CSE 587 Project:
Building an Information Kiosk

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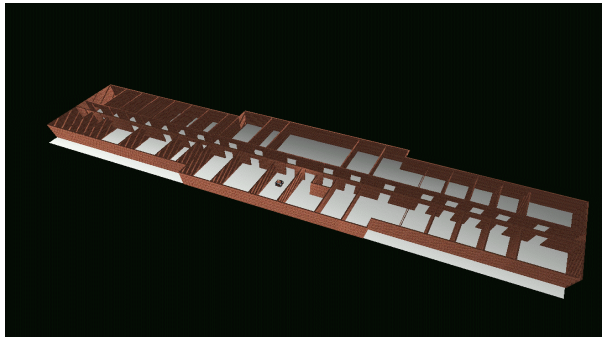


OUTLINE

- Introduction
- Motivation
- Content creation
- Data Organization
- Input and Display
- Photorealism
- Conclusion

Introduction

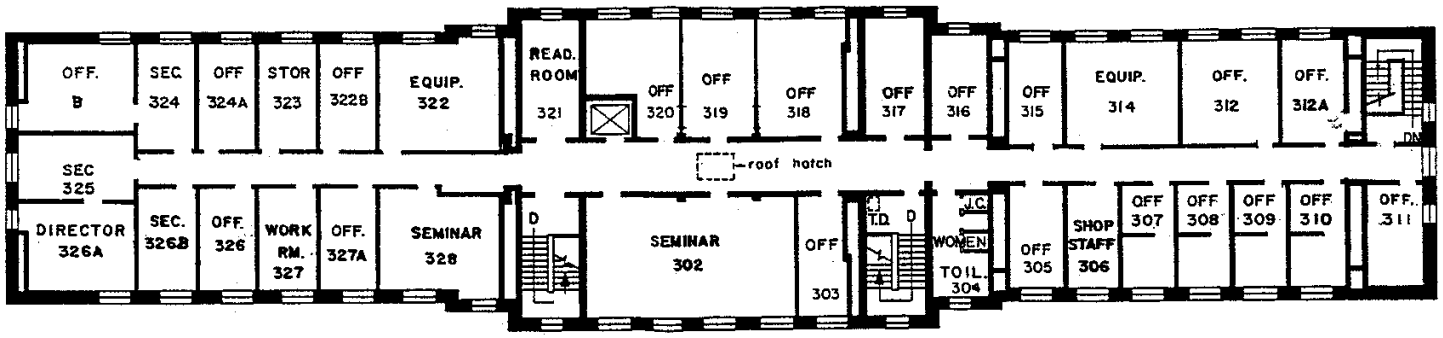
- **Aim:** To build a working *kiosk* depicting information about the Department of Computer Science and Engineering.
- The *kiosk* will display information provided in XML format in 3D along with speech.
- The *kiosk* will have support for speech and gesture recognition along with the conventional touch-screen based interaction.
- The above input modalities will be tightly integrated with the display module.

