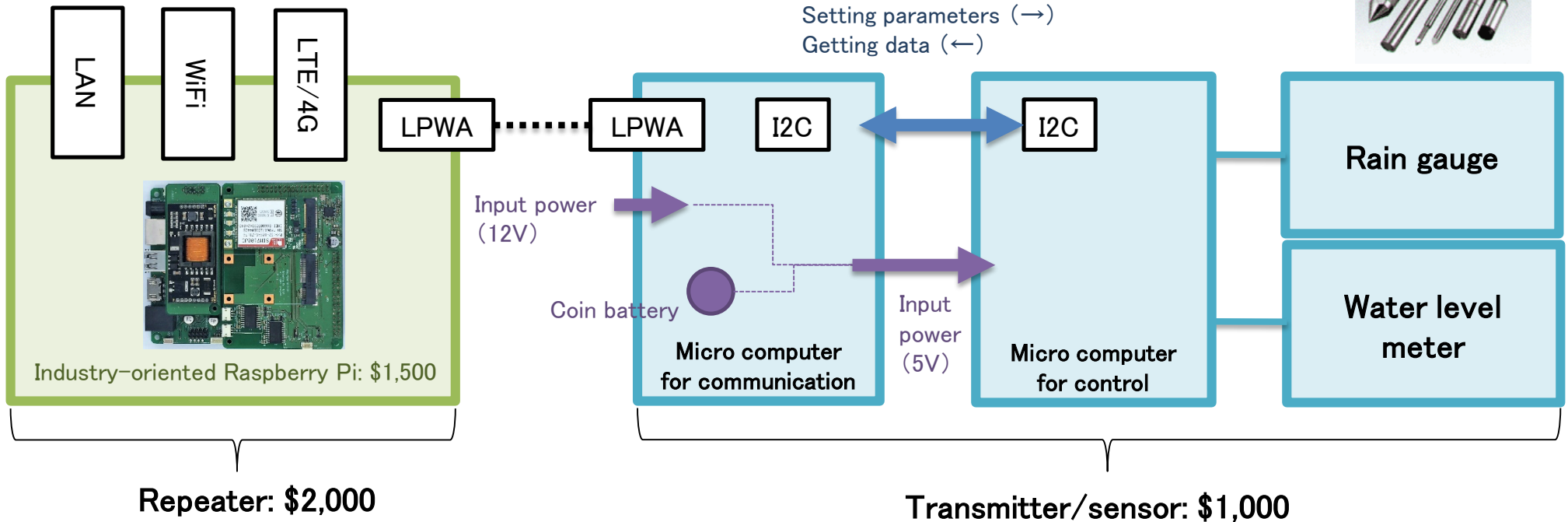
IoT water level meter and rain gauge (Under development)

Raspberry Pi...
No good for industrial uses

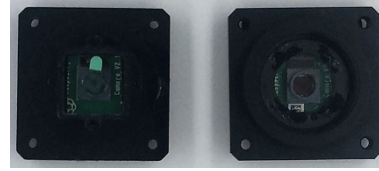


Rain gauge: \$500

Water level meter: \$500



Option HAT modules (ready for use)



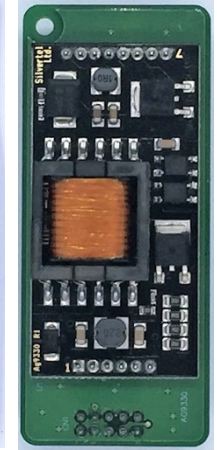
Camera module (V2)
L: M12 mount
R: CS mount



