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ICT Experiments on a mountain forest Monitoring System in litate Village, Fukushima

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Introduction

- litate Village in Fukushima Prefecture
 - 75% covered with mountains and forests
 - well-known as one of the most beautiful villages in Japan

大久保・外

飯樋町(久保)

小宮

- contaminated by radiocesium released from the nuclear power plant accident in 2011
- the villagers were forced to be evacuated for six years.



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- Six years is enough for wild animals such as monkeys and wild boars to occupy the village.
- Farmers who have returned to their villages
 - are annoyed by the animal attack
 - are protecting their farmland with electric fences and other measures.
- However, none of these measures can be effective
 - because we don't know the animal's behavioral patterns.
- <u>To track animal behavior and habitat</u>, we developed an LTE-WiFi camera system
 - that can transmit data from a data logger and acquire images even in mountain forests.

2.1. LTE-WiFi camera system (Misao network, 2022)



LTE-WiFi CAM (Scalable field Edge IoT devices)

> The CAM can connect to the Internet for 10 min per day We can use WiFi around the LTE-WiFi CAM

2.2. On-site installation



(a) Solar panel to charge the main unit's battery(b) Mesh WiFi unit built into the main unit

(c) Camera included in the main unit

(d) Data logger (optional)

Sensors : rain gauge

temperature/humidity

solar radiation
soil moisture(optional)

PIR-WiFi Camera Linkage



PIR = Passive Infrared Ray

Results and Discussion-Image data



When we access a webpage, we can see a photo, the battery voltage of the LTE-WiFi camera, the sensor list, and a graph of battery voltage. If we want to see sensor data, we may just click the sensor icon. For example, a PIR camera-B is in a red circle in the photo. All photos can be downloaded easily using PPCC on a webpage.

Image data download

URL: https://www.ppec.jp/md/dVX0htwl

フィールドカメラ

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https://twitter.com/msrmz/status/1478277169432625152

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LTE-WiFi CAM taken by PIR camera



<u>Movie</u>

Remote control of LTE-WiFi CAM on Web



Solar radiation in the mountain forest



Temperature change in the mountain forest



The voltage of data logger, Em50



The panel installation angle is important!



Change of battery voltage of LTE-WiFi camera in litate forest (2021-2022)



Conclusion

- To track animal behavior and habitat, we developed an LTE-WiFi camera system that can transmit data from a data logger and acquire images even in mountain forests.
- As a result of field experiments, the LTE-WiFi camera system could be used sufficiently by devising the capacity of solar panels, installation angle, and communication time in the winter season.