Clinical Project Application for Engineering Innovation in Medicine

Engineering Innovation in Medicine is a yearlong program to develop working, cost-effective solutions to health challenges that are positioned to make a clinical impact in a wide range of specializations. The program operates by teaming clinicians, engineering faculty, and undergraduate and graduate engineering students to solve real-world, unmet medical needs. The projects and deliverables are managed within a design course sequence “Engineering Innovation in Medicine” in the college of engineering. The entire first quarter (Oct-Dec) is dedicated to developing a thorough understanding of the clinical need and the various aspects that will need to be addressed for the project to be successful. Design, prototyping, and evaluation of engineering solutions occur in the winter (Jan-March) and spring quarters (March-June). The end goals of the projects are: (1) a working prototype of a cost-effective and innovative solution, (2) intellectual property (i.e. patents), and (3) data towards a publication or application for continued funding. The success of the projects depends on engaged clinical and engineering faculty mentors. The program commences in Autumn quarter, October 1st, 2015 and runs through June 10th, 2016.

As clinician partners, your insight and ideas for unmet needs is what makes this course happen! Our aim is to help you and a team of students navigate the design process, explore diverse designs, and generate solutions that could improve your future practice. If you are interested in submitting a project for our 2015-2016 program, we would like to hear from you!

We have a two-step process for proposing projects for the course:
1. Complete the following project summary and submit to Dr. Steele, kmsteele@uw.edu
2. Projects that align with our students’ background and program goals may be invited to prepare a brief presentation (10 minutes max) to explain the need and how a successful solution would impact clinical care. Presentations will be evaluated by a team from the schools of engineering and medicine.

We follow a need-based and human-centered approach to design and innovation. As such, the most successful projects for this program are based around a clinical challenge rather than a specific device. We challenge students to understand the need and explore a diverse set of solutions. For example, rather than “building a device to intra-operatively measure tendon force” we challenge students to “improve the accuracy and repeatability of tendon transfer surgeries.”

Examples of prior projects include:
- NEED: Intra-operatively prevent and treat pneumothoraces during and after lung biopsy
  Solution: Modified biopsy co-axial introducer that allows intra-procedural vacuum and can act as a temporary chest tube

- NEED: Quickly quantify blood clot strength in trauma patients
  Solution: Microfluidic diagnostic system to form and measure clot mechanical strength

- NEED: Quantify distal blood perfusion to detect early hemodynamic shock in low-resource clinics
  Solution: Open-source mobile app for measuring capillary refill time

Clinical partners are expected to interact with students on a regular basis to provide feedback and engage in the design process. The typical time commitment involves meeting with the student teams 3-4 times per quarter and attending final presentations at the end of each quarter.

If you are interested in developing innovative solutions to pressing clinical challenges, please complete the attached Project Summary by August 20th, 2015. If you have further questions or would like to brainstorm potential projects we would be more than happy to chat further.

We thank you for your time,
Keith Chan, MD – UW Radiology
Jon Liu, PhD – UW Mechanical Engineering
Jonathan Posner, PhD – UW, Mechanical Engineering
Kat Steele, PhD – UW, Mechanical Engineering
Project Summary

Title:
Proposed by:
Potential clinical mentors\specialty:

Please provide a brief paragraph addressing each of the following questions.

What is the unmet clinical need?
Please describe how this challenge affects clinical practice, patient health, or quality of life. What is the magnitude of this clinical need (e.g. prevalence, annual cost, social impact)? How often do you encounter this problem in your practice? Who would benefit from a solution to this problem? What would be the clinical or health impact of a working solution? Would this lead to potential cost-savings?

What are current solutions for this problem?
Please describe current solution[s] for this need. How do these current solutions meet / not meet the clinical needs? Do you know of other solutions that have been tried (e.g. not commercialized)? Why were they not adopted? How much do the current solutions cost?

What are specific design requirements?
Please describe some specific “must haves” aspects required to address the clinical need. What will be required for clinical translation? How do you envision the use of a successful design?

What are future pathways for this project?
We like to identify project that have the potential to live-on beyond our year-long class – either through further research, open-source designs, commercialization pathways, or direct clinical implementation. Please describe what testing or primary outcome measures could be used to evaluate if the team has addressed the clinical need or provided proof-of-feasibility. If the project is successful, what do you foresee as the next step in translating it to clinical practice or future development? Are there possible funding options to support future activities?

To gauge the fit of each project with our students and course, we may ask teams to prepare a brief presentation (10 minutes) for a team of experts from the UW College of Engineering and School of Medicine. Please indicate your availability to present on the following days:

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If none of these times work for you. Please provide alternative times that work best with your schedule.

Thank you for your time! We will get back to teams as quickly as possible.