DATT 2050 W 3.0
Media Signal Processing
Winter 2024

Lecture 1: Course Introduction
Wednesday, January 10, 2024

Land Acknowledgment

- We recognize that many Indigenous nations have longstanding relationships with the territories upon which York University campuses are located that precede the establishment of York University. York University acknowledges its presence on the traditional territory of many Indigenous Nations. The area known as Tkaronto has been care taken by the Anishinabek Nation, the Haudenosaunee Confederacy, the Huron-Wendat, and the Métis. It is now home to many Indigenous Peoples. We acknowledge the current treaty holders, the Mississaugas of the Credit First Nation. This territory is subject of the Dish with One Spoon Wampum Belt Covenant, an agreement to peaceably share and care for the Great Lakes region.

- Zoom has erected its headquarters in San Jose, CA, while Skype has erected one key arm of its operations in Palo Alto, CA. This is the traditional territory of the Muwekma Ohlone tribal nation. Current members of this nation are direct descendants of the many missionised tribal groups from across the region. We, who are able to connect with each other via Zoom or Skype, are deeply indebted to the Muwekma Ohlone people, as the lands and waters they continue to steward now support the people, pipelines, and technologies that carry our breaths, images, and words across vast distances to others.

- As we engage online, we personally acknowledge the debt we have incurred and that is amassing each time we meet online. We are all indebted to those peoples and communities whose waters and lands have been poisoned as a result of the extraction of metals and rare-earth elements required to fabricate the machinery through which we speak to, hear from, and view each other. We are indebted to those peoples whose working lives, youth and vitality have been spent in unsafe spaces and intolerable conditions, so that so many citizens of the so-called developed world might have easy access to these and related devices. As we encounter each other each day through our email accounts, our messaging apps, our virtual meeting rooms and chat rooms, let us strive to remain mindful of the incalculable debt we owe.

- Many thanks to Professor Jill Carter for the second and third acknowledgements.

Volunteer Peer Note Sharer

- Student Accessibility Services (SAS) is seeking your assistance to ensure there is note sharing support for our students.

- We ask for volunteers to provide copies of their notes on our confidential note-sharing website from the beginning to the end of the term for the use of a student or students who are registered with SAS.

- SAS will be pleased to provide the volunteer with a letter of recognition at the end of the course stating that they provided essential note sharing support to students with disabilities in the York University community.

- We kindly request the assistance of the faculty or course instructor in making an announcement to the class about our note-sharing program. Specifically, we need to inform the class about the need for notes in this course.

- Volunteer Instructions:

  - <u>Click on the link here</u>.

  - Click on the 'Volunteer Peer Note Sharing Services' button.

  - Click on 'Register Online'

  - Log in with your Passport York ID.

Course format

- Lectures will be held in person in VH D. Slides and Max patches will be posted.

- Labs will be held in person in ACW 103.

- eClass.yorku.ca will be the central location for class materials.

- Discord will be used for discussion about the course.

What is a signal?

- A continuous function in time (i.e. a series of numbers)

