

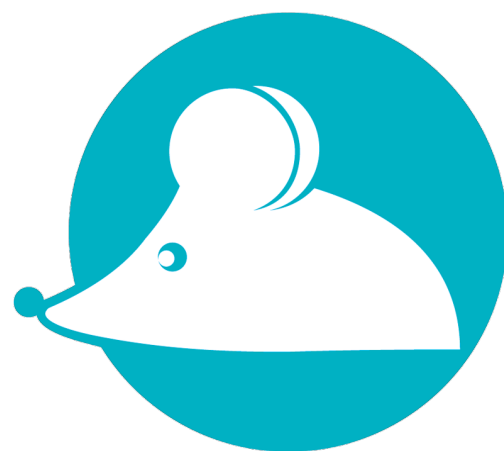
CageView™: A smart monitoring system and food control for phenotypical research in vivo

Problem & solution on rodent medical research using Artificial Intelligence



CageView™

WHITE PAPER



CAGEVIEW
BY TACTILE ROBOTICS



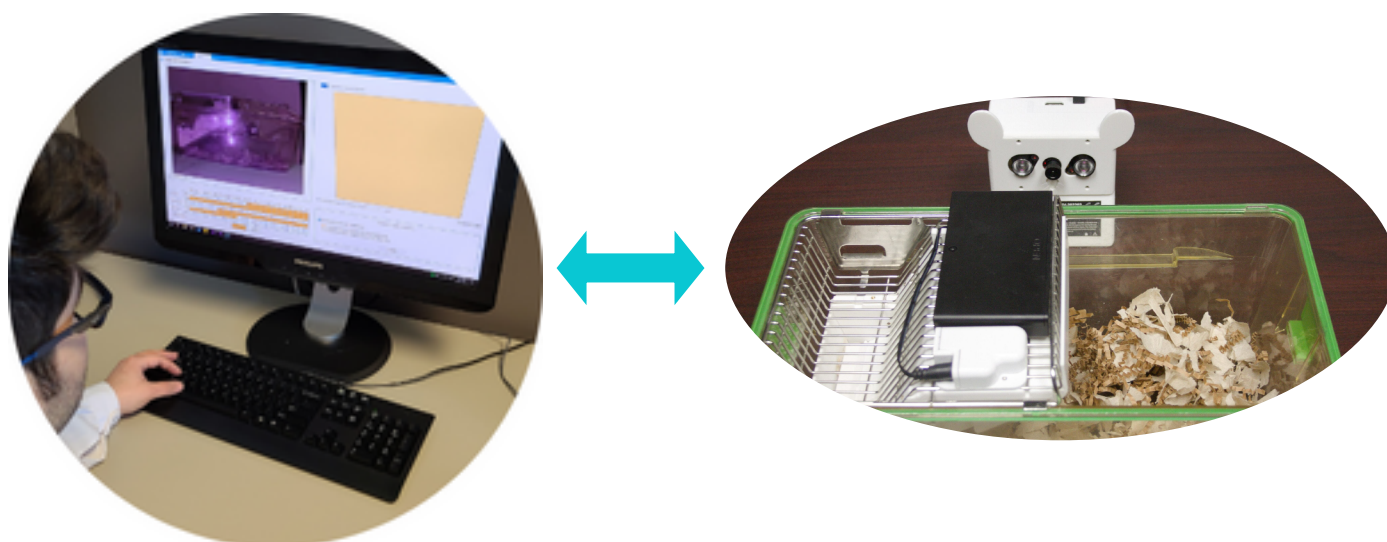
TACTILE ROBOTICS
Feel the Intangible

Biomedical researches using mice and rodents

Animal studies, as an inevitable part of biomedical research, require housing rodents in tightly controlled conditions. Researchers often required to measure precise food and water intake and monitor the behavior, drug ingestion, and exercise intensity and duration of the rodent. Manual switching between foods and alternating between fasting and fed status can be time-consuming and challenging, especially when high numbers of cages are involved and timing lies on the weekends or after hours.

Experimental studies on rodents require housing under highly regulated and controlled conditions. A major requirement for all animal housing in experimental facilities is health monitoring, which requires one or more of a variety of health care assessment techniques. One of the most basic techniques in animal health monitoring is a simple assessment of the degree and freedom of movement. This is particularly important when an experiment reaches humane endpoints (the point at which an experiment must be terminated to prevent unnecessary suffering) or following surgical procedures, as reduced physical activity is a valuable surrogate for discomfort in experimental animals. In addition, reduced physical activity can also be used as an indicator of the onset of labor and birth in pregnant rodents, which can be used to give an indication of the approximate time of birth, which may be of value in some experimental settings. While physical monitoring of experimental animals is straightforward during scheduled working hours, standards of animal care often require additional monitoring outside scheduled working hours.

