24-681   COMPUTER-AIDED DESIGN   Spring 16

Carnegie Mellon University

PROBLEM SET 6

Due: **2/25/2016 (Thu) 3:00PM @ DH A302**
Issued: 2/16/2016 (Tue)
Weight: 3% of total grade
Note: * **Attach the last page of the problem set as the cover page of your paper.**

PS6-2   'Zebra' reflection pattern generation

In this problem, you are going to write a computer code that generates a zebra reflection pattern given:
(1) a geometry file that represents a polygonal surface
(2) a viewpoint
(3) a zebra pattern plane
(4) a zebra pattern direction, line thickness, and line spacing

The automobile industry uses the zebra reflection pattern intensively, both in a physical prototyping and computer simulation, to evaluate the style design of a car. The two pictures below show computer simulated images of a zebra pattern. Also shown are zebra reflection patterns of a bi-cubic polynomial surface and a scanned face.
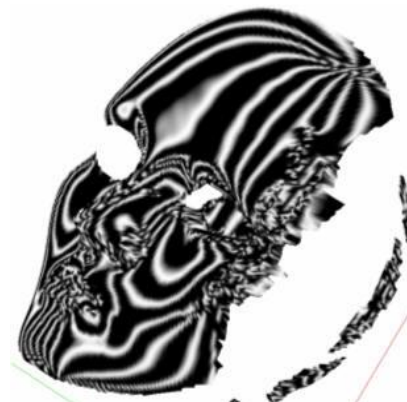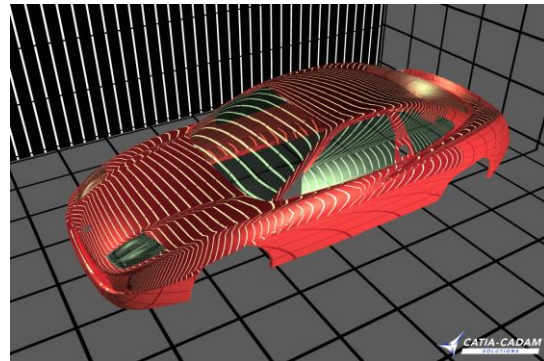
Write a computer program that takes as input:
(1) a data file of a polygonal surface in an ASCII format,
(2) a viewpoint position, $\mathbf{e}$,
(3) three vectors that define a zebra board plane, $\mathbf{p}_0$, $\mathbf{a}$, and $\mathbf{b}$

  ($\mathbf{a}$ and $\mathbf{b}$ are unit orthogonal vectors that specify the direction of zebra
  pattern), and
(4) a line thickness, d_w, and a line spacing, d_b

and generates a VRML file that shows the polygonal surface with a zebra
reflection pattern. Apply your code to your face data and the three polygonal
surface files posted on the class web: surface.txt, face.txt, car-panel1.txt, car-
panel2.txt.

In your hand-in directory on AFS, make a new directory called ps6 (in lower
case), and hand in:
  - source code
  - executable
  - output VRML files
 - "readme.txt" file that explains how to run your code

Also hand in a printout of the following:
  - explanation of your method (describe how to determine the color
    of each node using $\mathbf{p}_{ij}$, $\mathbf{e}$, $\mathbf{p}_0$, $\mathbf{a}$, $\mathbf{b}$, d_w, and d_b)
  - source code
  - a screen shot of each of the polygonal surface with a zebra reflection pattern
  - readme.txt file
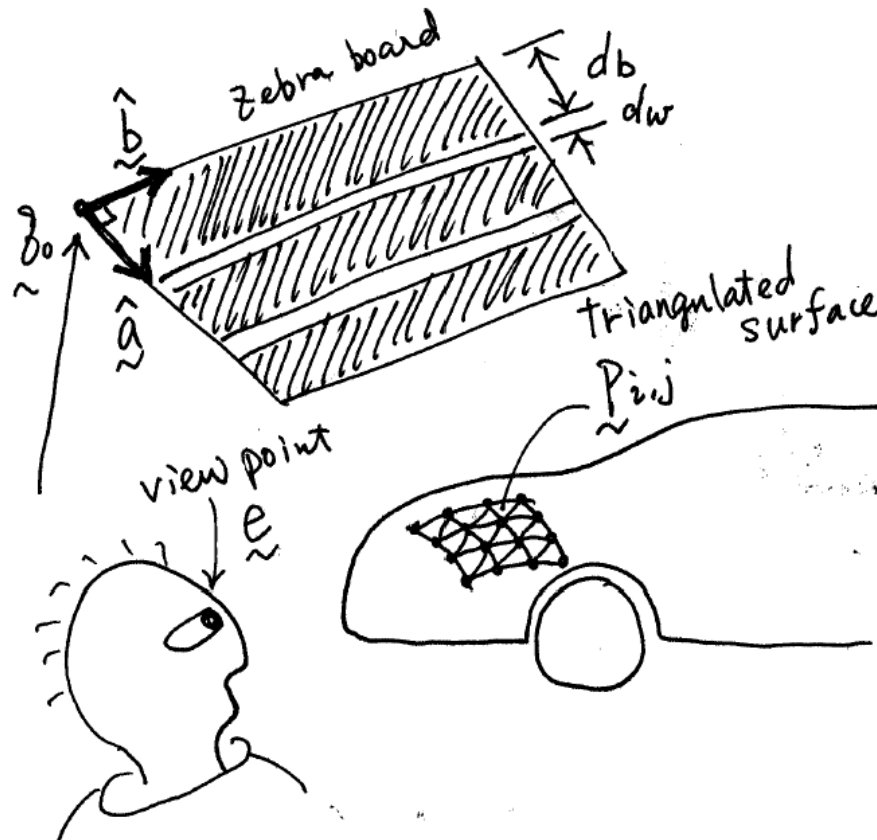
fBonus Points (10 pts)