- Analog and digital signals are representations of analog physical quantities
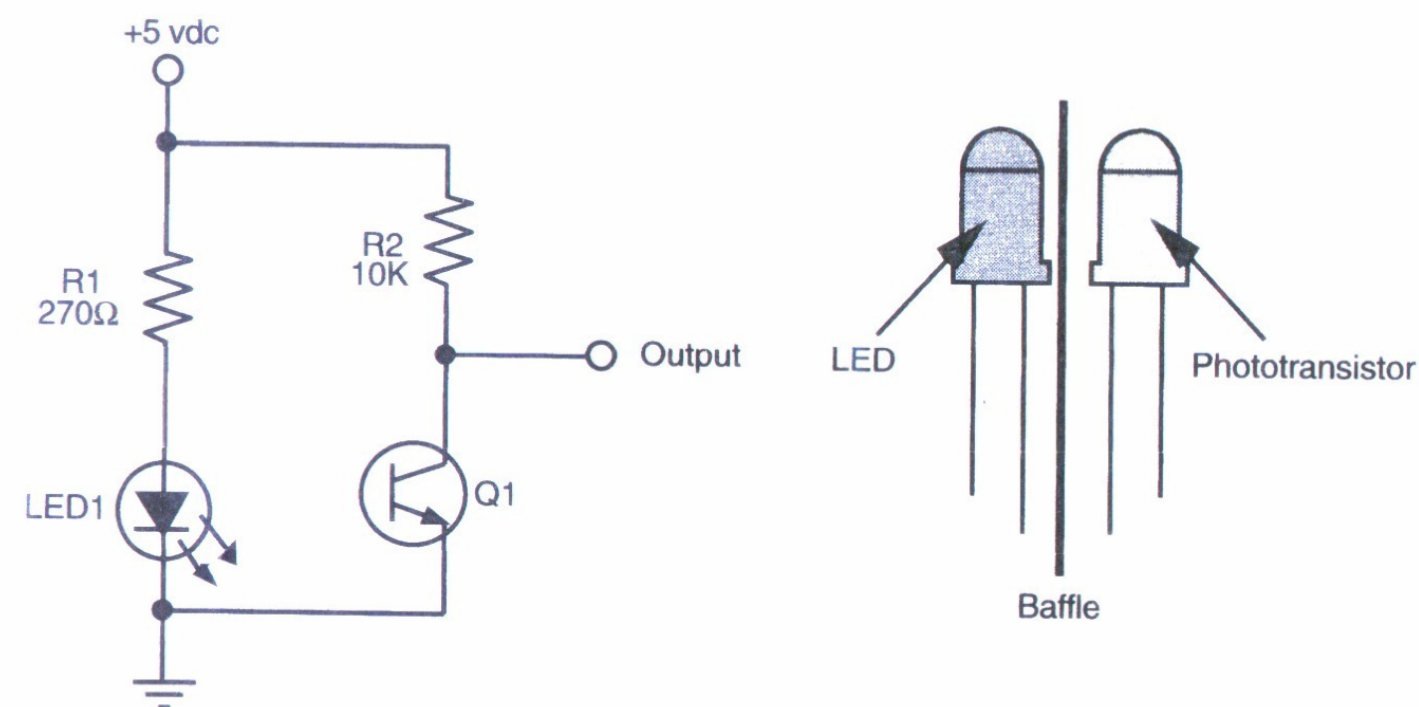
The basic design of the infrared proximity sensor.
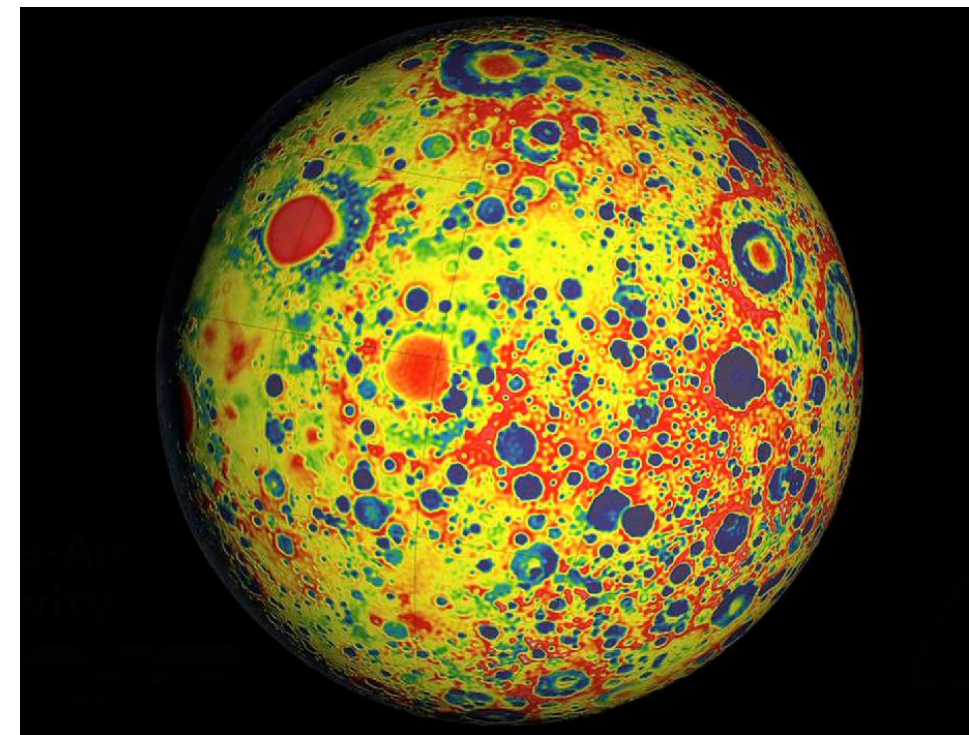
Digital Signal Processing

