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# E-C@GE : Instrumentation for remote measurement and management of laboratory animal welfare

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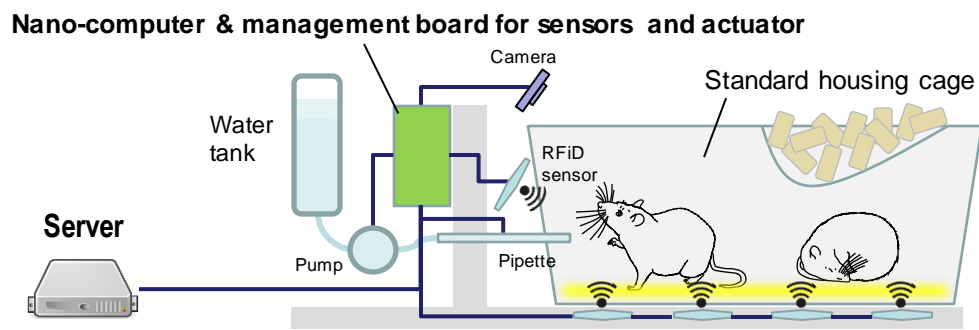
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## BACKGROUND

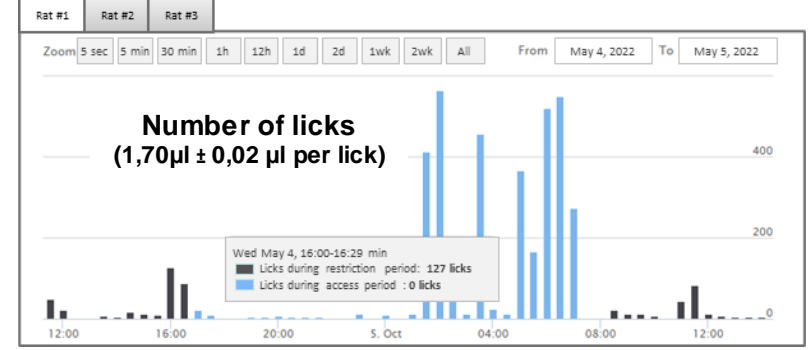
In Neuroscience, many behavioral studies on learning and memory in small animals involve water restriction. For both, ethical and scientific reasons, an optimal monitoring of the animals' welfare is required to avoid any bias due to altered physiological and/or cognitive state<sup>1</sup>.

The instrumentation presented here allows the measurement and management of water intake, the measurement of environmental conditions, and the remote monitoring of animal welfare. The system is based on a connected interface that provides lick detection, calibrated water delivery and video monitoring. Via a secure interface, the system is programmable according to the restriction protocol, displays data in real time, saves it and generates automatic alerts in case of anomalies.

### PRINCIPLE OF INSTRUMENTATION



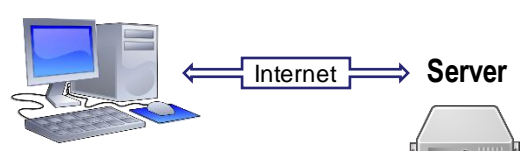
### FOLLOW UP OF INDIVIDUAL WATER CONSUMPTION



### Programmable access to water

Water access	Delete
Day of week	MONDAY
Start time	09:00
End Time	10:00
Water access	Delete
Day of week	MONDAY
Start time	17:00
End Time	18:00
Water access	Delete
Day of week	TUESDAY
Start time	17:00
End Time	18:00
Water access	Add

### Secure web interface (login/password authentication)



Programming Water access & Alert thresholds

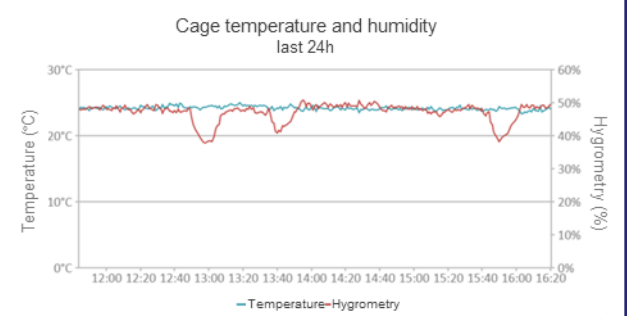
Monitoring consumption

Video Monitoring (day and night)

Temperature & humidity measurement



### ENVIRONMENTAL PARAMETERS



### ALERTS

Automatically sends email alerts to users and administrators when temperature/humidity thresholds are crossed or when water distribution/consumption anomalies occur.

### Real-time video streaming & screen captures at configurable intervals



### ADVANTAGES :

- Individual cage settings (water management, alert thresholds, volume of water per lick)
- Adjustable display of consumption and environmental parameters (T°, H%)
- Data backup
- Remote video monitoring in real time, day and night

### POSSIBLE USES :

- Monitoring of consumption in normal accommodation conditions<sup>2</sup>
- Supervision of water intake in the context of restriction protocols
- Calibrated and programmable delivery of medication via drinking water with measurement of actual intake per animal.

## CONCLUSION / PERSPECTIVES

This device allows a progressive implementation of a water restriction and a monitoring of consumption to the nearest µl, taking into account the baseline water consumption of the individuals and their progress in learning the behavioral task. Without replacing the regulatory requirements and recommendations in force<sup>3</sup>, especially the daily presence of experimenters and zootechnicians, remote observations allow the animals well-being to be checked at any time and relevant data to be collected for behavioral studies.

The system can be adapted for individual monitoring of food intake and other measurements (weight, actimetry).