Motivation

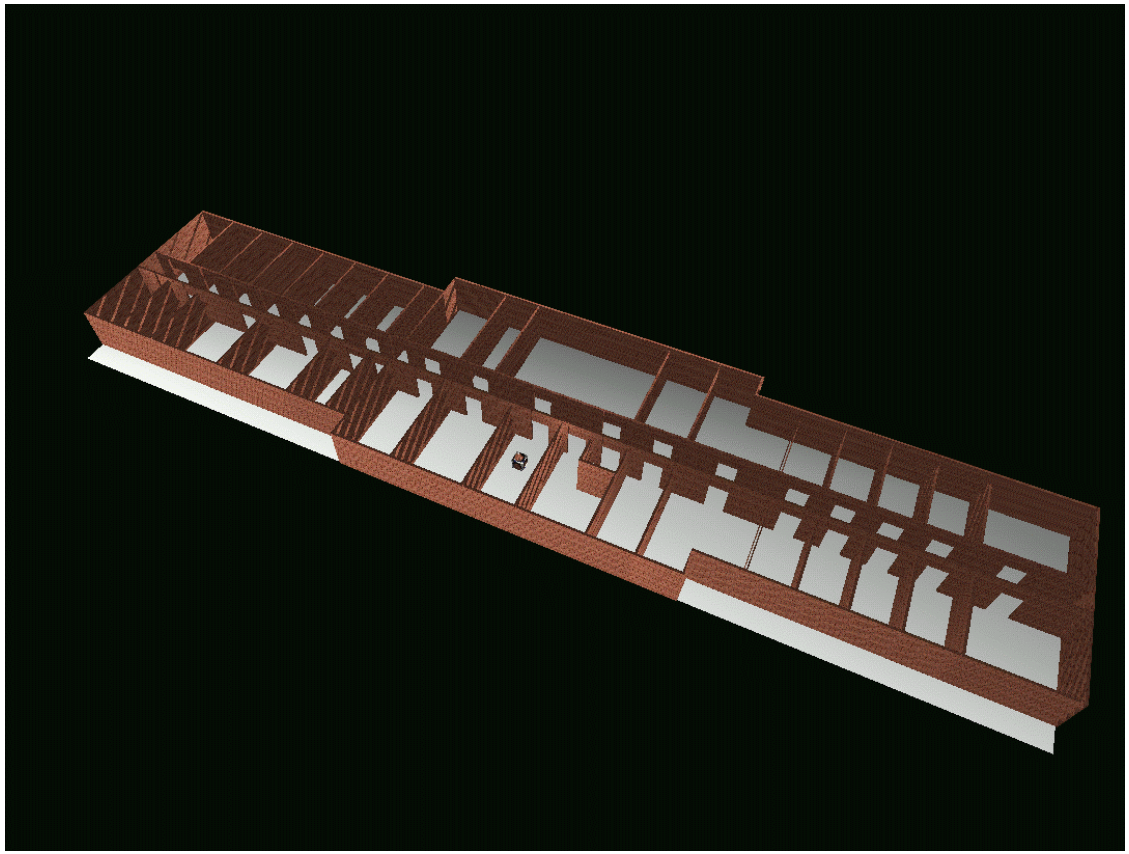
- A *kiosk* provides a very intuitive interface for any user seeking information about the specific content it is depicting.
- Most *kiosks* available today have a 2D display and a touch-screen based interface.
- Speech and gesture recognition provide an even more intuitive and easy-to-use interface for the unfamiliar user.
- And the Computer Vision group here was much in need for such a kiosk ☺

Content Creation

- An engineering drawing depicting the plan of the 3rd floor of Pond Lab was obtained from the archives of Pattee Library.
- It was manually converted into a digital equivalent which is stored in a file used by the *kiosk* program.
- Objects were added in the rooms as seen appropriate



Content Creation



The view of the 3rd floor as seen in the pop-up mode depicting the current location of the user

OpenGL Program

- The main program was written in C++ using the OpenGL API for graphics. The entire program consisted of approximately 2600 lines.
- GLUT was used with OpenGL for the windowing system to make the program platform independent. We have run it successfully on Linux, Solaris and MS Windows.
- Separate subroutines have been written to be able to communicate with the various input interfaces.
- The program tracks the user's movement and provides information about any room in real-time.

Data Organization

- The input file was provided in XML format.
- This made it extremely easy to structure the content data.
- Querying of data became extremely simple.
- We were able to dynamically query the XML data as the users traverse through the maze, and provide them with real-time information about the room.

