

Integrated Reward Block

Enhanced control for behavioral testing. A project under van der Meer Labs.

Background

The Science of Behavioral Testing

- Aims to understand how the brain anticipates future events and uses this information to make decisions
- Neural activity recorded through implanted tetrodes
- Reward Blocks used as an aid to reward subject interaction, mainly by delivering pellets

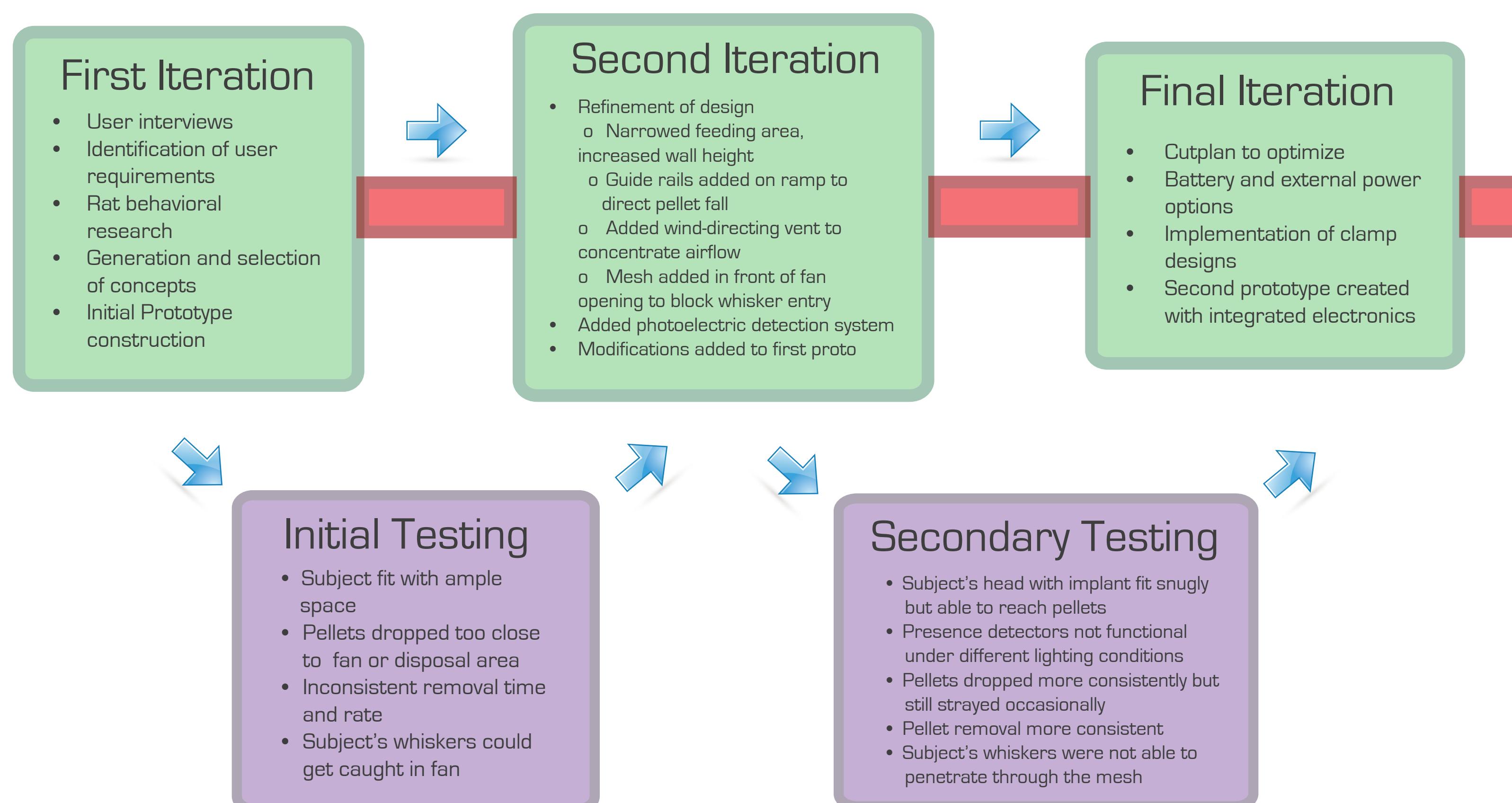
State of Art

- Unable to remove uneaten pellets
- Small dimensions restrict access for implanted test subjects
- Limited compatibility in different environments
- Costly

