

Quad Rat Vitals Monitor

Client: Dr. Alex Converse

Advisor: Dr. Tom Yen

Team:

Jack Ho

Nathan Werbeckes

Joseph Yuen

Guest Starring:

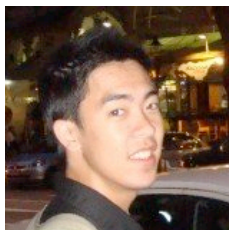
Kuya Takami





Problem Statement

- Vitals for anesthetized rats during PET imaging
 - Heart rate (200-500 bpm)
 - Rectal temperature (93 – 100° F)
 - Respiration rate (20-30 bpm)
- Current oximeter is designed for “small animals”
 - Inaccurate at faster heart rates
- Current devices too expensive
 - Budget = \$4,000 USD



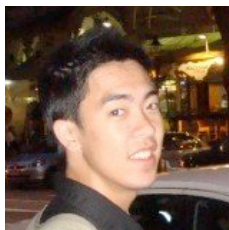
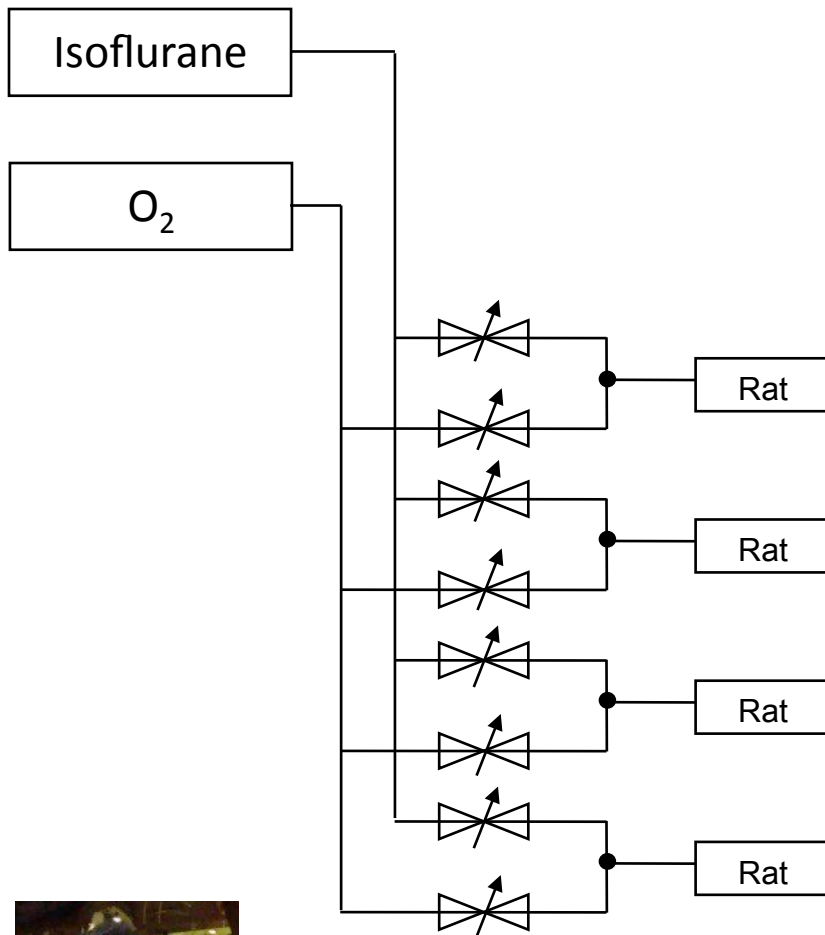
Jack Ho
Team Leader

