CPSC 314
Computer Graphics

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Projection contd…

Brief review for midterm

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Today

- Announcements
- Some practice for midterm
- Cameras and projections (Chapter 10 of text)
  - Pinhole camera model
  - Projection in homogeneous coordinates
  - Distinguish between
    - Eye coordinates
    - Clip coordinates
    - Normalized device coordinates (ndc)

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vancouver
SIGGRAPH2014
The 41st International Conference and Exhibition on Computer Graphics and Interactive Techniques

- Consider becoming a student volunteer
- Lots of benefits, including full conference registration
- Deadline: Feb 9 (firm)
- Details and application here:
  - http://s2014.siggraph.org/volunteers/student-volunteers

Assignment Grading

- Sign up for Assignment 2 face-to-face grading before Monday Feb 10. We have only a few days to finish before reading week!
- Please do not miss your face-to-face grading time! If you need to reschedule, do it at least a day in advance.
- Policy for assignments 2-4: unless you have a documented excuse, 15% deduction from the max grade for that assignment.

Assignment Spotlight

- Many of you implemented really cool things for the "creative license" part! Nice work!
- We plan to demo some of the most interesting examples in class. Due to time constraints, we will only pick a small sample.
- We will contact you to get your permission to include your work in the spotlight session. It's totally optional, and does not affect your grade.
- Assignment 1 spotlight on Feb 12, in class.

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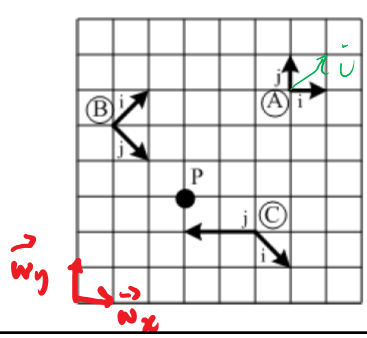
Transformation Practice 1

- Interpreting coordinate frames. Here is the picture for your Homework (L10). Write down the ~~4x4~~ 3x3 (in 2D!) matrices that define one frame in terms of another.

Eg. $\vec{a} = \vec{w}\,\bar{A}$ or $\vec{a} = \vec{b}\,\bar{S}$

Note: $i \equiv x$, $j \equiv y$



$$\bar{A} = \begin{bmatrix} 1 & 0 & 6 \\ 0 & 1 & 6 \\ 0 & 0 & 1 \end{bmatrix}$$

if i is moved as shown in green:

$$A = \begin{bmatrix} 1 & 0 & 6 \\ 1 & 1 & 6 \\ 0 & 0 & 1 \end{bmatrix}$$

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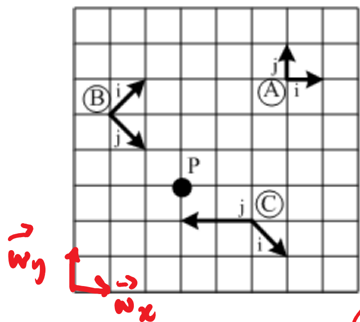
C^3: Interpreting Frames

- What is the matrix $\underline{\bar{C}}$, in $\breve{C} = \breve{a}\,\underline{\bar{C}}$

Note: $i \equiv x$, $j \equiv y$



(a) $\begin{bmatrix} 0 & -1 & -4 \\ -1/2 & -1/2 & -2.5 \\ 0 & 0 & 1 \end{bmatrix}$

(b) $\begin{bmatrix} 1/\sqrt{2} & -1 & -1 \\ -1/\sqrt{2} & 0 & -4 \\ 0 & 0 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 1 & -2 & -1 \\ -1 & 0 & -4 \\ 0 & 0 & 1 \end{bmatrix}$

(d) $\begin{bmatrix} 0 & -1/2 & 1 \\ -1 & -1/2 & 4 \\ 0 & 0 & 1 \end{bmatrix}$

(e) None of the above

Transformation Practice 2

- Section 5.2 is very important, since it uses transformations in the most common ways in computer graphics, e.g., different versions of doMtoOwrtA (see p. 46 of book, and L12 class notes). Make sure you understand this section.
- Assignment 2 is good practice for this, esp. moving the head.

Viewing

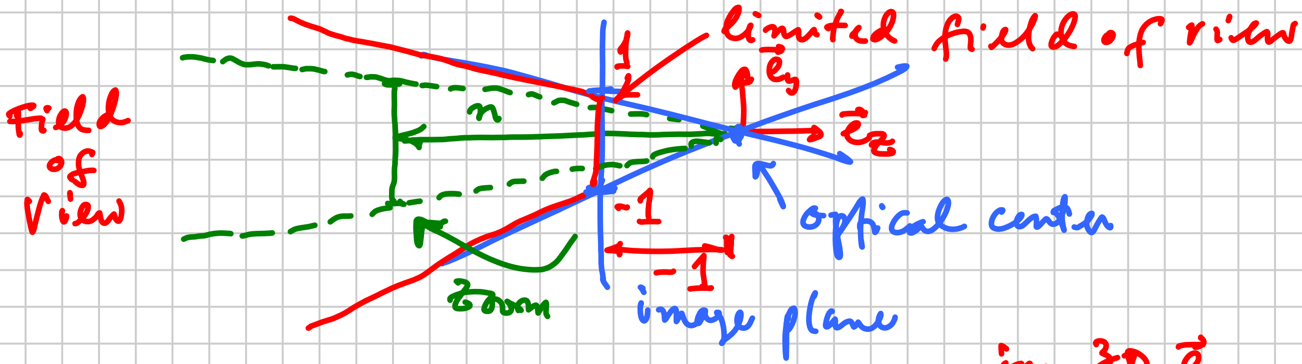
Note Title 2014-02-05

How to simulate a camera

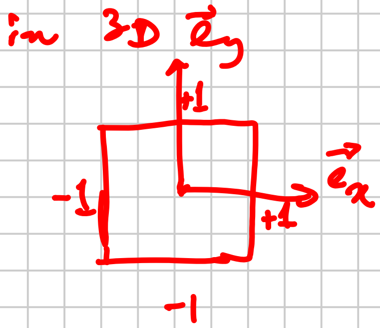
Last class: pinhole

Slightly more realistic cameras.

- Lens. Eg. focus effects. Not in this course
- Finite Field-of-View



"Canonical Square"



Zoom moves image plane to $z_e = n$

Repeating derivation similar to last class

$$\begin{pmatrix} x_c \\ y_c \\ z_c \\ w_c \end{pmatrix} = \begin{pmatrix} x \\ y \\ z \\ z/n \end{pmatrix}$$

eg $x \rightarrow \frac{x}{z} \cdot n$

So the Projection matrix becomes

$$P = \left[\begin{array}{ccc|c} 1 & & & 0 \\ & 1 & & 0 \\ & & 1 & 0 \\ \hline 0 & 0 & 1/n & 0 \end{array}\right]$$