Scheduling of staff outside regular working hours is also required when a fasting regime is part of an experimental design. Under normal housing conditions, rodents are given access to food ad libitum, i.e., as desired. However, there are many experimental circumstances where food intake must be restricted, for example, positron emission tomography (PET) experiments utilizing glucose analogs as a tracer. Such food restrictions are often required to be initiated outside regularly scheduled work hours.



CageView: Anywhere, Anytime Remote Cage Monitoring and Food Control

Proposed solution: CageView™

CageView is a programmable, sensorized and easy-to-handle cage monitoring system which can be used in different types of *in vivo* studies. It is designed to provide tightly controlled conditions where the food and water intake, behavior, drug ingestion, and exercise intensity are required to be accurately measured. It reduces the workload on the technicians need to alternate between foods, fed/fast status and measuring intake. It also gives the operator remote access for condition control and monitoring. Although it has comprehensive and unique features, CageView has a competitive price compared to similar products and is completely affordable for research laboratories.

CageView is a programmable and remotely operable system such that

- an experimenter at a remote workstation may set up a feeding/fasting schedule that allows feeding/fasting without the requirement of the physical presence of a staff member;
- the experimenter can control access to food in real time regardless of the pre-set schedule;
- the experimenter has real-time access to a live video feed to assess the mouse;
- an artificial intelligence system tracks the mouse's location and physical activity; and
- a record is kept of activity which can be displayed as a 2D representation of mouse movement or a histogram showing mouse movement in 15 minute blocks for the duration of the experiment.



Summary of issues and the proposed solution

Current issues

- Lack of remote tool to control animal's access to food and record the process
- Experimentalist's inconvenience for changing animal access to food or starting its fasting period
- Lack of monitoring system in the absence of experimentalist
- Limited testing hours and experimentalist's availability

Solutions to the current issues

- Scheduled feeding using SmartFeeder
- Remote control of fasting/eating mode
- Dispensing food to the animal according to the experimentalist's need
- Record the animal access to the food for unlimited days
- Trained artificial intelligence system to identify the mouse
- Record the motion tracking using SmartVision



