Selecting a Medical Device Project
BMEN 3151 Medical Device Practicum
Prof. Steven S. Saliterman

The goal of this course is for you to apply your prototyping skills to designing and building a useful medical device. To expedite choosing a project I have listed several ideas below for you to explore.

Next year in Senior Design you will participate in a clinical experience and develop a patient “needs” statement in concert with a health care provider. The process takes a month or so, and during the first semester a rudimentary medical device prototype is created. You will be asked to produce several “deliverables,” or reports that demonstrate your understanding of the clinical problem, market assessment, timeline for creating the medical device, and plans for testing the device.

In this course you will rapidly select and research a clinical problem, and then choose a feasible project. You will present your project idea to the class and try and narrow the scope of your effort. I will also be available Monday & Tuesday 11:00 – 1:00, Wednesdays from 12:00 – 2:00, and Thursday & Friday 1:30 – 3:30 in 6-108 NHH to meet with teams individually. Please email me to schedule time.

While you are free to choose any project, you might consider third world needs as well. Consider any new or redesign of an existing device that works as intended, is lower cost to produce and safe to use. Think about manufacturing in a resource-limited environment, access to technology, expertise, training, power grids and local regulatory requirements (typically less stringent than the FDA.)

Also consider tissue engineering projects if you already have experience in extracellular matrix engineering and/or 3D printing. Consider methods for modeling disease, pharmaceutical studies, diagnosing disease, and treatments. Since we do not have a student wet lab, it will be necessary to identify faculty who have the facilities and can assist you.

You might also look into needs of Homeland Security and the armed forces.
While the following list is not inclusive of all possibilities, it may serve a starting point for your research:

1. Allergy
   a. Early detection and treatment of anaphylactic reactions.

2. Cardiovascular Diseases
   a. Monitoring and recording angina episodes.
   b. Arrhythmia monitoring.
   c. Cardiomyopathy monitoring.
   d. Minimally invasive treatment methods and tools.
   e. Pacing and defibrillation.
   f. Peripheral arterial disease assessment and/or monitoring.
   g. Stents and other implanted devices.
   h. Thrombophlebitis diagnosis and/or treatment.

3. Dermatology
   a. Deep learning computer application to diagnosis of skin lesions.

4. Ear, Nose and Throat (ENT)
   a. Prosthetics and implants.
   b. Surgical tools.

5. Emergency Medicine
   a. Applications for trauma.

6. Infectious Disease
   b. Sample collection.
   c. Sterilization methods.
   d. Transport and handling of specimens.

7. Gastroenterology
   a. Biopsy instruments.
   b. Video capsule for visualization of the digestive tract.

8. Nephrology
   a. Home dialysis
9. Neurological Diseases
   a. Thoracic back pain diagnosis.
   b. Parkinson’s disease monitoring.
   c. Peripheral nerve disease assessment.
   d. Seizure monitoring.
   e. Sensory and motor function assessment tools.

10. Orthopedics
    a. Rehabilitation devices.
    b. Surgical tools.

11. Pharmacology
    a. Enhanced drug delivery systems.
    b. Infusion Pumps

12. Plastic Surgery
    a. Restorative/cosmetic prosthesis and implants.

13. Psychiatry
    Alert systems for Depression and/or Anxiety
    Suicide Prevention

14. Pulmonary
    a. Diagnosing drug-induced respiratory depression.
    b. Low cost sleep apnea monitoring.