Objectives

- Accept 45 mg food pellets
- Removal of uneaten pellets
- Illumination
- Activity detection
- Easy to clean
- Modular
- Meet safety requirements
- Minimize electrical interference

Methology and Testing



Next Steps

At van der Meer Labs

- Final testing with final iteration prototype
- Final calibrations and modifications to design
- Create duplicates for laboratory use

Future Improvements

- Expand range of clamp designs for greater flexibility of positioning
- Implement pellet detection system
- Decrease noise of fan

Health and Safety

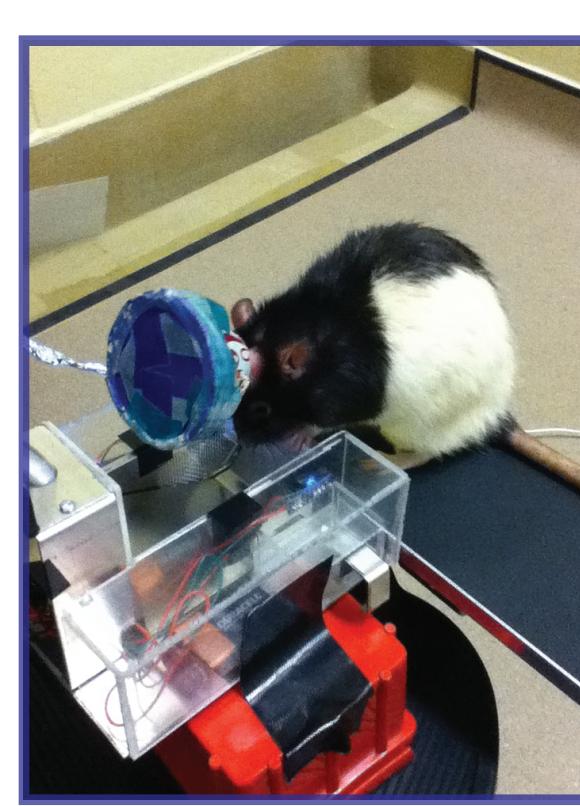
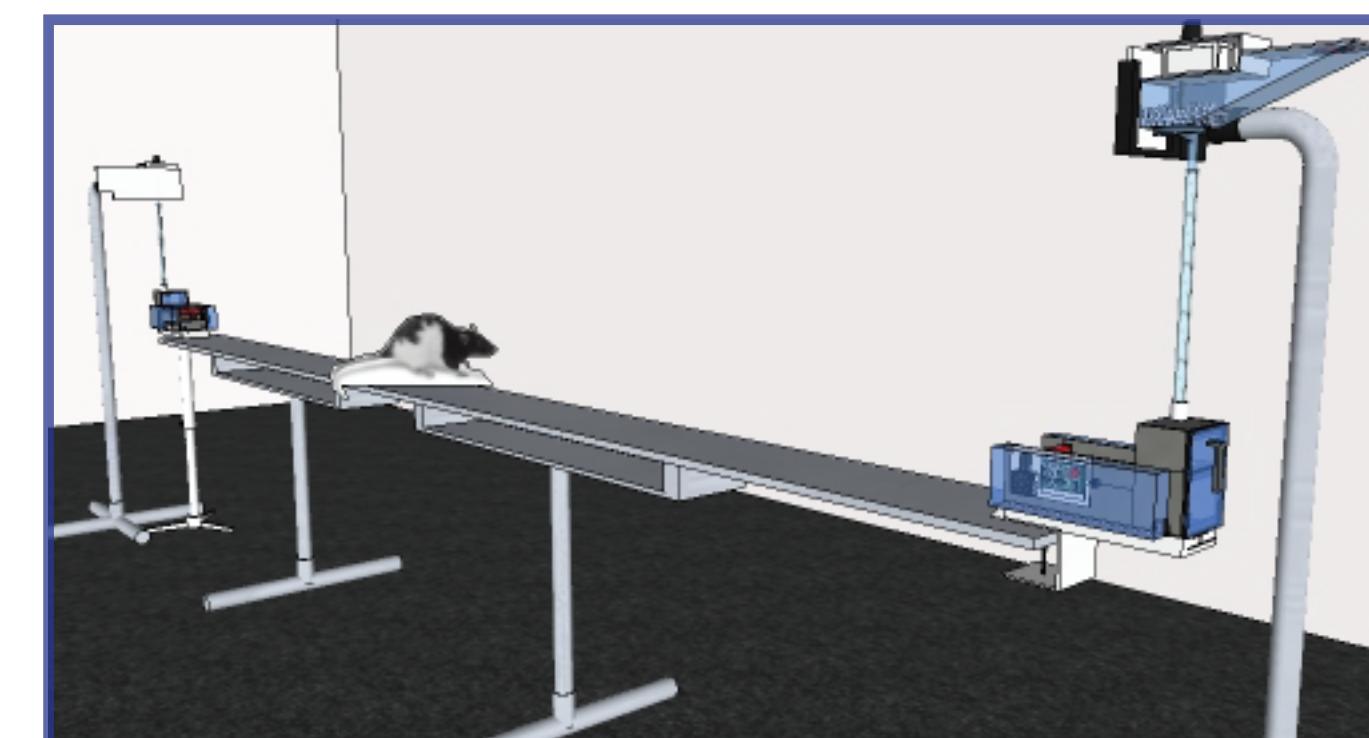
- Shielded and grounded electrical components
- Guarded fan mesh and vent for subject safety
- Low current rating
- Spacious design for subjects with implanted tetrodes

