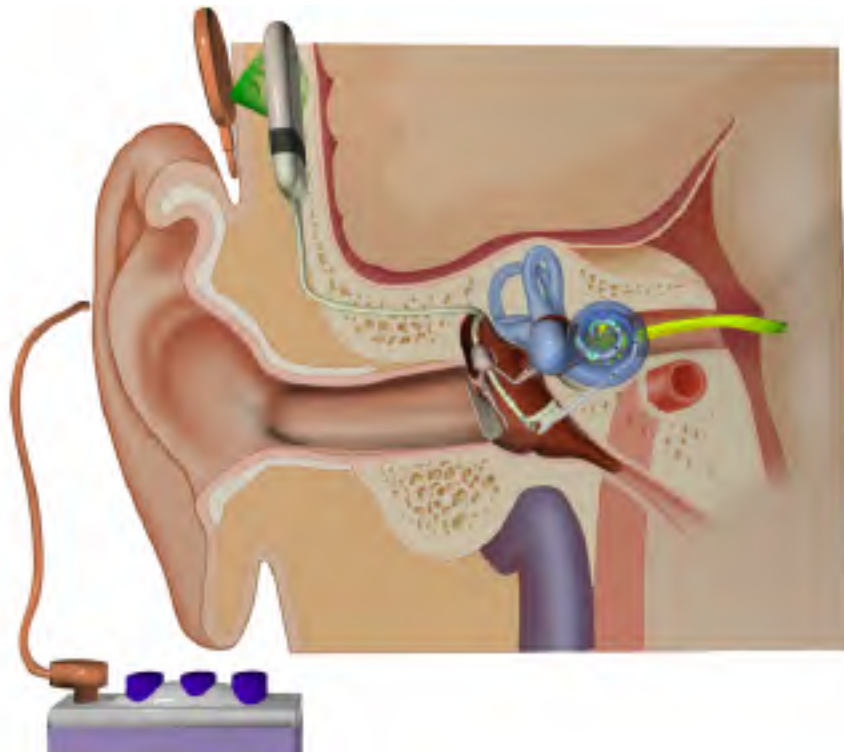


Problem Scenario: Cochlear Implant Surgery

Consider the problem and surgical technique for transmastoidal cochlear implant surgery



Question 1 – Analysis of existing procedure

- A. Develop an outline for evaluating this procedure, including such factors as “cost”, “safety”, “effectiveness of pain relief”, “accuracy”, “time”, etc. For each such criterion, include:
- Short definition or explanation of the criterion
 - Short discussion of how that criterion should be assessed (e.g., units of measure, means of gathering information)
 - Short discussion of how important each criterion is to each relevant group affected (patient, surgeon, hospital administrator, insurance company, employer, etc.)
- B. Use this outline to evaluate the existing manual methods using these criteria.

Question 2 – Identifying alternatives

- A. Sketch an alternative approach using computer assistance to enhance this procedure. Do not write a book. I am looking for 1-2 pages maximum, possibly with a sketch or two.
- B. Sketch a second, distinct approach using computer assistance, with the same sort of information and discussion included in Part 2.A.
- C. Develop an outline evaluating the two approaches using the criteria developed in Question 1. Your analysis should compare your approaches to each other and to existing manual practice.

Question 3 – Fleshing out the preferred embodiment

- A. Based upon your analysis in Question 2, select one of your proposed system solutions for further design evaluation. For this design, provide an additional 2-3 pages total (discussion + sketches) outlining the technical approach. Your discussion should clearly define
- Preoperative, intraoperative, and postoperative information needed.
 - How this information will be obtained.
 - Important components and human interfaces.
 - What components need to be developed.
 - What components (if any) need to be “invented”
- B. Summarize the step-by-step procedural flow for your solution
- C. Discuss the steps, timeline, and estimated resource requirements to implement your solution for clinical use

Important NOTE

- There is no single “right” answer to these questions, and I am well aware that people may not have either the experience or the knowledge to make highly credible estimates of things like schedules and costs. The purpose of the exercise is to get you to think.
- In grading the answers, we will be looking more at your reasoning and your approach to the problem than at the specific “correctness” of any technical solutions you come up with.
- At the same time, do try to keep sight of the specific goals of the application, and don’t simply resort to science fiction. An answer proposing well trained termites is not likely to score very well.

Selected bibliography

- As mentioned earlier, this exercise is open book, open web, and (indeed) pretty much open everything except previous years' homework, with the requirement that you explicitly cite any references that you use or consult.
- If your solutions resemble something in the literature, that is fine, too. But, again, you need to cite your sources and critically discuss them.
- Here are a few selected bibliographic references that may be helpful in getting started:
 - J. Niparko (ed), *Cochlear Implants: Principles & Practices*, Philadelphia, Lippincott, Williams & Wilkins, 2009.
 - D. Tucci and T. Pilkington, "Medical and surgical aspects of cochlear implantation". in *Cochlear Implants: Principles & Practices*, J. K. Niparko, Ed. Philadelphia: Lippincott, Williams & Wilkins, 2009.
 - See also the videos linked from the class web site