

What is Engineering?



Engineering is...

Engineering is the discipline, art and profession of acquiring and applying technical, scientific, and mathematical knowledge to design and implement materials, structures, machines, devices, systems, and processes that safely realize a desired objective or invention.



ENGINEERING BEYOND BOUNDARIES

COLLEGE OF ENGINEERING

UNIVERSITY OF WISCONSIN-MADISON

Education for a rapidly changing world...

ENGINEERING BEYOND BOUNDARIES (EB2) is a new, long-term educational transformation initiative in the College of Engineering that will encourage faculty and staff to rethink our academic culture to address important shifts, including:



Grand Challenges

Throughout human history, engineering has driven the advance of civilization.

These are the current themes of engineering considered the most important:

- Sustainability
 - Health
- Vulnerability
- Joy of Living





Make solar energy economical



Provide energy from fusion



Develop carbon sequestration methods



Manage the nitrogen cycle



Provide access to clean water



Restore and improve urban infrastructure



Advance health informatics



Engineer better medicines



Reverse-engineer the brain



Prevent nuclear terror



Secure cyberspace



Enhance virtual reality



Advance personalized learning



Engineer the tools of scientific discovery

Did you Know 4.0

- <http://www.youtube.com/watch?v=6ILQrUrEWe8>



The BME Department

- The University of Wisconsin is ranked first among public institutions, and second overall in annual research expenditures.
- The University of Wisconsin was ranked 14th among all schools of Biomedical Engineering to receive NIH awards in 2005.
- There were 36 new US patent applications filed by BME faculty members in 2006.

Biomedical Engineering is...

Biomedical engineering is the application of engineering principles and techniques to the medical field. This field seeks to close the gap between engineering and medicine. It combines the design and problem solving skills of engineering with medical and biological sciences to improve healthcare diagnosis and treatment.^[1]

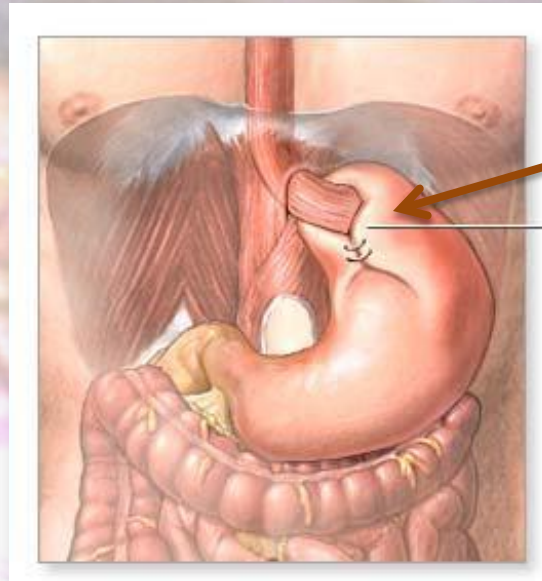


Blood Pressure & Ultrasonic Flow meter



We get to work with a surgery (Nissen Fundoplication)

- Treatment for chronic heartburn by GERD
- Daily problem for 15 million Americans
- Upper stomach wrapped around esophagus
- Liver retracted to expose surgical site



Fundoplication

Here's our client (Dr. Gould)

- Surgeon at UW Hospital



Our Goal

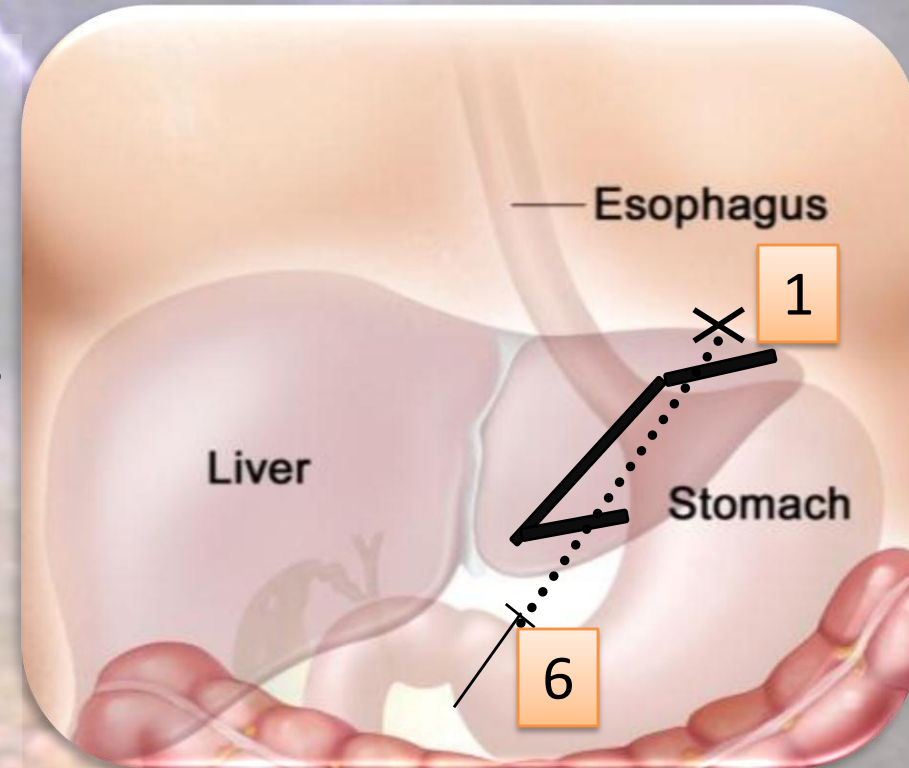
- Decrease # of incisions
 - Cosmetic
 - Less risk of infection
 - Patient satisfaction