Environmentally Friendly

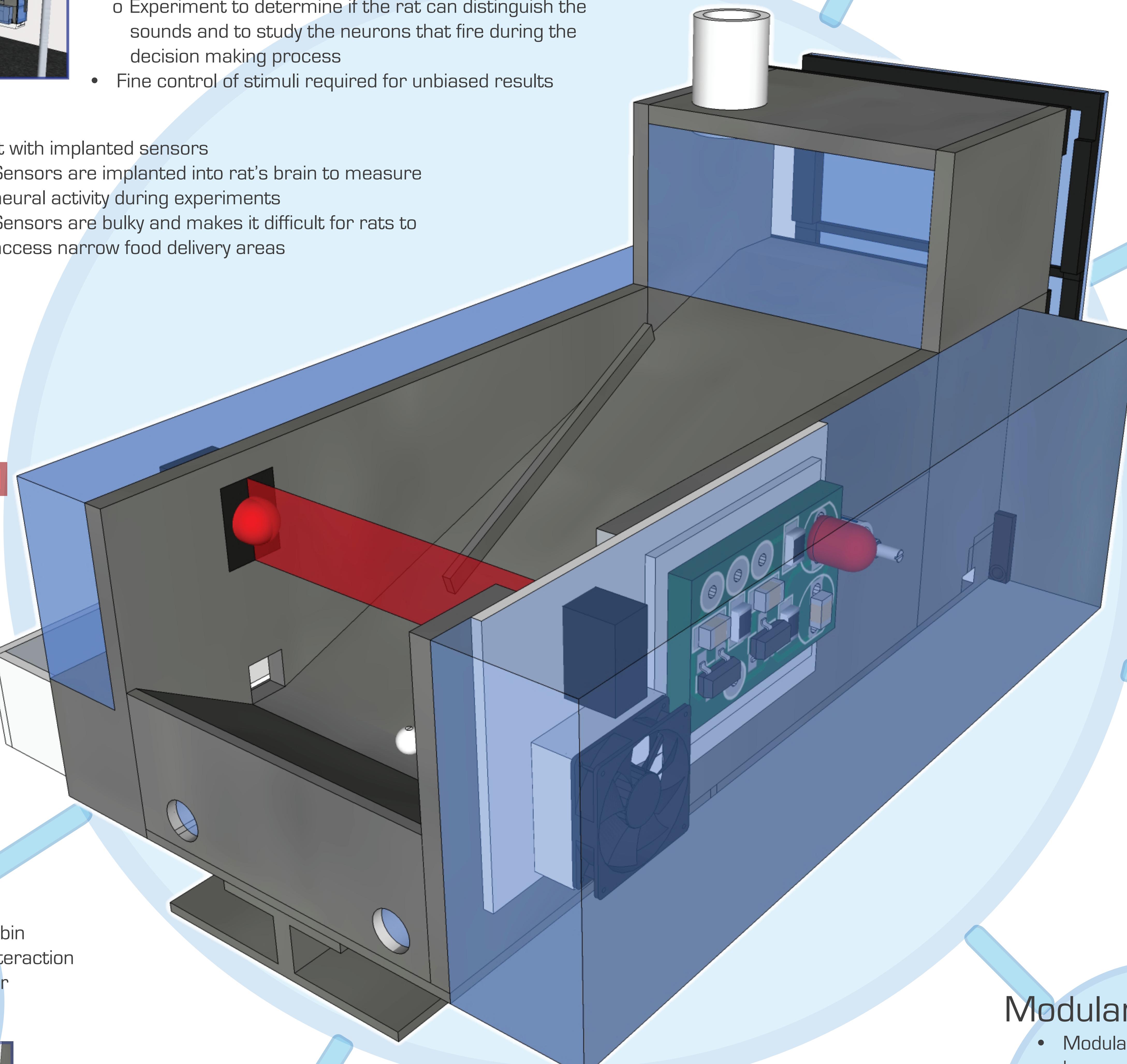
- Removable electronic components allow for quick and simple replacement in case of failure
- Able to run on batteries as well as through DC Voltage
- Frame and bases made out of 100% recyclable aluminum

