

1. Improvement of Mechanical Ventilation by Automation (Clinical - Blatchley, ECE):

Patient's in need of mechanical ventilation can have a wide variety of pathological conditions that fluctuate in intensity throughout a hospital stay. Ventilation systems are equipped with audible alarms to alert hospital staff when the device needs to be adjusted for changes in patient breathing. The goal of this project is to create an automated ventilation system that can adjust based upon patient pathological condition. The development of this product would provide faster care to patients and maximize hospital staff function.

2. Portable Patch Clamp with Automated Data Acquisition under culture conditions (Cularciello, ECE):

A portable system must be designed that can record continuously from cultured neurons. This project will address real-time data acquisition and storage.

3. Predictive Fall Detection and Monitor (ECE): One of the leading causes of hospitalization for the elderly due to a fall. While there are commercially available products for fall detection their usefulness is limited due to patient noncompliance and accuracy. The goal of this project is to develop a predictive fall detection monitor that is cost-effective, accurate, and able to notify the subject so they can take evasive action and minimize the chance of a fall. If a fall does occur, the device should be able to contact appropriate personnel and provide a location of the fallen subject.

4. Immediate Report of Potential TBI (ECE): On July 1, 2012 the Indiana state law for concussions and head injuries for student athletes goes into effect. According to this law a player should be removed from practice or a game if a player is suspected of a head injury. To diagnose a head injury evaluators are to look for signs and symptoms of a concussion.

5. Thermal Regulation of Core Body Temperature of Quadriplegics (Duerstock, ECE):

In a healthy individual, sensory feedback to the brain initiates physical responses (e.g. sweating or movement) to cool or warm the body as needed to maintain homeostasis. Individuals with spinal cord disconnects are unable to utilize sensory feedback below the level of the spinal cord disconnect resulting in an inability to regulate body temperature. The goal of this project is to design a device which will monitor core body temperature and provide feedback to a controller which will then adjust the external temperature of the body, in a sense providing artificial homeostasis.