Technical Review Paper: Sonar Sensing
What is a Technical Review Paper?

- It’s a summary of published research or documentation in which the writer does NOT add their opinions, ideas, or contributions to the topic.

- It’s useful to quickly bring people up to speed on a particular topic.
Subject of Your TRP: Ultrasonic Range-finding

- Common on mobile robotic platforms as a way of sensing the world.
- Simple and inexpensive, but has several limitations, in general and in specific situations.
- Your paper will discuss the technology and its limitations, and apply this information to an anticipated situation.
Motivation and Audience

- You are about to be on a design team that will be working with a mobile robot that uses sonar sensing.
- This TRP will help quickly get everyone up to speed so that you don’t have to spend time on this information during the project.
- Your audience is fellow engineers who will soon need to use ultrasonic range-finding.
Sonar Summary

\[ d = \frac{T}{2c}, \]

where

- \( d \) = distance
- \( c \) = speed of sound and
- \( T \) = round-trip delay

\( (c \approx 340 \text{ m/s}) \)

Figure 4.3: Timing diagram for the E-220B series ranging module showing analog and digital output signals in relationship to the trigger input. (Courtesy of Massa Products Corp.)
Sections of Your Report: Introduction

- Explicitly state the purpose of the paper
  - “This paper is a review of …”
  - Exactly what does the paper cover?
  - You’re not writing a mystery novel

- Provide necessary background on the technology being reviewed
  - Will be brief; avoid “fluff”
Sections of Your Report: Sonar Principles and Limitations

- All the technical information goes here.
- We’ve only given you the bare minimum necessary to understand the topic.
  - These slides, and on the assignment sheet.
- Organization is key.
  - Consider the logical layout of your information
  - Make ample use of headings and subheadings
Sections of Your Report: Application-Specific Concerns

- We will give you a typical situation that the robot will encounter during the final project.
- You will use what you learned about sonar to anticipate what types of measurements the sensors will return.
- You will briefly discuss the reasons for problem areas.
Where Do You Find Reliable Technical Information?

- Journal articles and conference proceedings
- Trade publications
- Patents
- Manufacturer documentation (datasheets)
- Books (including textbooks)
- Websites
What Are NOT Citable Sources?

- Wikipedia
  - It can be useful to lead you to citable sources, but is not one itself.
- HowStuffWorks.com
  - Again, might lead to sources, but is itself unreliable.
How to Find Sources

- General web search (e.g. Google)
  o Basic definitions and explanations of the technology
  o Miscellaneous web sites (e.g. users groups, trade organizations, web sites for hobby supplies, Wikipedia, etc.)

- Georgia Tech library web site
  o Search for articles and conference proceedings (pick “Databases”)
  o IEEE Xplore, Compendex, and SPIE Digital Library are the best databases
  o Browse on-line journals and SPIE Proceedings

- Browse print versions of technical magazines (articles and ads)
  o IEEE Spectrum, Proceedings of the IEEE
  o Electronic Design, EE Times, NASA Tech Briefs, etc.
Useful Links

- Georgia Tech Library
  - www.library.gatech.edu
  - Select “Search & Find”
  - Select “Articles” or “Databases” to execute specific searches
    - Best options are “Compendex”, “IEEE Xplore,” and “SPIE Digital Library”
  - Select “eJournals” or “Journals” to browse specific technical journals, or to locate a specific article in a journal

- Google Scholar
  - http://scholar.google.com
  - May have to use the GT library links to get to the articles you find

- U.S. Patent Office
  - http://www.uspto.gov
  - Select “Patents” and the “Search”
Required Writing Consultation

- You will meet with your GTA to review a full draft of your TRP.
  - 15% of your writing assignment grade.
- Consultations will be 30 minutes each, held between Sept 12 and Sept 25.
  - Sign up ASAP to get a good time and date.
- Look for more details from your GTA soon.
Writing Assignment Resources

For all 2031 writing assignments:

- The *lecture slides* provide a brief intro to the topic and the document.

- The *assignment sheet* provides more detailed document requirements.

- The *evaluation sheet* provides information on how the document is graded.

- All of these (and more) are on the UPCP site.
Use Piazza for Discussion

- Piazza is the best way to get your question seen and answered.
- We will also post any announcements there, including the provided source.
- If you haven’t joined yet, do so ASAP!
Schedule

● Due Sept 29 - over three weeks from now.
  ○ Mostly so that GTAs can handle all of the consultations.
  ○ This is not a 3-week paper, but...

● Don’t procrastinate.
  ○ Bringing a truly complete draft to your consultation will allow your GTA to give you the best feedback.