Background

Sample Experimental Setup

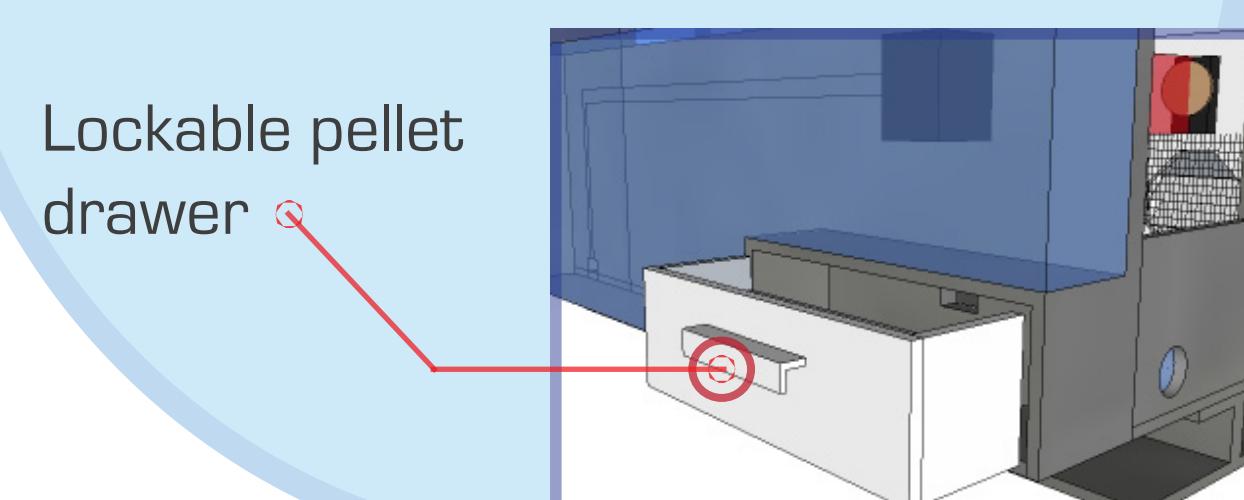


- Rat is trained to run along a narrow platform
 - A sound is played that corresponds to a certain number of pellets dropped into the food trough at each end of the platform
 - Experiment to determine if the rat can distinguish the sounds and to study the neurons that fire during the decision making process
 - Fine control of stimuli required for unbiased results



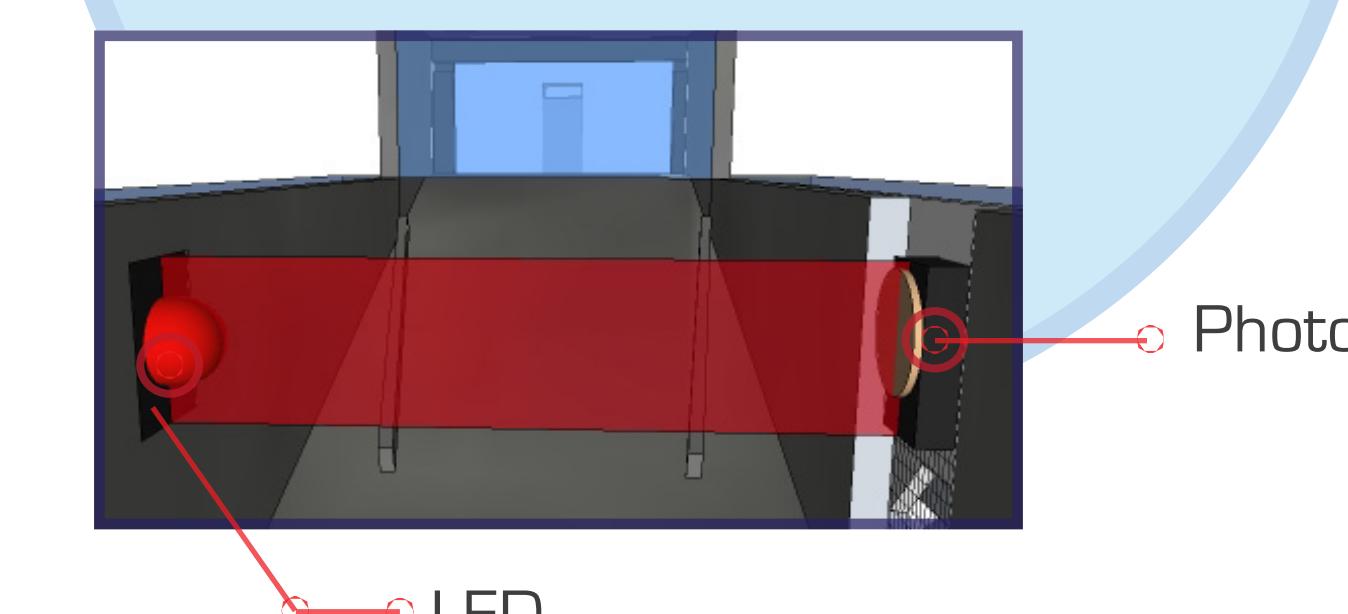
Pellet Storage

- Easily accessible pellet collection bin
 - Lockable to prevent subject interaction
 - Large capacity supports longer experiment durations