SmartFeeder



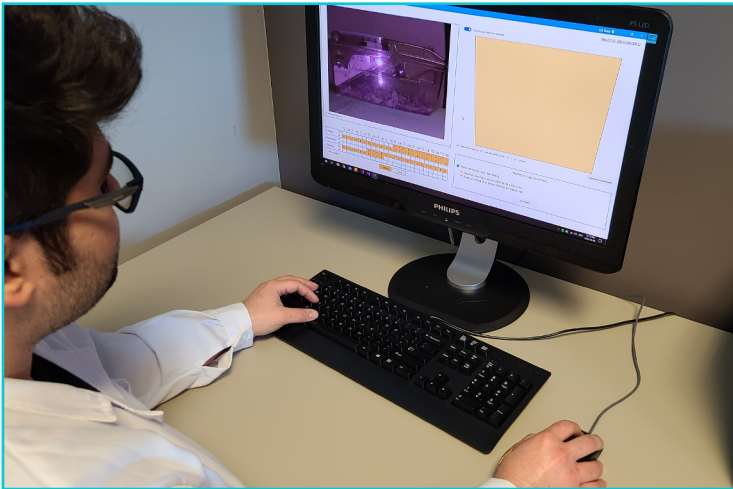
SmartVision



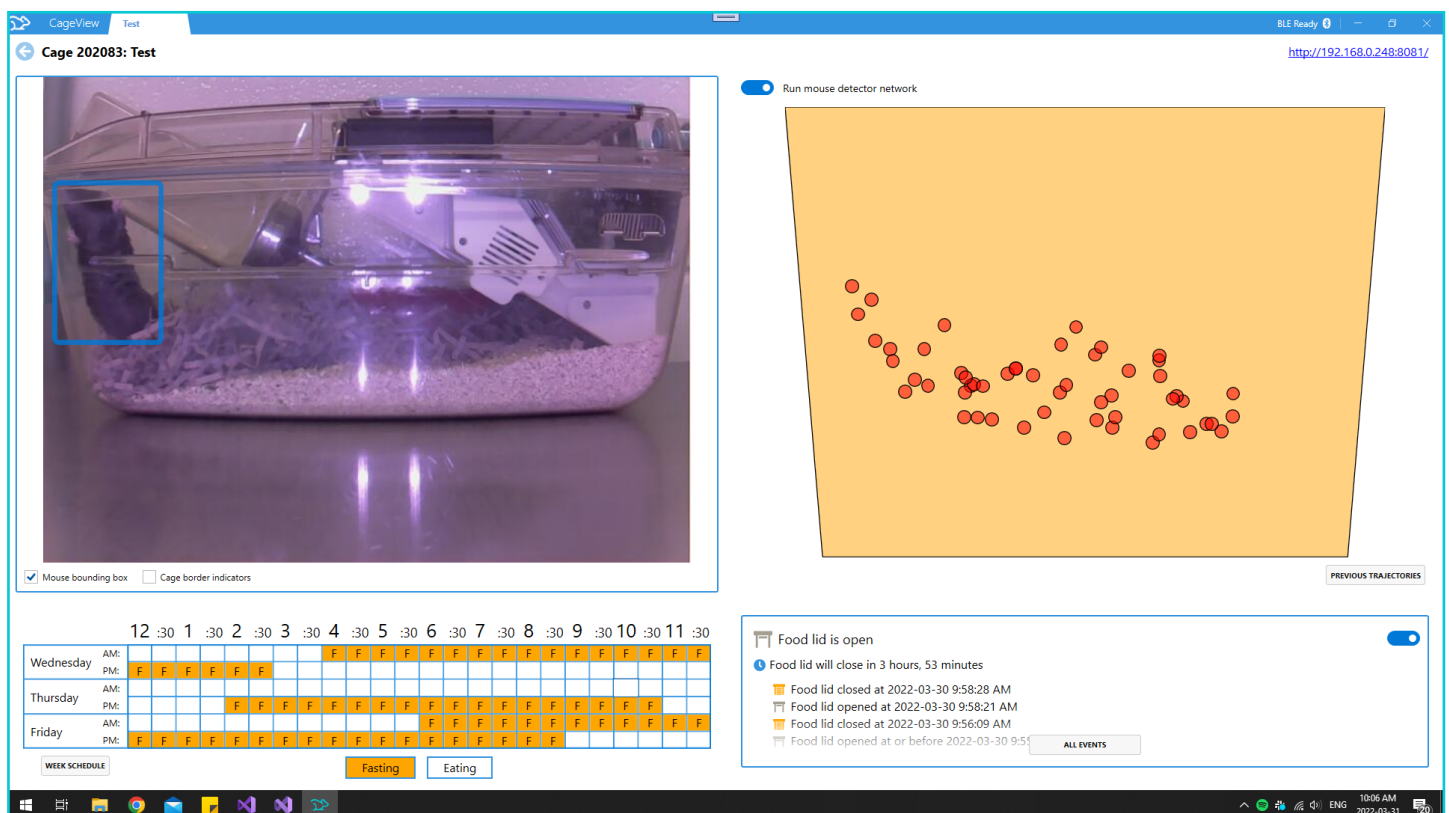
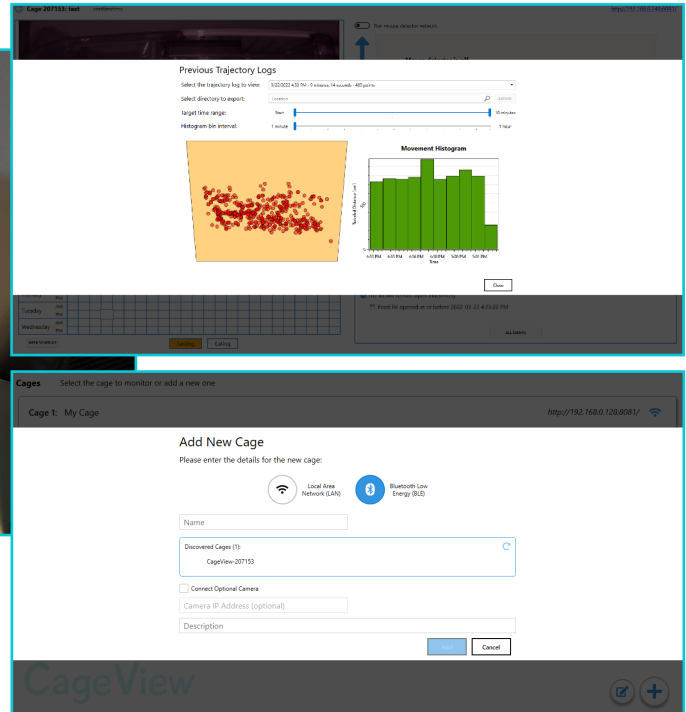
Premium