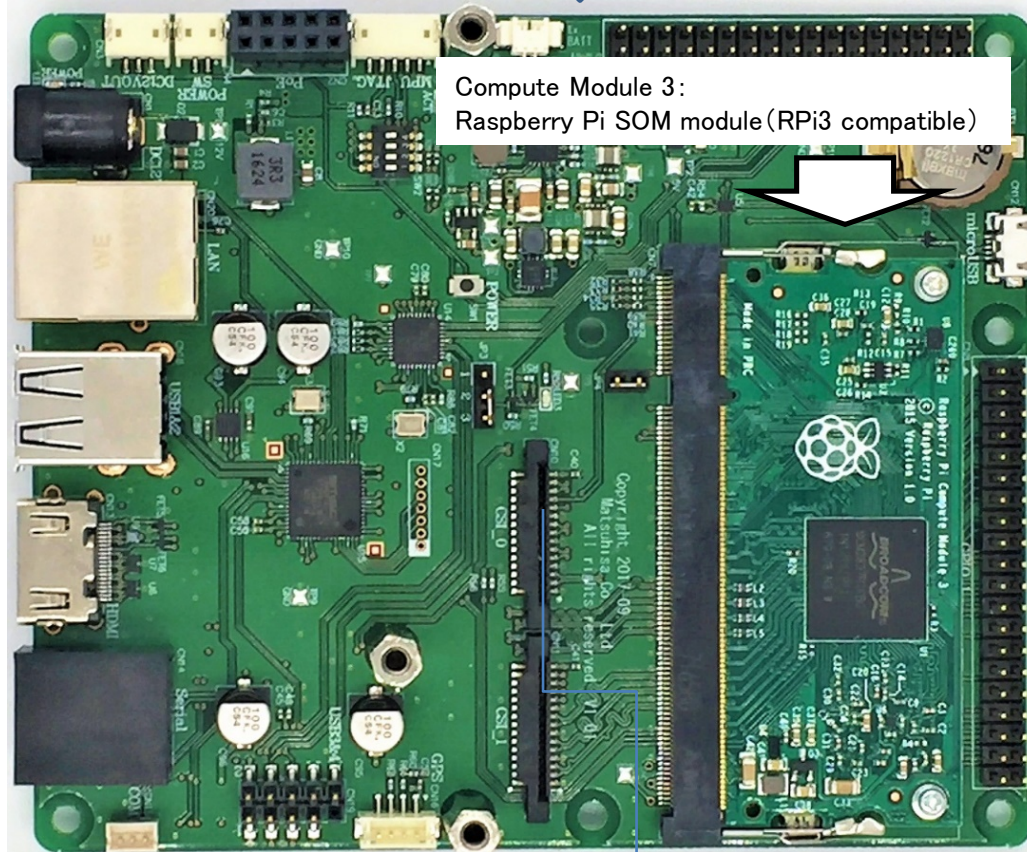
LTE communication



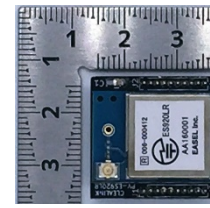
GNSS (GPS)/RTC



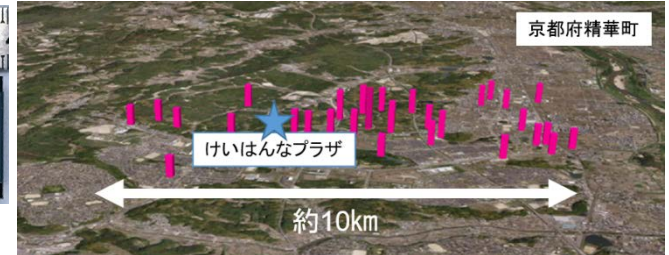
PoE



Compute Module 3:
Raspberry Pi SOM module (RPi3 compatible)



Private LoRa

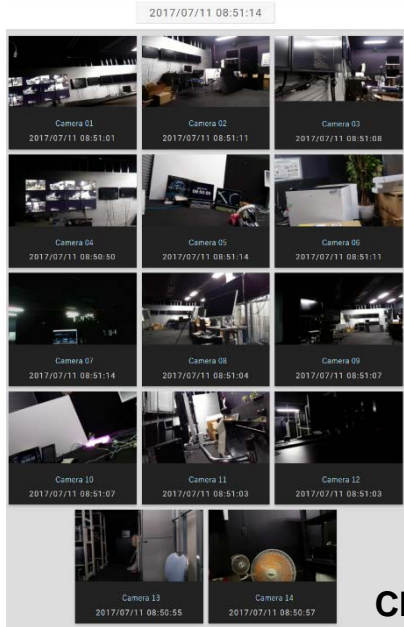


LoRa Area network experiment @Kyoto (Keihanna)

- All parts are temperature guaranteed (from -45 to +80 degree in Celsius)
- Rich optional HAT boards