Problem Statement : Background Info : Design : Future Work





Quad Adjustable Isoflurane Delivery*

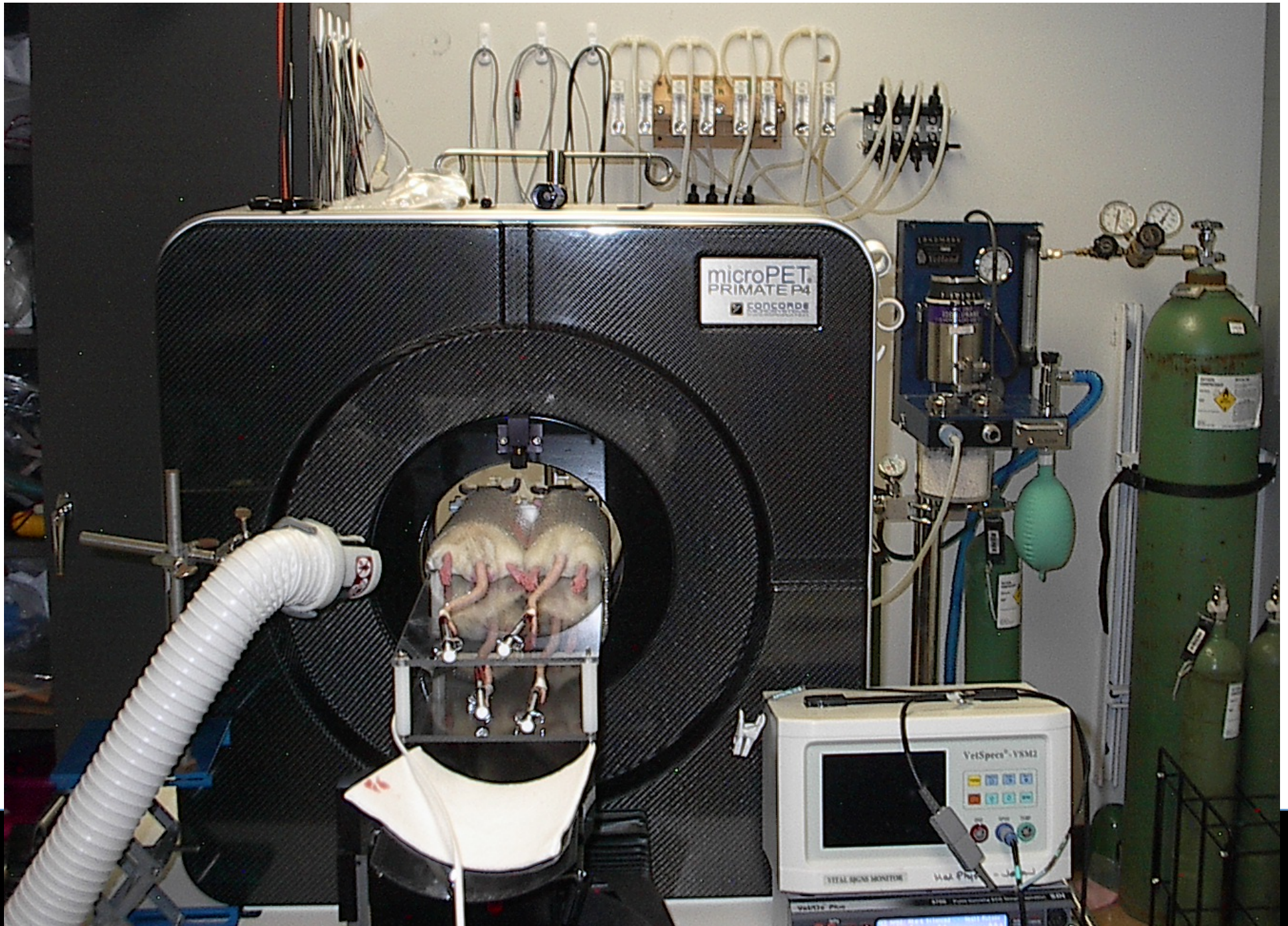


Jack Ho
Team Leader

Problem Statement : Background Info : Design : Future Work



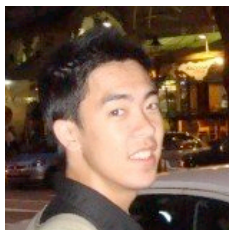
*Slide by Dr. Alex Converse





Current Devices

- Veterinary Oximeters
 - Nonin, Bionet, etc.
- Starr Life Sciences
 - MouseOx
- Expensive