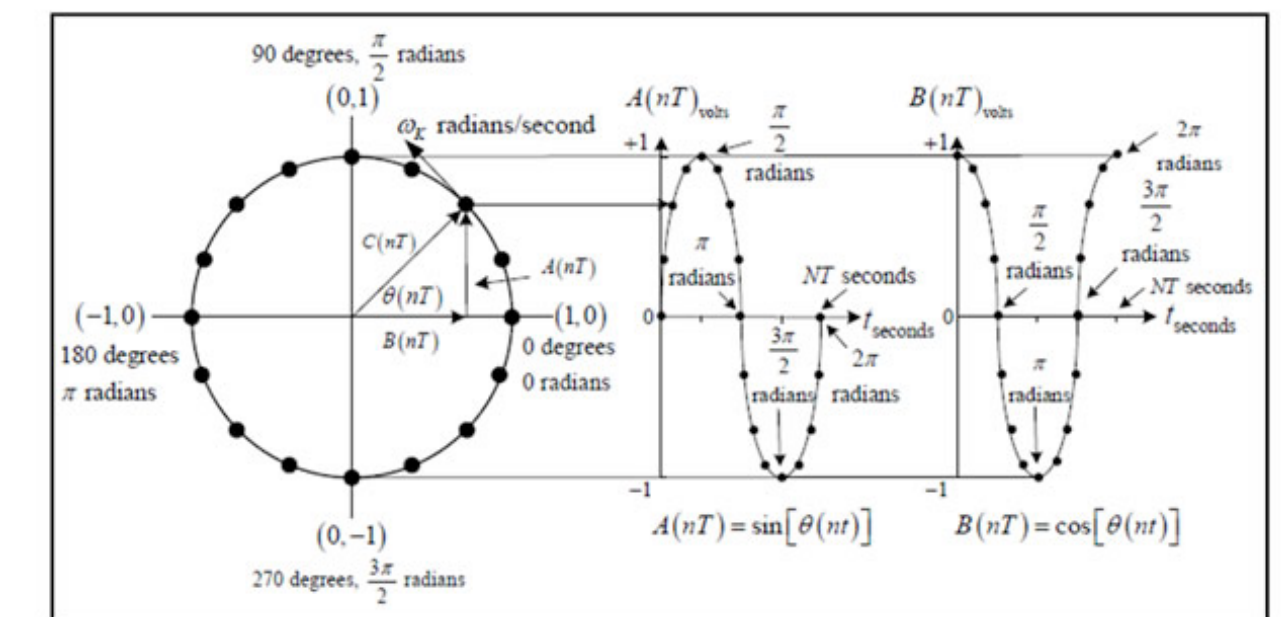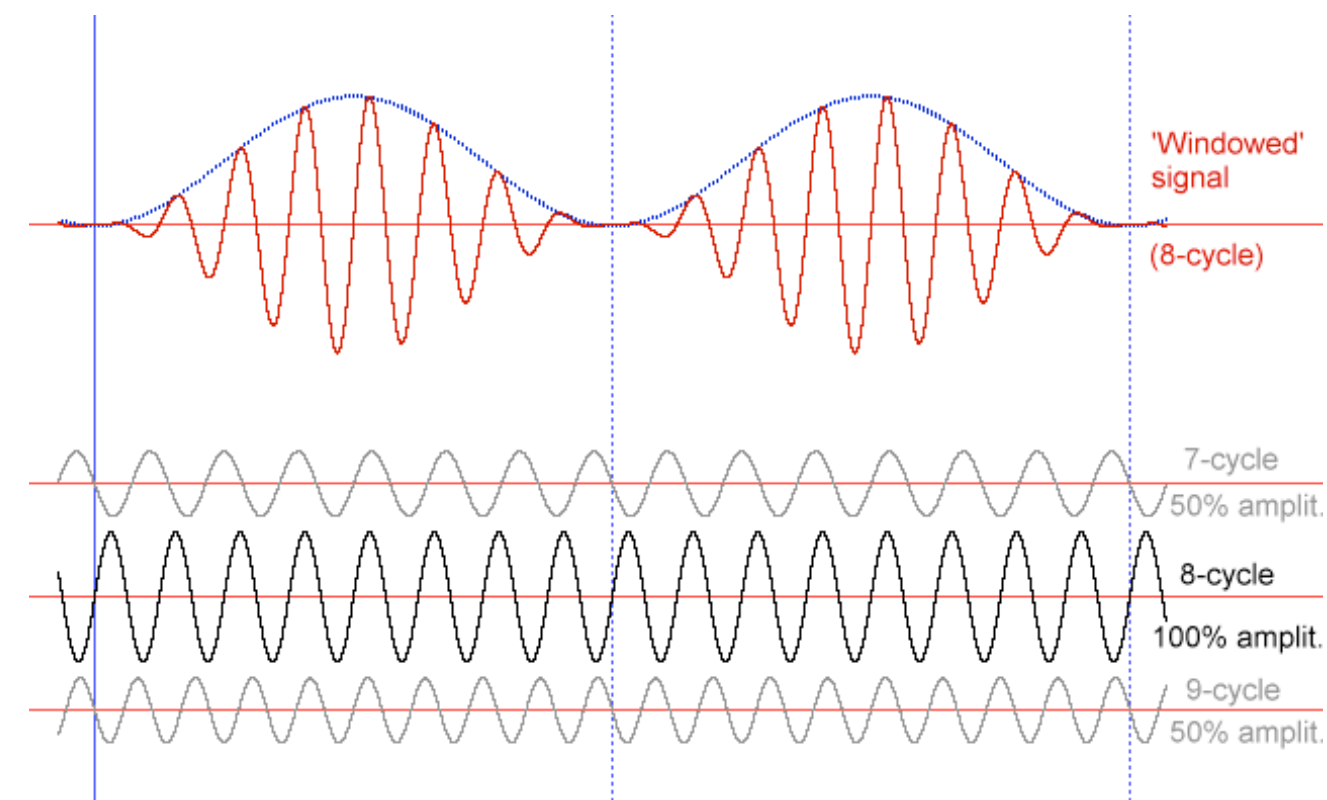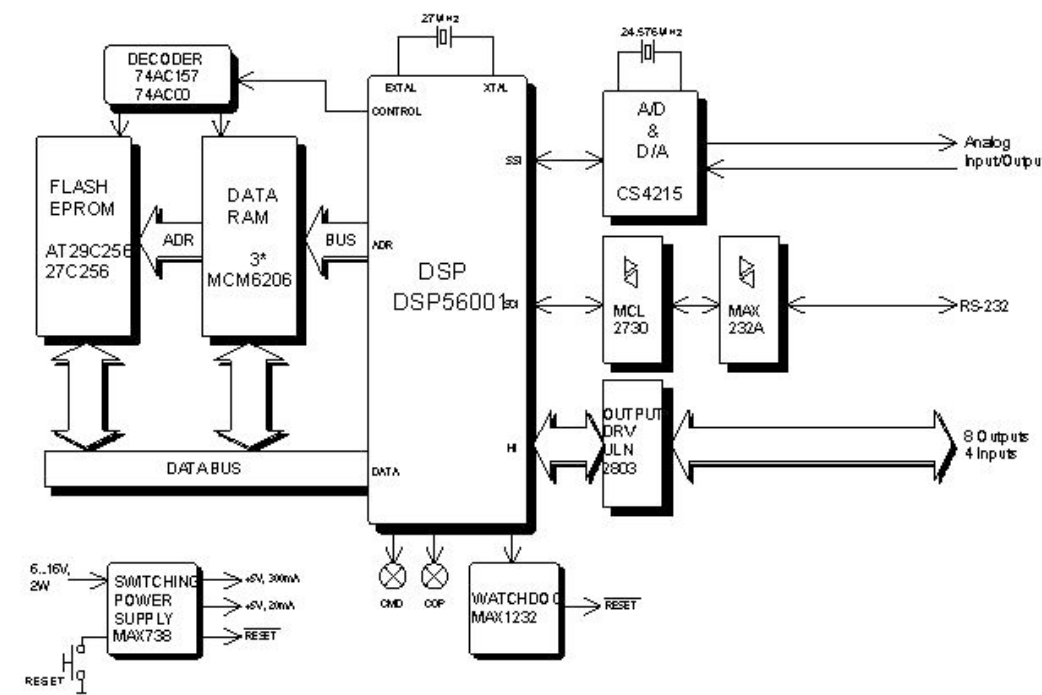- generating, analyzing and/or modifying streams of numbers with algorithms