Generate a zebra reflection pattern for your own face geometry data and submit the output VRML file to AFS and submit a printout of a screen shot of the polygonal surface with a zebra reflection pattern.
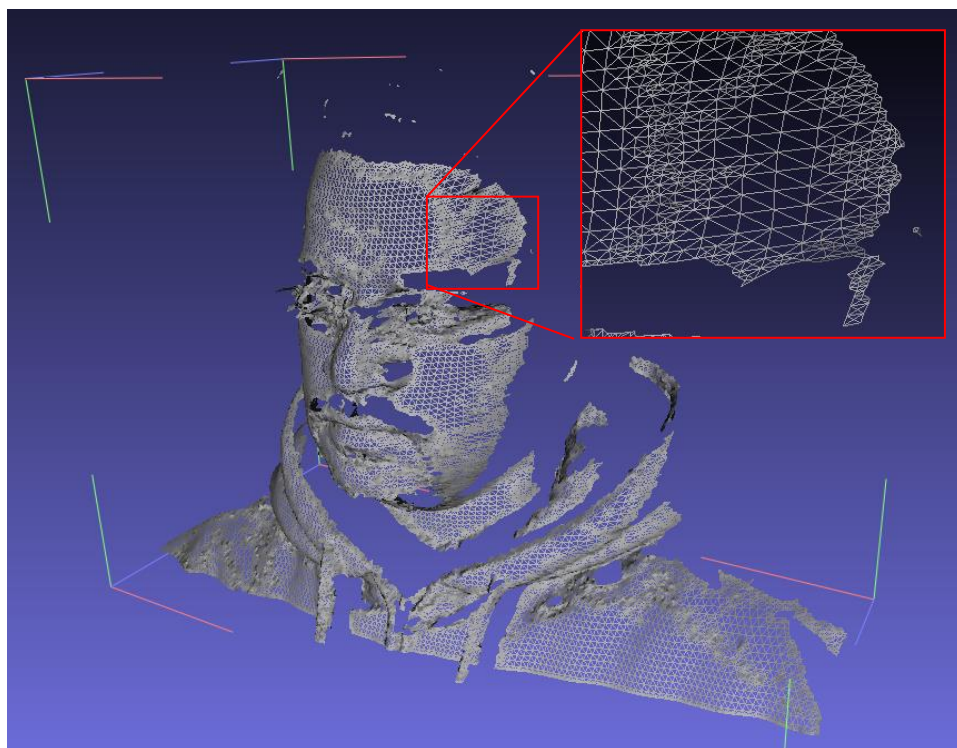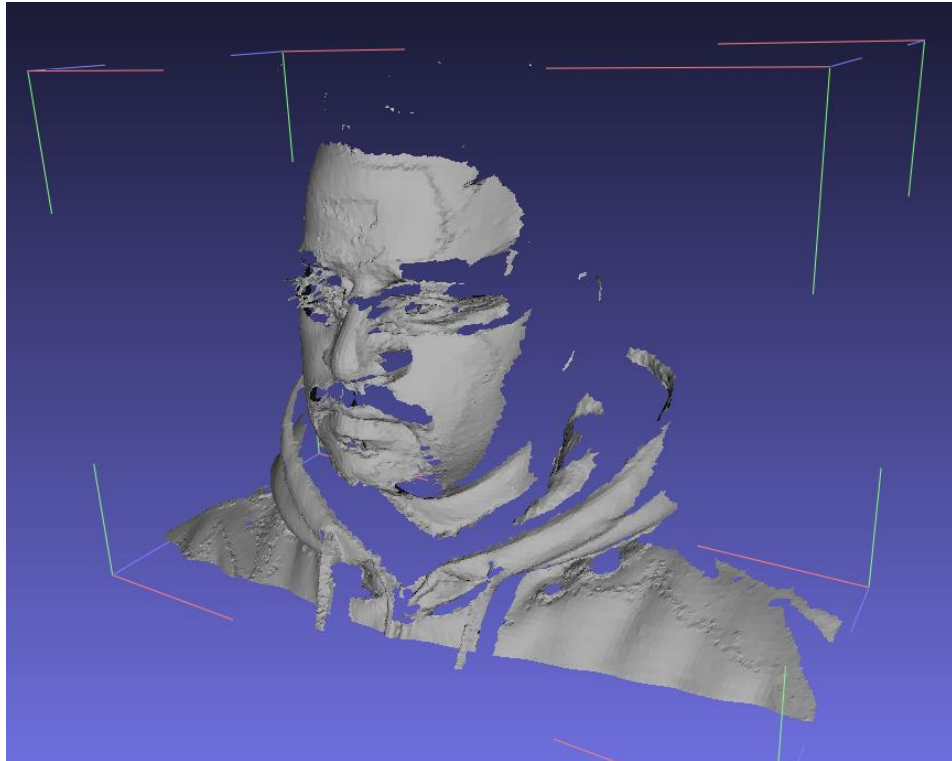
PS6

The first letter of _____   _____
your LAST name   First Name   Last Name

How many hours did you spend to complete this problem set?

_____ Hour(s)

How many no-penalty late days do you want to use for this problem set?

_____ Day(s)

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