Display of Objects

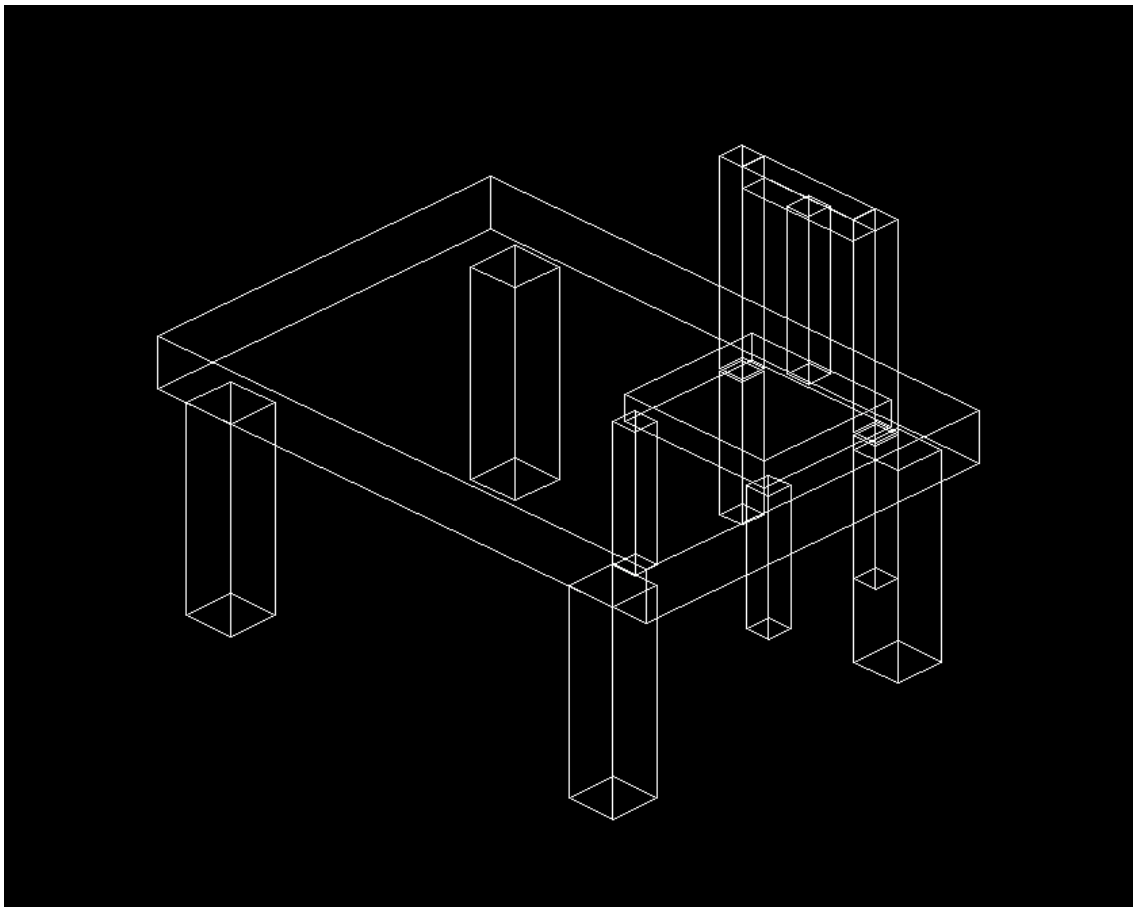
Display of Objects consisted of three tasks:

- Making a 3-D Model of Objects.
- Specifying Lightning Information.
- Giving proper Texture to the objects in the room

Chronology of making an Object:

- Wire Frame Model
- Ensuring consistency of 3-D view from every perspective
- Giving them an Aesthetic Look

Display of Objects



A 3D wireframe model of a table and chair

Display of Objects

A 3D textured model of a table and chair

Lightning Model

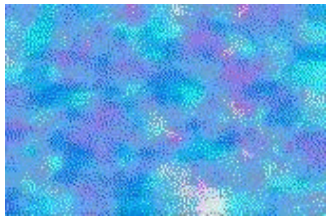
Specifying the Lightning Model:

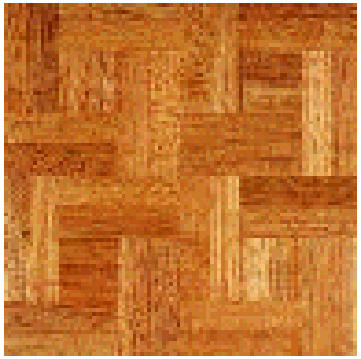
- Deciding the number of light sources and their positions
- Specifying the kind of light
- Ensuring all portions of the object are suitably illuminated
- Giving the reflective and diffusive properties of the objects
- Providing normal to surface vectors to ensure proper lightning