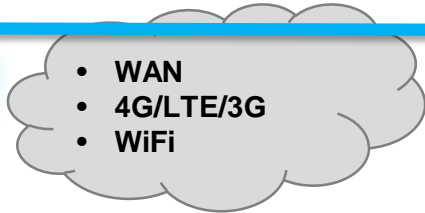
Industry-oriented Raspberry Pi

Concept of Visual IoT and Sensor IoT



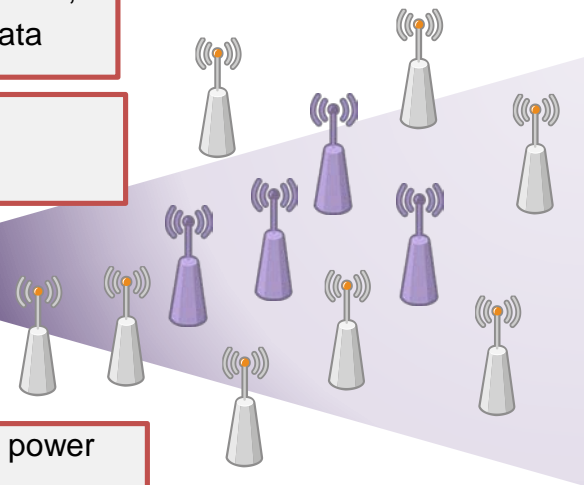
Multi-view web

Cloud



Raspberry Pi based camera

IoT sensors



- Video transfer with small latency (for real-time operation)
- High-quality video transfer on wireless networks
- Narrow band video transfer (100Kbps)
- Low cost communication (MVONO)

- Video triggering (on/off, direction, zoom level) by IoT sensor data
- Edge computing

Multi-point view from multi-point camera

GIS web of video/image and sensor data

Adaptive movie/image transfer parameters

Remote monitoring and operation

Cloud computing (A/I)