Jack Ho
Team Leader

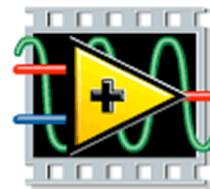
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Last Semester's Final Design

- Decided to buy sensors (FSR, pulse-ox, thermistor)
- Design and build circuit elements
- Integrate and display with LabVIEW



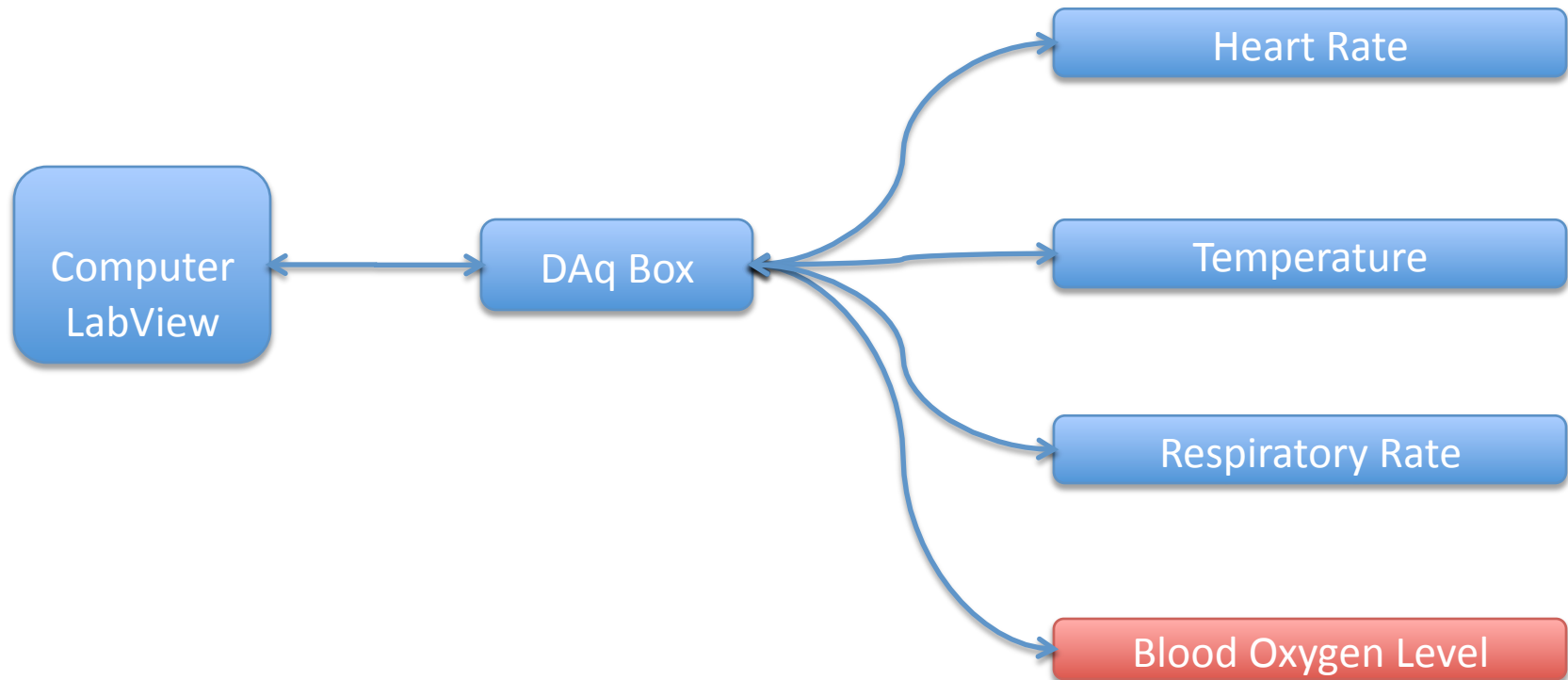
Nate Werbeckes
Communicator

Problem Statement : Background Info : Design : Future Work





Final Design



Nate Werbeckes
Communicator

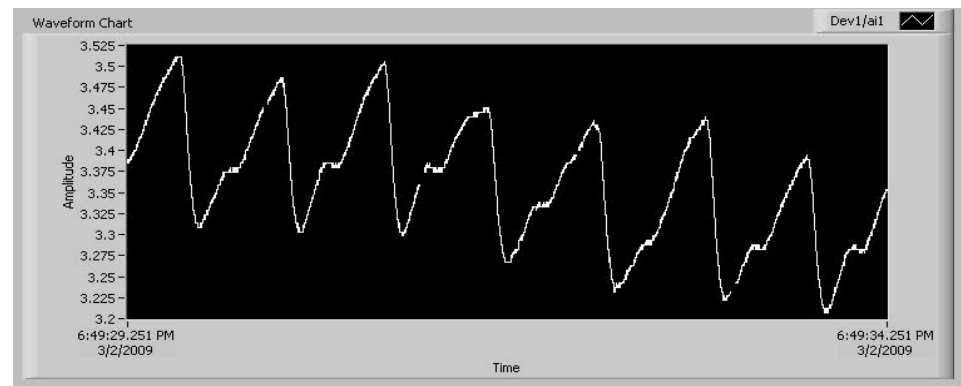
Problem Statement : Background Info : Design : Future Work





Heart Rate

- Pulse-Ox clip
- Transimpedance, differential, & non-inverting amp