Textures

- Searching for proper textures for the objects, walls etc.
- Ensuring mapping of the texture on one surface does not stretch to an adjacent surface of the same object
- Specifying the way the texture is to be mapped on the surface, i.e., tiled or stretched
- Seeing that the texture mapped looks good with the surrounding environment

Textures

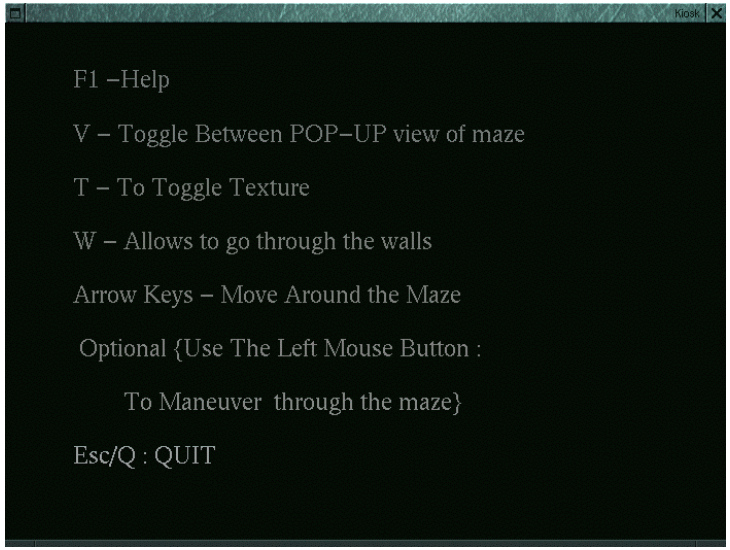




Sample texture files

Help Menu

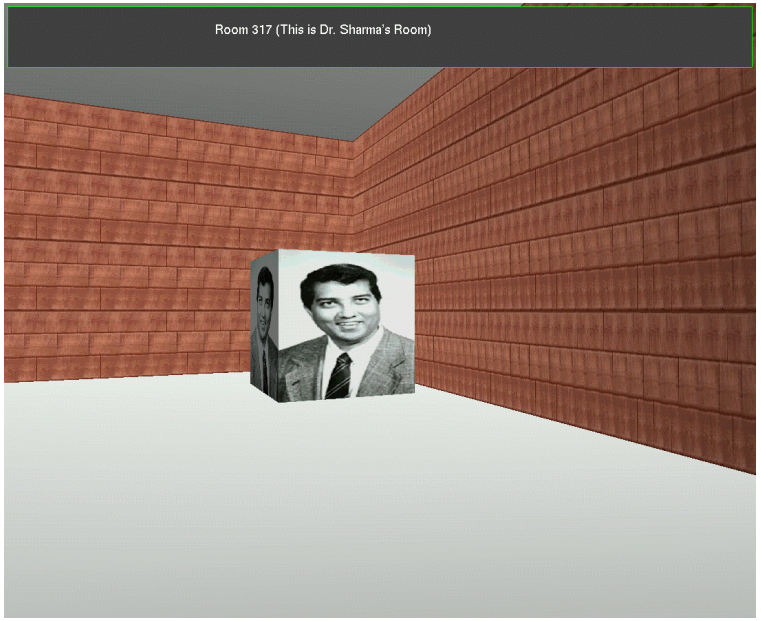
- Gives information to the user about the various choices the kiosk provides in relation to the display and the inputs
- Gives a Pop up display on the touch of a button and then reverts back to the position the user was in as soon as it is closed.



Integration of objects

- Use collision detection to ensure that a person should not go over a chair, table or any such object
- See that the size and placement of the objects is realistic when placed in the actual room.
- Ensure proper lightning of all the portions of the 3-D plan
- Application of proper textures on walls

Final integrated program



Conclusion

- A working demo was made for the *kiosk*.
- The entire project was integrated successfully with the help of the content-creation and XML groups.
- Integration with the other groups (gesture and speech recognition) was not done due to the late arrival of the kiosk and the lack of time remaining.