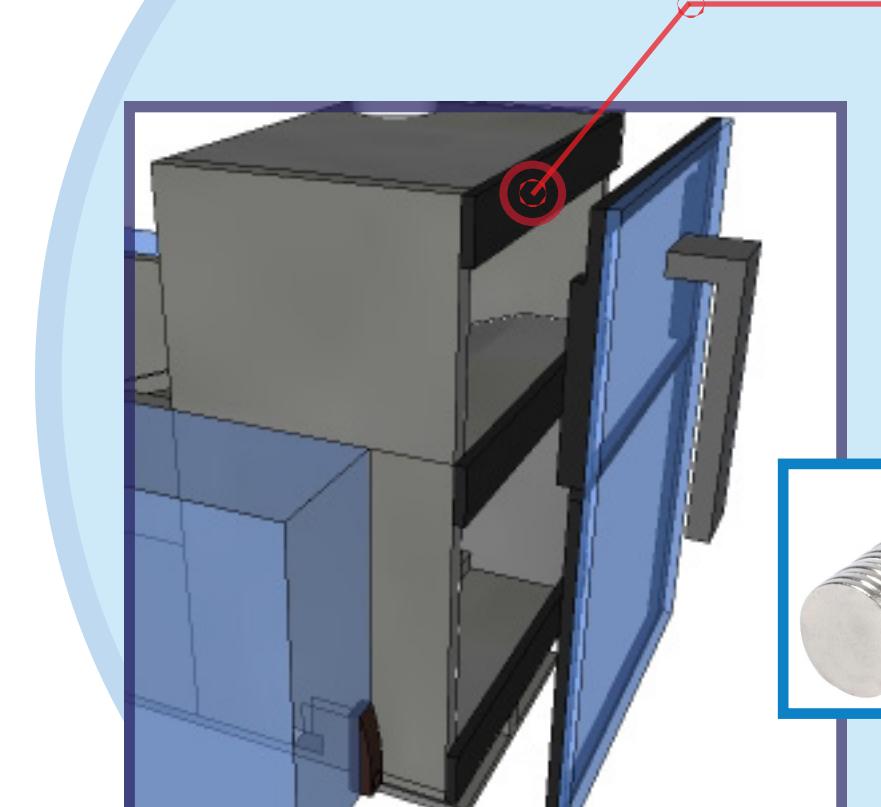


Activity Detection

- Photocell + LED Diode
 - Output 0-5 Volts to controller
 - Ideal for detecting subject presence in feeding area
 - Adjustable sensitivity for various light settings