Our Project

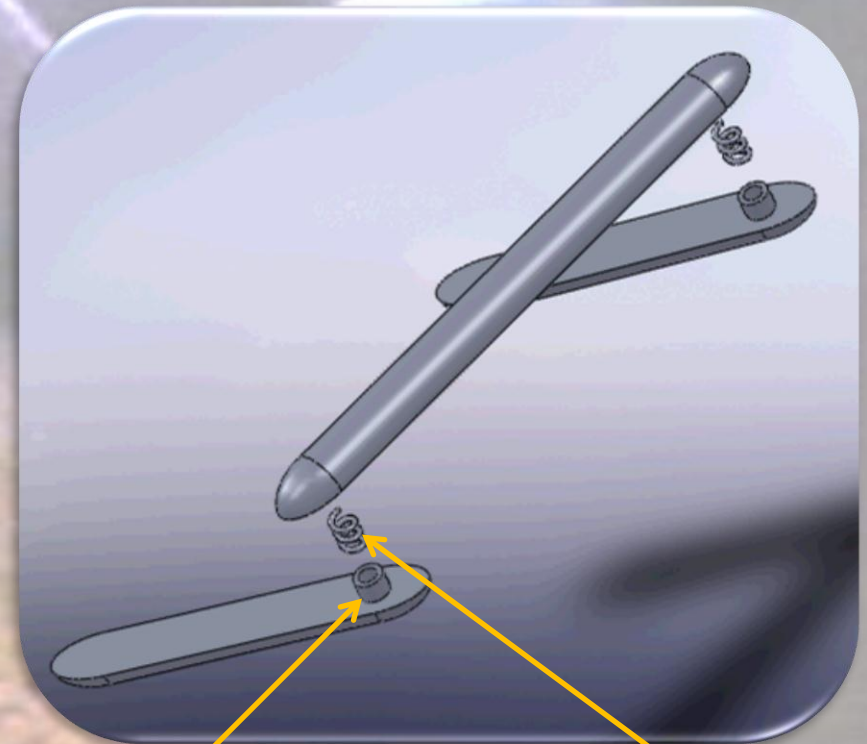
(Complicated procedure...)

1. Attach suture to left crus
2. Thread suture through retractor
3. Insert retractor
4. Deploy retractor
5. Move retractor under liver
6. Pass suture out abdominal wall
7. Apply tension to retract liver



Our Device

And it fits through here:



