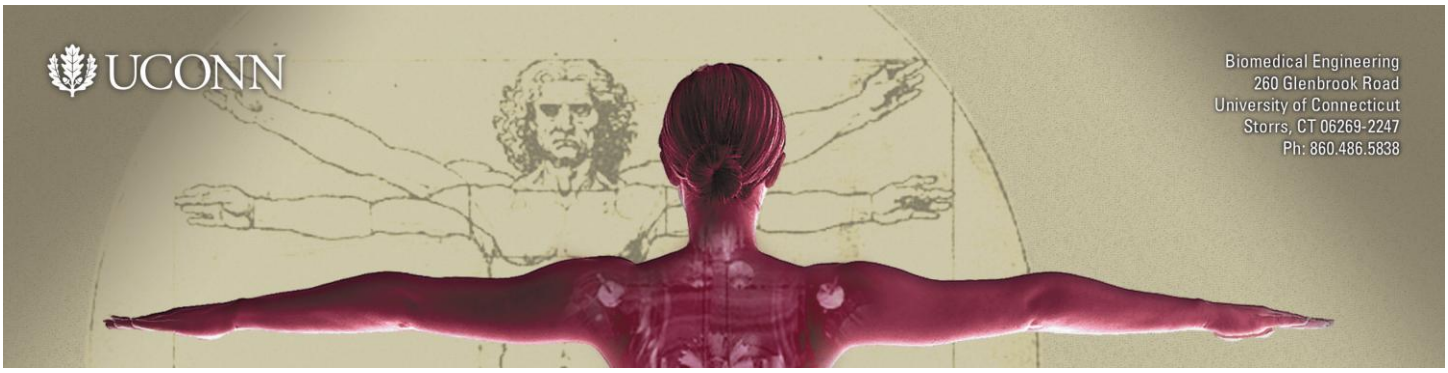


# BIOMEDICAL ENGINEERING
# SENIOR DESIGN DAY

**Friday, April 27th, 2007**

Project Demonstrations: 12 to 1 PM
Bronwell Room 213

Project Presentations: 1 to 4 PM
UTEB Room 150

**Biomedical Engineering Program**
**The University of Connecticut**

# BME 291 Senior Design Projects

## Head-Mounted & Arm-Mounted Art Design System: (NSF)

**Becky Lussier, Nemi Kotadiya, Sirisha Muppidi**

Our project has created specialized head and arm-mounted art design systems that aid people with cerebral palsy and hydrocephaly to create works of art. The client has limited mobility and requests devices that are to be mounted to her head and her wrist to help draw simple art designs, such as squiggles. Both devices utilize infra-red sensor technology in order to turn a rotating compass on or off, so that the client may power the devices manually on her own.

## Accessible Infusion Pump User-Interface: (RERC)

**Michael Cahill, Kevin Golebieski, Hassam Sultan**

The Accessible Infusion Pump Interface is a device that allows patients with sight, hearing or motor disabilities to operate an infusion pumps at home. Infusion pumps are notoriously difficult to use and intimidating, even to people without physical limitations. By generating an interface that facilitates easy use, the infusion pump becomes a much more helpful home tool. The interface would allow patients to save money by avoiding the costs of home nursing and also to regain independence and therefore pride.

## Accessible Home Vital Signs Monitoring System: (RERC)

**Rob Croce, Mike Kapinos, Jenna M. Sullivan**

Vital signs are a common and important way to monitor a person's health. Our monitor measures six (6) basic vital signs - heart rate, blood pressure, blood oxygen saturation, temperature, respiratory rate, and weight - and has been designed for home use. The device is fully accessible to everyone, utilizing a large LCD screen, text-to-speech module, and simple user interface. Finally, clients can send their vital signs to a remote health care provider using the provided Bluetooth technology and secure website

## Interactive Wheel of Fortune Game: (NSF)

**Meghan Schmidt, Kristen Gingras, Yadverinder Singh**

The Interactive Wheel of Fortune game will be used by adults at the ATCO sheltered Workshop. Adults there suffer from diseases such as cerebral palsy and mental retardation. The features of the game need to accommodate these disabilities. Special features include the use of bright colors, two methods to enable the wheel through use of a wireless push button remote and motion sensor, and audio comments to congratulate a job well done.

## Medicine Reminder & Shampoo/Conditioner Identification Devices: (NSF)

**Sheldon Bish, Karla Sittnick, Kenta Umetsu**

### The Medicine Reminder

Our client requires a device that will help her keep track of her medicine dosing schedule, as well as keep a record of when and how often she takes her medicines. This project has produced a device that provides our client with a clear and user friendly method of keeping track of her dosing schedule, while providing her healthcare professional and family with a convenient way to check-up on her dosing habits.

### The Shampoo/Conditioner Identification Device

As an elderly woman that suffers from poor memory and vision, our client requires a device that helps her recognize which bottle is her shampoo and which one is her conditioner bottle when she is in the shower. This project provides a device that helps her identify these bottles every time she takes a shower.