Autonomous power supply

Small size camera system

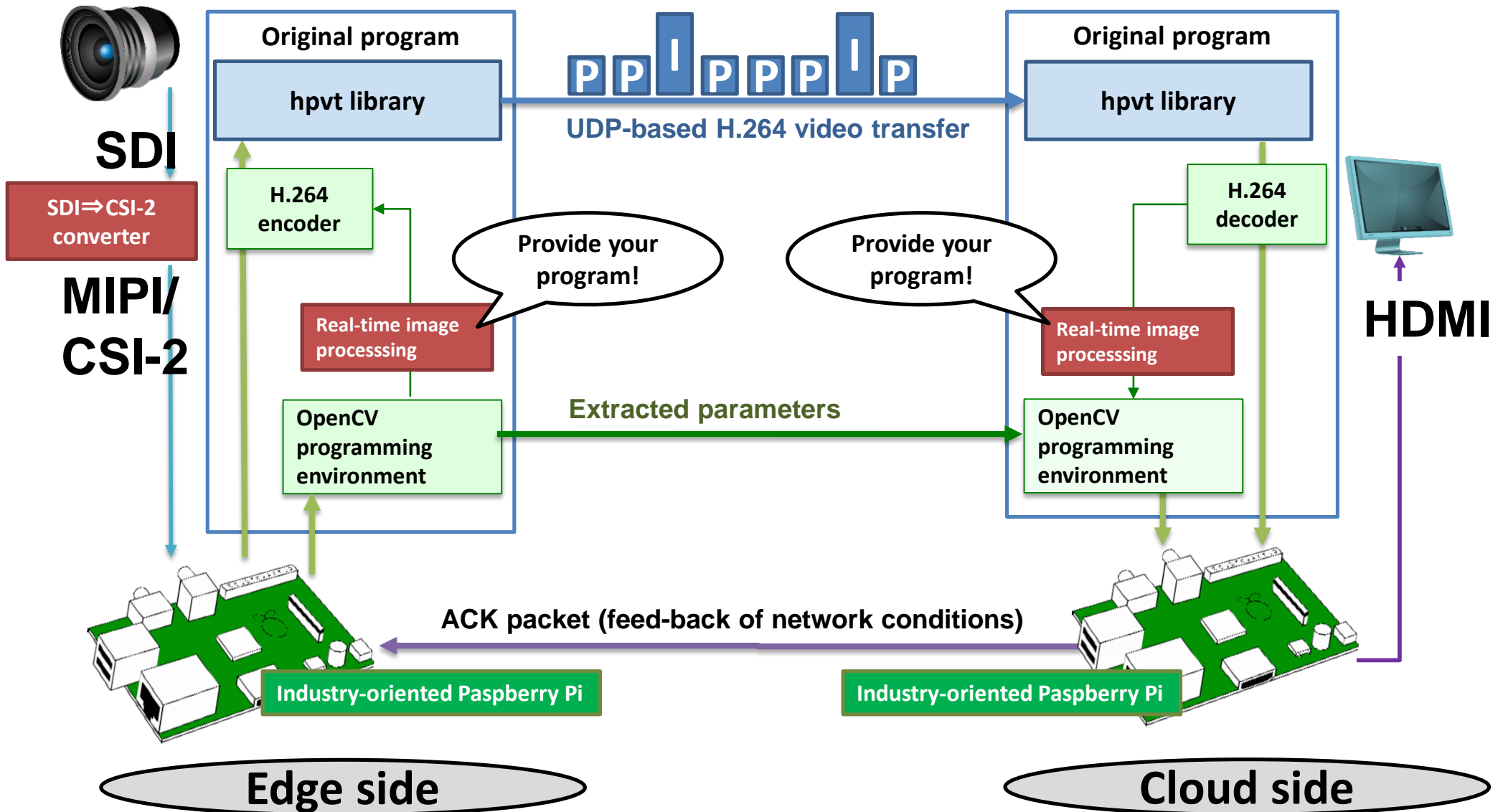
Durability in outdoor

Multi-directional camera

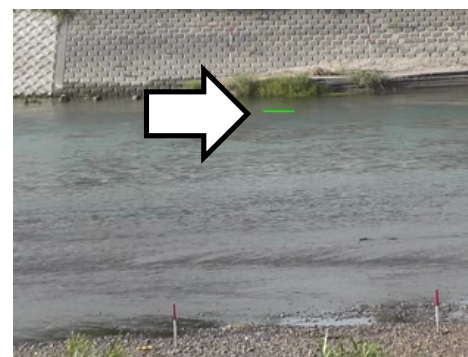
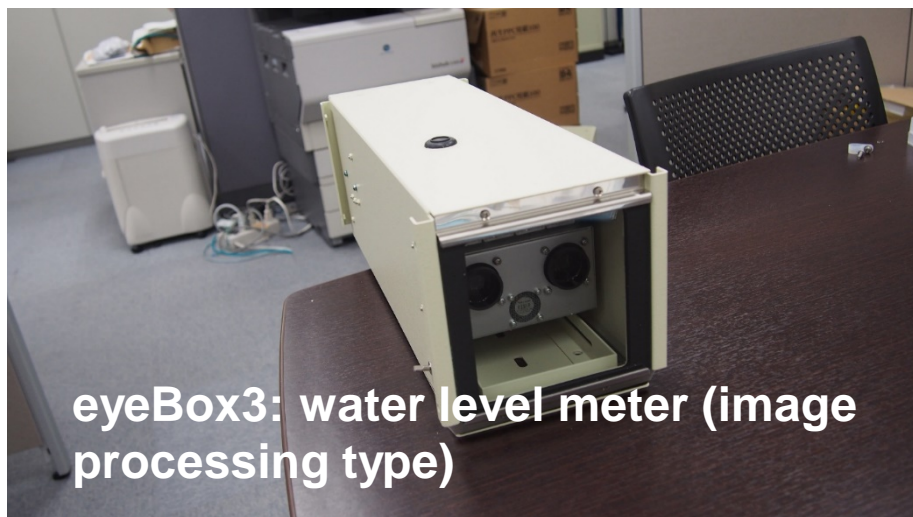