Figure 1.1 Unit circle

What will we do in this course?

- Explore the foundations of media signal processing

- Understand the fundamentals of human perception

- Gain an understanding of digital signal processing techniques

- Apply knowledge of digital signal processing techniques, and its historical and cultural use in the creation of art-based studies and exercises

- Expand knowledge and skills through Max

Preliminary Schedule

Week	Topic
1	Course Introduction, Project #1
2	Understanding colour, and sound; Multichannel sound synthesis; mgraphics II
3	Timing, structure and recording a patch
4	Introduction to particle systems
5	Particle systems II and sound analysis
	Reading week
6	Particle systems III
7	Maticies for 3D
8	More 3D, Modulation and cross modal transformation
9	3D materials, lighting and cameras, sonification
10	Spatial audio and Gen
11	GL, blend and layer
12	Course wrap-up and final concert

Assessment

- 4 Projects 80%

- 2 Written Analyses 15%

- Lab attendance 15%

Assessment

- Feb. 02   Project 1: *Sixty Thousand Equals One* (20%) - week 4

- Feb. 16   Analysis 1 (10%) - week 6

- Feb. 29   Project 2: *Particulations* (20%) - week 8

- Mar. 16   Analysis 2 (10%) - week 9

- Mar. 23   Project 3: *Oscillations* (20%) - week 10

- Mar. 08   Project 4: *Integrations* Concert (20%) - week 12

Projects 80%

- Four projects will be given at fairly regular intervals throughout the course. Projects are evaluated on the following criteria:

1. The execution of the concept: How well instructions were followed and the goals of the project are met.

2. Aesthetic quality: A consistent, clear and well-articulated composition based on the constraints given in the project and framed by the readings and lectures.