## Freely Adjustable and Accessible Keyboard and Mouse Pad for Client with Cerebral Palsy: (NSF)

**Stephen Heussler, Nolan Skop**

A larger, more accessible, and durable keyboard and mouse pad for a client with cerebral palsy. This keyboard should increase the client's ease and efficiency of communicating and using a computer

## Orthodontic Wire Mechanical System Tester: (UCHC)

**Max Feldman, Bethany Lepine, Scott Michonski**

This device will be used for research on orthodontic archwires at the University of Connecticut Health Center. The device uses linear slides equipped with stepper motors to provide forces and torques in three dimensions for testing the wires in various application configurations. The forces and torques are measured using two sensors that are configured to National Instruments LabVIEW hardware and an executable program that runs the motors as well as collects and displays data.

## Adjustable Back Angle Controller (ABAC): RERC

**Alaena DeStefano, Steven Frisk, Raymond Pennoyer**

The basic design of this project consists of a lever handle that controls a circuit which powers a mechanical actuator attached to the back of a bed to adjust the back angle. The key features to this device are its safety lock to prevent accidental movement, the control lever which increases the speed with the amount of force applied to it, and the intuitive approach to operating the handle such that lifting the handle will give the sensation of lifting the back angle upwards and visa versa. The device as a whole accommodates a wide range of patients and users of all disabilities to easily adjust the back angle of any bed.

## Assistive Robotic Arm: NSF

**Asma Ali, Megan Madariaga, Danielle McGeary**

The intent of this design is to provide more independence to a young boy who suffers from cerebral palsy within his integrated, fifth-grade classroom. The design mounts to the child's wheelchair and features robotic grippers along with a detachable spatula so that the child is able to grasp objects for himself and also eat independently. The device closely resembles the movements of the human arm by providing a full range of motion about the x, y, and z axes and throughout the three primary planes of motion

# BME 290 Senior Design Projects

## Muscle Recorder

**Mark N. Mazmanian, Angela M. Correa, Roua, Z. Taha**

Our project is to develop a contained apparatus to measure the length-tension and force-velocity relationships of small muscle contractions. The force-velocity relationship should be measured under lengthening and shortening of the muscle. This device is to be used as equipment for the BME Labs in future experiments.

## Expert Anesthesia Monitor

**Timothy R. Morin, Nathan E. White, Kane M. Killelea**

The expert anesthesia monitor is a device that will import data from the BIS VISTA and GE anesthesia machine to determine the overall level of consciousness. Additionally the device will calculate a suggested drug dosage for maintaining the patient's condition. The imported data will be time stamped to record all dosages and vital sign changes

## Improving Scanning Using an Intelligent Agent: (NSF)

**Tristan Ramas, Kyle Lotring, Ryan DeCaprio**

For the Alternative and Augmentative Communications laboratory at Ohio University, our group has designed a device for use by children (ages 2 to 10) that are afflicted by cerebral palsy. The users can not speak or gesture so they can not adequately communicate their daily needs. This device features a FLASH-based computer program that contains an automated scanning agent to select objects inside of a virtual environment that represent these needs. The user controls a single button interface to confirm object selection and an LCD monitor that displays these requests.

## Monitor Lift and Paint cap Remover: (NSF)

**Patrick Keating, Thuy Pham, Daniel Zachs, Katie Zilm**

### Monitor Lift

The Neurolinguistics Laboratory at Ohio University perform experiments to diagnose and treat patients with neurogenic communication disorders. During the experiments, the large monitor that weighs 80 pounds will be raised and lowered to accommodate the patients' eye level. Our team designs a monitor lift that is capable of steadily lifting the monitor from near surface up to 12+ inches

high. The monitor lift is simple to operate, quiet when used, and has no unnecessary features that distract the patients during the experiments.

**Paint Cap Remover**

Being handicapped on one hand due to the Multiple Sclerosis, the artist experiences difficulty in opening the paint cap. Our team works to design a portable, easily accessible device to help him twist open the paint cap with minimal efforts.

The Biomedical Engineering (BME) Senior Design course is intended to engage students in a meaningful experience by bringing together concepts and principles learned in the biomedical engineering curriculum, extend this theory to practical application, then to plan and construct a finalized product.

This experience is comprehensive, reflecting all aspects of the engineering design process along industry guidelines. Problem solving for large-scale, open-ended, complex and sometimes incompletely defined systems is the primary emphasis of these courses.

Students use the web to describe and report progress on their project. Students have also utilized the web to facilitate communications with other universities in joint projects. The Senior Design homepage is located at:

http://www.bme.uconn.edu/bme/ugrad/bmesdi-ii.htm

Interested individuals are welcome to visit this site to experience first-hand what BME senior design is all about.

For more information regarding the BME Senior design course contact:

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**The BME Program wishes to thank our sponsors for their generous support.**

**Rehabilitation Engineering Research Center (RERC) on Accessible Medical Instrumentation**

**National Science Foundation**

**School of Orthodontics**
**University of Connecticut Health Center**