WONM: Wide-area Observation Network Monitoring system

High-speed video transfer system via industrial-oriented Raspberry Pi

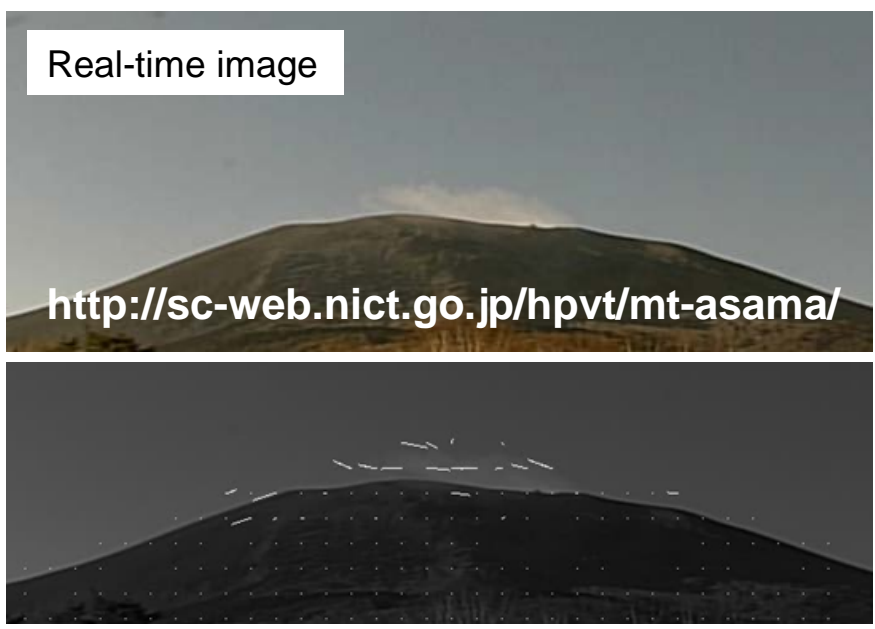
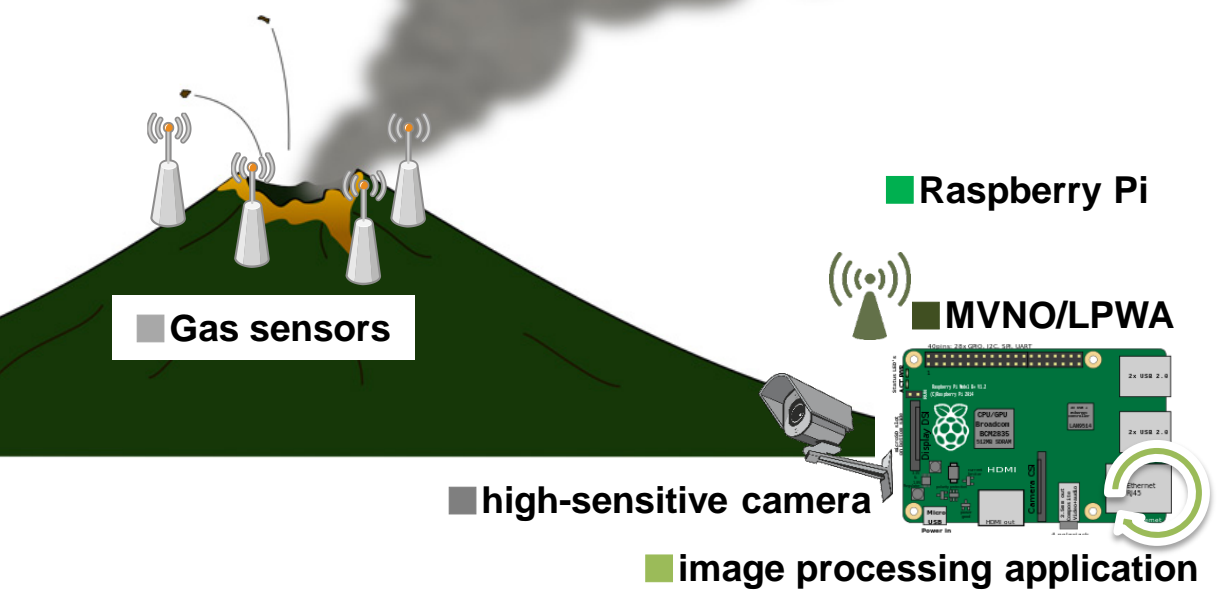


Ongoing: water level meter (image processing type)

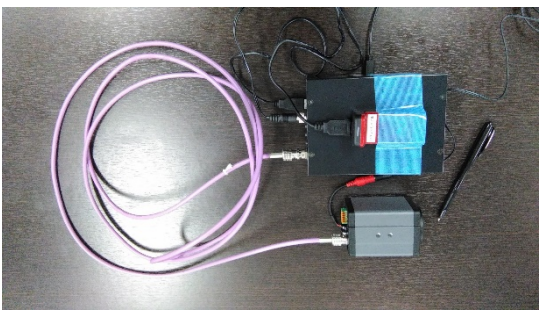


Water level detection results

Ongoing: volcano monitoring



Optical flow processing (Prof. Honda, 2017)



Ongoing: highway monitoring



Monitoring pavement, wall and other facilities in real-time

Proposal: landslide monitoring



Proposal: island monitoring

