For your capstone design projects, we have partnered with the Center for Disability Services. They serve a large population of people ranging from children to adults with a wide range of disabilities. The Center solicited requests for project ideas from their therapists, nurses, and aides. They have an expert for each project that you will be working with. This person will show you the problem as they see it, help you meet with the patient(s), and give you feedback on your design proposals. Here are the five projects they passed along to us.

**Capstone Design Projects Descriptions:**

**Dental chair for wheelchairs:**
The idea came up at a meeting to make something that could accommodate wheelchairs of varying sizes and types in the dental office. It would need to be able to tip backward as a dental chair would for the exam. If that isn’t possible, perhaps something to elevate the wheelchair could be designed to bring the consumer closer to the dentist. One of the problems at 314 is that the dental office is on a slab, making traditional lifts and the like impossible to use. This concept would also be valuable for other procedures such as videofloroscopy. In the past, I accompanied a client confined to a wheelchair to a videofloroscopy. I had to bring so much equipment to the hospital to sit them in the standard videofloroscopy chair. I feel that a chair with adjustability to accommodate a consumer needing a video done is needed for all involved clients. The actual video chair is small and needs to fit in a certain area. I don't know if they should make a chair or a special ramp so the client can get an accurate picture while sitting in their own chair.

**Backup Wheel Chair Sensor/Alarm:**
The Site Safety Committee discussed an incident report that involved a consumer in a powered wheelchair who backed their chair into a clinical staff person accompanying them to the appointment. The staff person was wedged quite hard into a door jam/wall, with slight injury. It came up in discussion, that it would be an great idea to mention to you the possibility of having a backup noise automatically sounding when someone backs up (such as they way the school busses and vans have), so as to prevent crashes into other people and personal/business property. I might add an automatic stop device that would prevent the chair from continuing to apply pressure against an item such as a wall or a person.

**Mic-key button:**
We have issues with mic-key buttons, ie: leaking around stoma, top piece becoming loose to not fit in correctly and falling out d/t balloon losing integrity. Looking for a better functioning alternative.

**Feeding tube:**
In just 4 months- our residence has had to deal with 16 feeding tube cloggings requiring interventions from Albany Medical Center. These visits have ranged from 5 hours to 2 day long hospitalizations. Clogged feeding tubes are big concern for the following reasons:
- The consumer can not receive and food or medications
- The consumer must spend hours, sometimes days in the hospital
The consumer often has to have the tube replaced as unclogging attempts often do not work. This can be a painful procedure
- The consumer is at risk for needing larger sized feeding tubes due to stretching of the GI tract and runs the risk of increased scar tissue
- Frequent replacement often times causes gastric contents to leak from the tube site-resulting in burns and open skin prone to infection
- Staffing needed to stay with the consumer during the hospital stays are costly and very disruptive to the home
- Frequent incidents are very disruptive to the consumer's life

The above concerns just list a few of the issues with clogging and replacement. There are a host of other concerns associated with the current feeding tubes. My idea is to develop a new feeding system with a new type of feeding tube and pump able to work together to be capable of the following:

- Checking for proper placement in the stomach or small intestine
- Check stomach residuals (and maybe record?)
- Ability to be programmed to administer water flushes at designated times
- Self clean the inside of the tube to prevent build up/debris
- Detect clogs and safely assist in their removal (maybe with a pressurized system, unclogging tool, dissolving methods…???)
- Ability to detect if balloon needs water or tube is dislodged
- Ability to detect additional problems

Some additional “nice to haves” could be:
- Capability to administer medications and flush desired amount of water in between medications
- Capability to ensure medications are finely crushed to prevent clogs

The tube itself would likely need to have the inside made of a better material in order to be cleaned and maintained and also to prevent build up from tube feed.

**Water safety alarm:**

Although many patients are capable of bathing themselves, there are no current precautionary technologies or safety measures implemented in the bathroom to prevent drowning. There are bath chairs used for individuals with limited mobility who require support in a tub, however, the individual who desires privacy while bathing could potentially slip out of position to a point where his/her neck and mouth are below the water level, placing them at a severe risk of drowning. This lack of technology necessitates that caregivers bathe patients, depriving them of their privacy. We are looking for a device that would detect if a person has sunken to a dangerous level in the water and in that instance, automatically drain the tub to prevent drowning.
**Project Proposal:**

Over break, we would like you to choose two (2) projects that interest you. Then, for each project we want you to write up a two-page project proposal. The project proposal should contain the following:

- Background research in the current technology available
- If a disability is noted, details about the disability
- A restatement of the problem as you read it
- Questions you would ask the expert for the project when you get to meet with them
- Initial thoughts of how you would like to proceed with the design/project

Please submit your proposal via e-mail to both cotters@union.edu and curreyj@union.edu by **Monday Dec. 8th by 5 PM**. Please indicate which project is your first and second choice. There will be 3 groups of 3 and 1 group of 4 students. We will form groups based on project interest and do our best to accommodate everyone’s requests. We will let you know your groups by **Friday Dec. 12th**. At that time, we will provide more details on what we expect next. The idea is that we want you to be able to hit the ground running so you can make the most of the 10 weeks to work on the project.

Good luck and please let us know if you have any questions.