

Technology Offer

Multifunctional RFID-based Platform for Animal Observation and Manipulation

Ref.-No.: MI 0214-5247-MG-ZE (RFID-MS)

Ref.-No.: MI 0214-5440-MG-ZE (MOMO)

An efficient system to monitor and control animal behavior in wildlife as well as in laboratory settings

Background

Radio-Frequency IDentification (RFID) systems are broadly used to track assets, objects or animals. In agricultural settings, RFID- ear tags are used to identify e.g. cattle or sheep. In behavioral sciences, e.g. migrations of wildlife animals are observed by microchip-tagging of e.g. whales or birds. Even pets can be implanted with an RFID-chip for simplified identification in case of loss / runaway. The RFID system comprises an RFID reader, which constantly emits an electromagnetic field. It comprises further the microchip transponders, which send their data to the reader as soon as they receive enough power via electromagnetic transmission from the reader-emitted field. The transmission and data-transfer is very fast and can span long distances, however maintenance of the magnetic field required high energy-input.

In most cases, the RFID system is simply used to identify a given object at a certain place, ideally with a date-and-time stamp. Certainly, modern electronic and communication techniques offer much broader possibilities. The successful identification of a given individual can be used as trigger for all sorts of downstream activities, like to open doors, to provide access to food or medicine and to start video recording, to name a few. However, using these features requires a flexible platform that allows for the custom-built composition and control of existing technical solutions.

Technology

Scientists of the Max Planck Institute for Ornithology in Seewiesen have developed a multifunctional RFID-based platform for animal observation and manipulation. The platform combines an advanced RFID management system RFID-MS (MI 0214-5247-MG-ZE) with the multifunctional Mainboard to Observe and Manipulate Organisms MOMO (MI 0214-5440-MG-ZE).

The advanced RFID-MS comprises: RFID reader, data logger, microcontroller and power supply. The system is designed for efficient energy use by allowing the activity of the RFID reader to be coupled to specific triggers, like light barriers or infrared sensors. This setup ensures that energy is only consumed when the trigger is active. The RFID-MS thus features significantly elongated battery lifetime optimally supporting this device for autonomous long-lasting in-field operations.

The MOMO component provides a simple solution for direct incorporation and control of multiple technical applications. Various RFID readers may be connected to trigger specific subsequent functions. This enables the selective observation and manipulation of specific individuals within a mixed population. It allows for the collection of high-quality data without imposing disturbance or stress on the sampled individuals.

Advantages

- Compatible with common RFID systems and triggers
- Very low energy consumption for long lasting observation periods
- Minimal external disturbance and stress to the observed individuals – also for laboratory setups!
- World-wide exact time record of the triggered event via radio-controlled clock
- Supports broad range of technical applications like e.g. traps, gates, feeders, lights, cameras
- Easy data-transfer to external devices via SD-card or WLAN

Applications



Fig. 1: For use in ornithology, both systems have been combined to built a "smart nestbox" for observation of bird migration and breeding behaviour. Copyright: Julius Kramer.

Further reading:

<https://github.com/peterloes/RFID-MS>

<https://github.com/peterloes/MOMO>

Gilsenan et al., 2020, Journal of Animal Ecology, doi: 10.1111/1365-2656.13160

We are looking for a licensing or cooperation partner for this technology and will be pleased to share detailed information and scientific data.

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