Research Survey Assignment for COMP4336/9336 Mobile Data Networking
Semester 2, 2016 (Individual Assignment)

Due: 11:59pm Friday 21 October

Weighting: 25%

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NOTE: This is a research survey assignment alternative open to only PG students. This option is not open to UG.

Title: A Survey of techniques, products, and applications for audio-based device-to-device communications

Background and Motivation

Most mobile devices include a speaker and a microphone. This creates an opportunity to enable device-to-device (D2D) communication over audio that would work for almost 100% of the available devices in the market. Audio-based D2D would also enable any other devices with a speaker, such as a TV, FM radio, musical instruments, alarm systems, and so on to communicate directly with a personal mobile device without having to configure WiFi or Bluetooth connections. Audio-based D2D can also provide a more efficient and ubiquitous alternative to NFC-based communication used for a growing volume of mobile payment transactions and other emerging services. Tech giants have already started exploring the potentials of audio-based D2D giving rise to new developments such as Google Tone, an extension of Chrome that lets nearby devices to share URLs over inaudible sound frequencies.

Learning objectives

Upon completing this assignment, students will:

1. Gain insight to audio-based data communication applicable to current mobile devices,
2. Learn and compare various methods of achieving audio-based communications between mobile devices,
3. Determine the current state-of-the-art in audio data networking in terms of product features and performance limitations
4. Identify trends and future directions in sound-based data transfer
5. Develop skills to research a specific current topic of interest and write a report surveying a large number of publications and other information sources

Assignment Task

Your task is to write a research survey report on audio-based D2D communication within the following limitations and format:

- Maximum of 15 pages including references/bibliography
- 12 pt Times New Roman single column with 2.5 cm margins on all sides
- Maximum pdf size: 5 MB

Your work will be checked against all documents on the Internet using Moodle turnitin facility. All plagiarism policies will be enforced. Submissions containing verbatim copy of texts from other sources will be severely penalized.

The report should answer the many questions a general reader may ask about this new topic. Examples of such questions could be:

- What are the motivations for audio-based D2D communications?
- What different methods of data transfer have been considered so far (in terms of modulation, coding, frequency selection, etc.) and how do they compare?
- What performances in terms of data rate, bit error rate, distances of communication etc., have been reported? What are the main factors that influence performance for this type of communication?
- Is there any commercial interest in this technology? If so, what are the available products/platforms, what are their features, and how do they compare against each other
- Are there any "apps" available for smartphones for audio-based communication using built-in speaker and microphone? How do they compare against each other?
- What are the limitations of the state-of-the-art and what are the future directions for this technology?

Initial Reading List

To write a good research survey report, you will need to search the scientific databases, such as Google Scholar, locate, read, and analyse a large number of references. To help you find these references, a short initial list is compiled below:

Sound tone communication, Masters Thesis, 2015
https://www.cse.iitb.ac.in/synerg/lib/exe/fetch.php?media=public:students:nisham:nisha_mtp1_report.pdf

TAPIR Sound Tag: An Enhanced Sonic Communication Framework for Audience Participatory Performance
http://www.nime.org/proceedings/2014/nime2014_461.pdf

Context-aware Computing with Sound
https://www.cl.cam.ac.uk/research/srg/netos/papers/2003-ubicomp-audio.pdf

Marking criteria

- The more references, i.e., distinct publications (conference and journals), research theses, etc., you can find the better
- Should be well structured and organized with meaningful section headings
- Technical content should be easily accessible (easy to follow)
- Should be free from grammar and typographical errors
- References should have all details, such as conference/journal name, volume number etc.

The End