- Process with peak detection algorithm
- Display in LabVIEW
- Working on: peak detection accuracy



Nate Werbeckes
Communicator

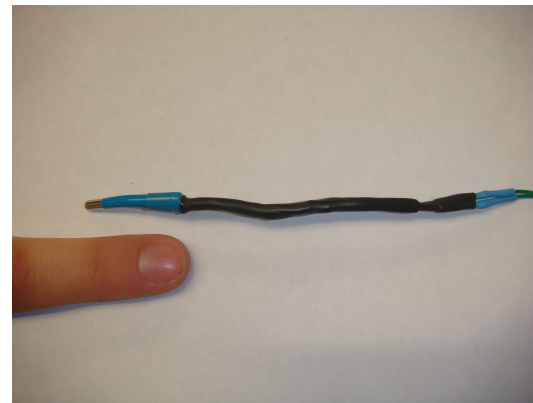
DESIGN : Heart Rate : Temperature : Breathing Rate





Temperature

- Oral Thermometer from Walgreen's
- Voltage divider & non-inverting amp
- Heat-shrinking plastic
- Display and integrate in LabVIEW
- It works!



DESIGN : Heart Rate : Temperature : Breathing Rate



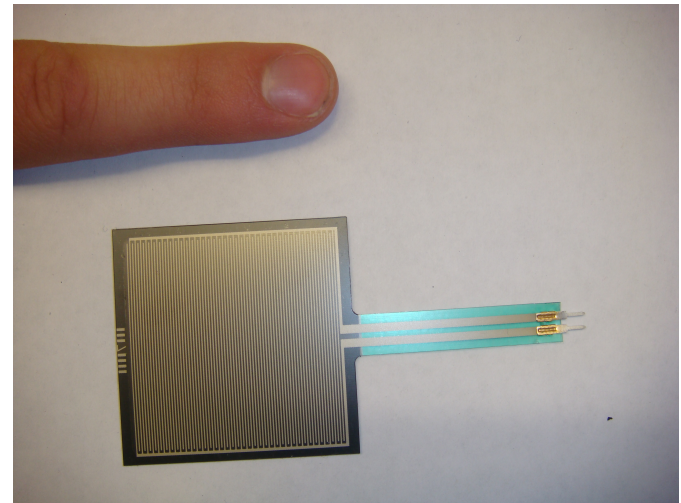
Joseph Yuen
BSAC & BWIG





Breathing Rate

- Force Sensing Resistor (FSR)
- Voltage divider
- Place underneath rat
- Display and integrate with LabVIEW
- Needs to be tested