Hollow
Axle

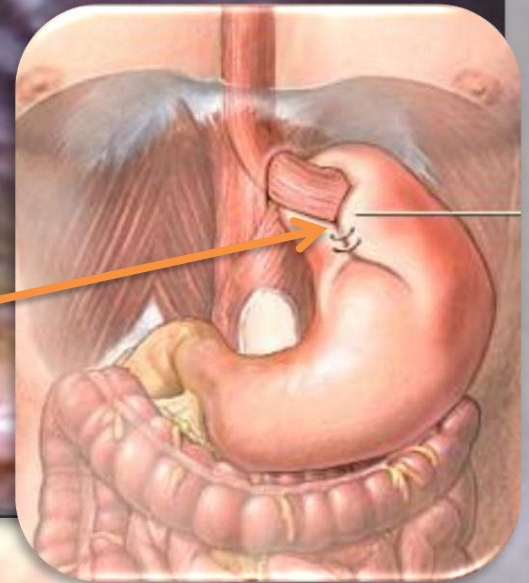
Torsional
Spring

Video Preface: Nathanson Retractor

Dedicated
port required

Liver

Gastroesophageal
Junction

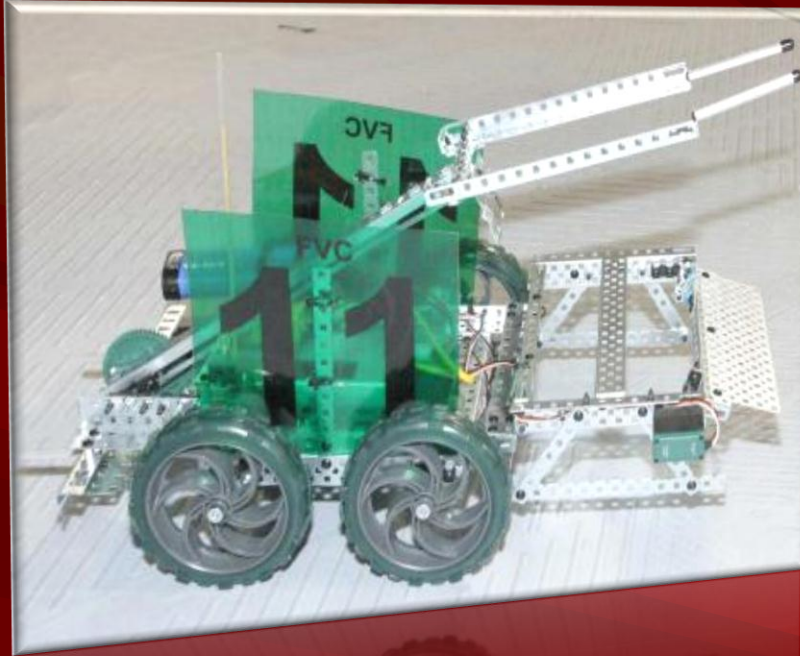






Cool things you can do in engineering

Science Olympiad



09 engineering EXPO'09

sponsored by **BOSCH**
at the University of Wisconsin Madison

discover
the element
of engineering

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Spring 2011



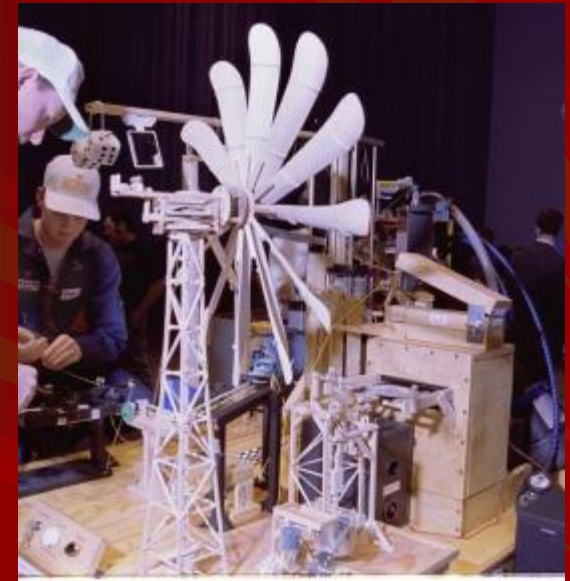
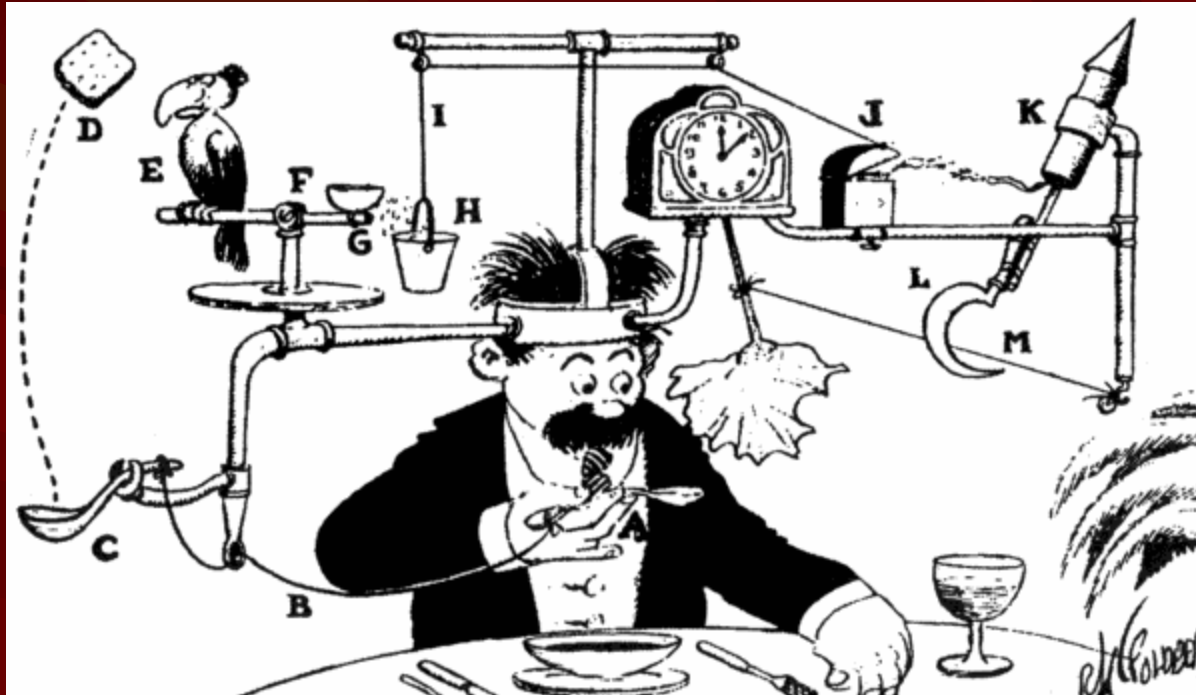
Concrete Canoe



Steel Bridge



Rube Goldberg



Formula SAE



Tong & Schoof's Prizes