3. Technical achievement: A reasonable technical extension of the project, showing an ability to comprehend and be creative beyond what is demonstrated in the lab.

Final Project : Integrations

- Will be realized in Max.

- Is a group project.

- All projects will be performed at public formal concerts during lab times on Monday, April 8.

- Projects from this course will be considered for the Digital Media Showcase in April.

Readings

- Assigned readings are due at the beginning of the lecture.

- Readings will be given in the form of short selections from books and articles.

- Readings will be provided electronically.

- Readings will inform your work for assignments and the final project.

Labs

- All labs are on Fridays

- A mouse is highly recommended for Max patching!

- These are hands on sessions to explore materials and concepts introduced in lectures

- A limited time will be sometimes be available to work on projects but you are expected to do the majority of work on your projects outside of class time

Teaching team

- Don Sinclair, dws@yorku.ca, appointments by request, www.yorku.ca/dws

- Marcus Gordon, magfoto@yorku.ca, appointments by request.

- Michael Palumbo, info@palumbomichael.com, appointments by request.

- Don Sinclair will be teaching Lab 3, Michael Palumbo will teach labs 1 and 2, and Marcus Gordon will teach Lab 4.

eClass site

- eclass.yorku.ca

- Discord

- Project #1

Max

- last year's subscription should have expired

- you should have received a new one

MGraphics

- jit.mgraphics supports 2D vector graphics with the MGraphics API

- Works with specific matrix dimensions

- jit.mgraphics takes and processes drawing commands

- https://docs.cycling74.com/max8/refpages/jit.mgraphics?q=mgraphics

MGraphics

- We will work in absolute mode where position in x,y is a reference to pixel location

- jit.mgraphics gets instantiated with pixel dimensions

- 0, 0 is in the upper left

MGraphics

(0, 0)

- jit.mgraphics 1920 1080

(1919, 1079)

jit.mgraphics

- Needs to have a bang in the left inlet to output

- Produces a 4 plane character matrix of the instantiated dimensions

jit.mgraphics

- There are many types of commands

- The concept of a path (a series of drawing instructions) allows simple and compound shapes to be created

jit.mgraphics

- fundamental drawing commands

  - move_to x y

  - line_to x y

  - rectangle x y w h

  - ellipse x y w h

  - arc xc yc r a1 a2

  - paint

jit.mgraphics

- fundamental modifier commands

  - set_line_width w

  - set_source_rgb r g b

jit.mgraphics

- Drawing the path

  - stroke

  - fill

jit.mgraphics

- Help patch

  - Note reset elements

jit.mgraphics

- Examples

- (Note patch settings)

A Very Simple Synth

- The process:

  - Initiate with a frequency

  - Output the wave at that frequency

  - Modulate the amplitude of the output

  - Output the values through a digital to analogue converter

A Very Simple Synth

- The most elemental oscillator (more on why next week): cycle~

- Generates a periodic waveform that is one cycle of a cosine function (0-2PI)

- Outputs values between -1. And 1.

- Input is cycles per second (Hz)

A Very Simple Synth

- Values between -1. And 1. are maximum values for digital to analogue conversion

- Multiplying these values by a number between .0 and 1. Will change the volume of the output

- Using series of linear functions allows us to shape the sound.

A Very Simple Synth

- Examples

Lab for Week 1

- Become reacquainted with Max

- Work with jit.mgraphics

- Create a simple synthsizer

- Combine graphics and sound

Before Friday's Lab

- Think about the inspiration/motivation for Project #1

- Make something in Max with jit.mgraphics and foundational oscillators

- Read Max reference: How Digital Audio Works https://docs.cycling74.com/max8/tutorials/02_mspdigitalaudio

For next week

- Think about the inspiration/motivation for Project #1

- Make something in Max with jit.mgraphics and synthesize sound with foundational oscillators

- Read Max reference: How Digital Audio Works https://docs.cycling74.com/max8/tutorials/02_mspdigitalaudio