Joseph Yuen
BSAC & BWIG

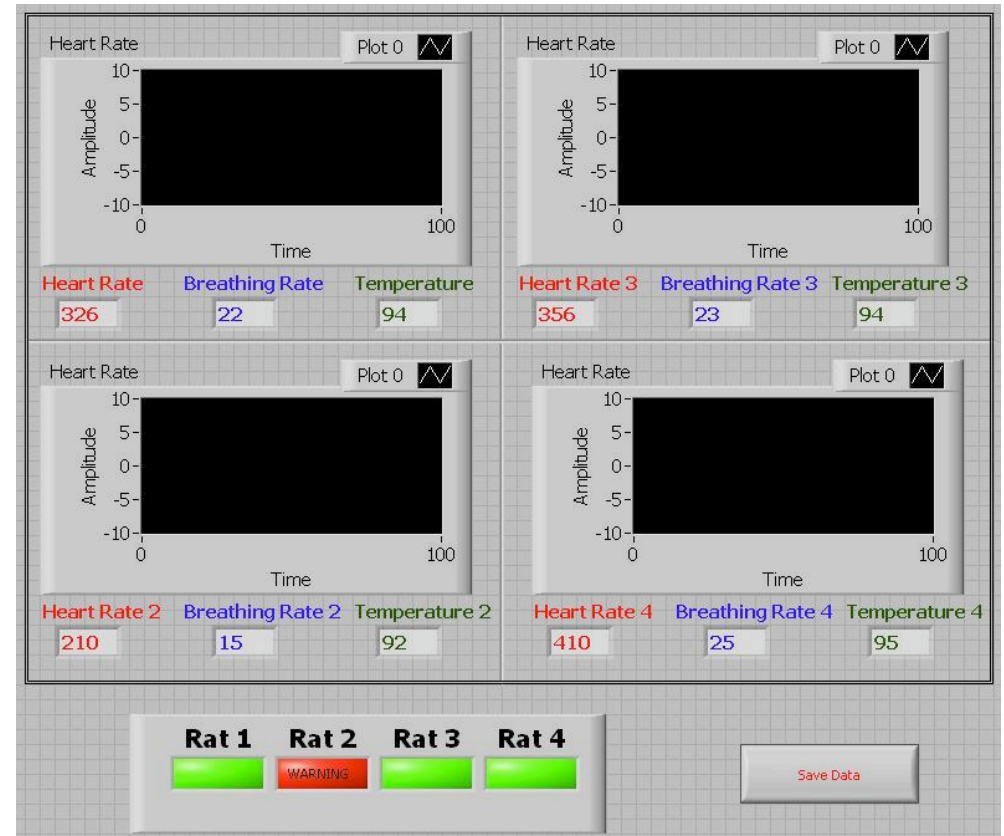
DESIGN : Heart Rate : Temperature : Breathing Rate





Future Work

- Test FSR breathing rate monitor with rat
- Choose most accurate peak detection algorithm
- Integrate and display all information in LabVIEW
- Create full scale model for four rats simultaneously



Joseph Yuen
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Problem Statement : Background Info : Design : Future Work





References

- Webster, J. G., Design of Pulse Oximeters. IOP Publishing Ltd 1997.
- Ford D., D. Nachreiner, R. Thomas, “Design of a Pulse Oximeter for Use in Mice”. 2005.
- Starr Life Sciences (website). MouseOx <http://starrlifesciences.com/>. 2008.

References : Questions





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