Easy Accessibility

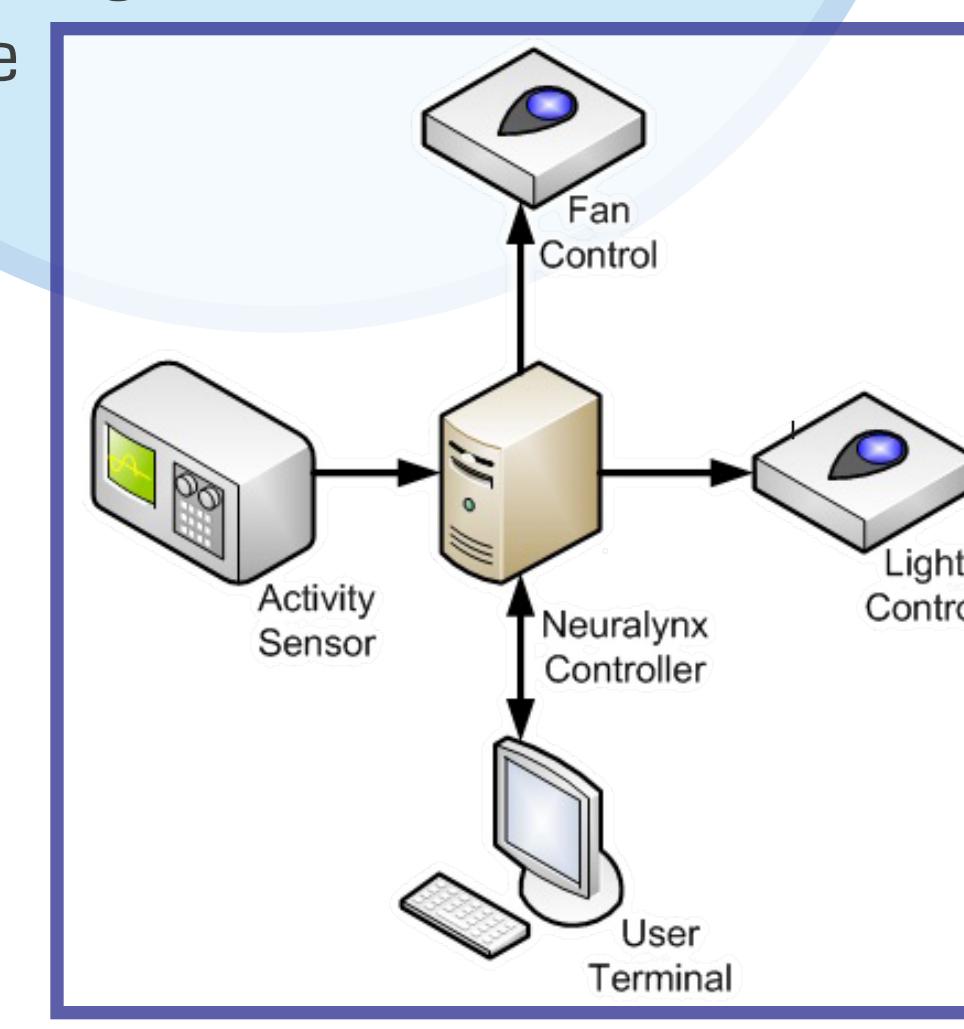


- Magnets allow for easy access
- Ideal for quick maintenance and cleaning

- Rare Earth magnets provide strong and reliable seal

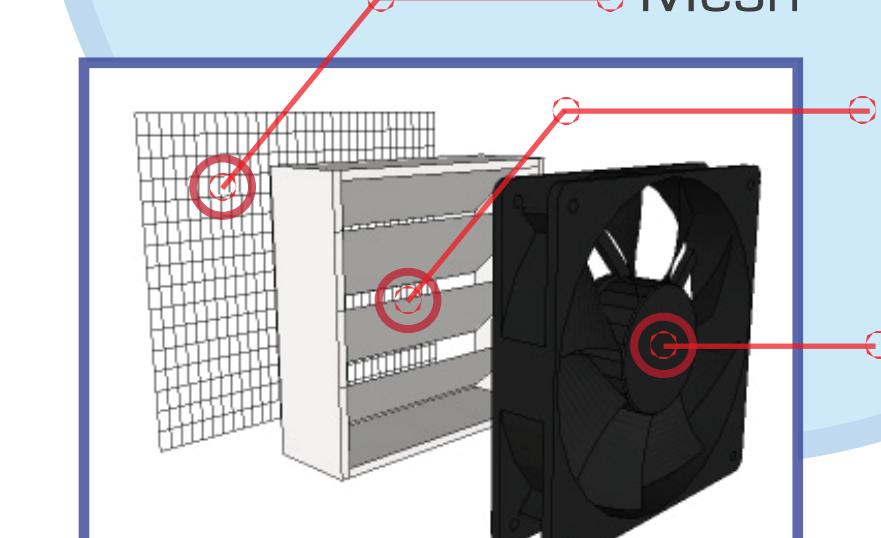
System Integration

- Send and receive signals with TTL Pulse
- Sends TTL pulse output of activity sensor information
 - Ideal for imbedded control in a research setting
 - Shielding for minimal electrical noise



Pellet Removal

- Miniature fan blows excess pellets from the feeding trough into small bin at other end of reward block
- Allows for consistent and unbiased experimental results



Modular Bases

- Modular base rail allows exchange of multiple base components
- Base designs allow reward block to be:
 - Clamped onto surfaces,
 - Fitted into cages,
 - Positioned anywhere across the floor