SmartCage-App™

- Easy-to-use programmable interface
- Consolidates information from SmartVision™ and SmartFeeder™ units
- Records and exports data in .csv formats
- Export a mouse's activities over any time interval in the form of histograms
- Remote access to all functions of CageView
- Ability to use multiple units simultaneously

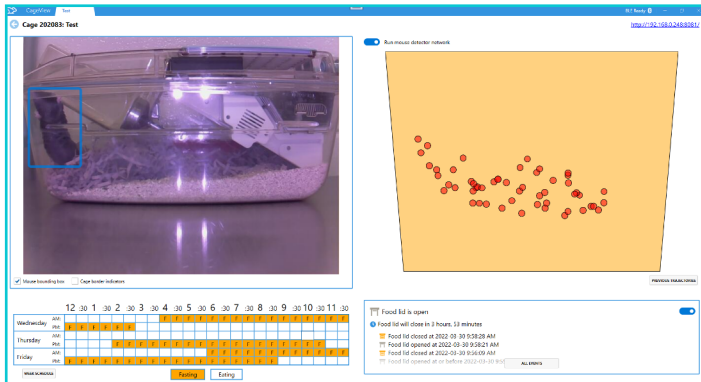
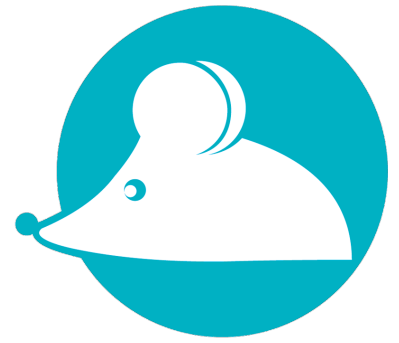


24/7 remote access to multiple cages



CageView™

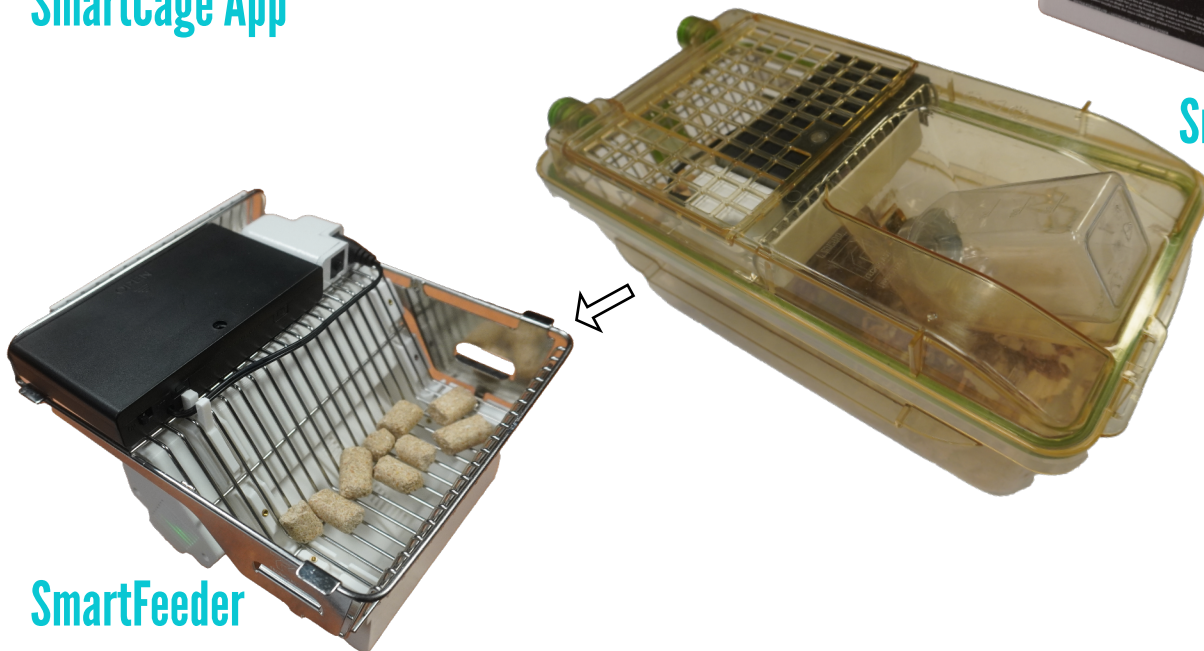
(Patent Pending)



SmartCage App



SmartVision Unit



SmartFeeder

Call to action

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