



Touch Graphics Inc

Progress Report

Perkins School for the Blind Talking Campus Model (TG Project No. 11-106)

Date: 14 June 2011

Introduction

The project calls for creating a new multi-sensory exhibit near the entrance of the new Grousbeck Center for Students and Technology. The exhibit will consist of a touchable campus model mounted to a 36" square pedestal. As users touch the surface of the model, a computer will receive information about the location and intensity of touches. If a touch is strong enough to be obviously intentional, the computer will play a corresponding audio description. Simultaneously, an overhead projector will illuminate the part touched, and will display large font captions of all spoken instructions. A refreshable braille display will be available on a retractable shelf to echo all spoken messages. The system will be programmed to allow for rich human-computer interaction, with various operational modes and ways to obtain information, depending on user preferences and capabilities.



Figure 1: The proposed exhibit (note: buildings shown are placeholders only)

Free exploration vs. structured queries

Users will have two ways to interact with the campus model: they will simply touch any part to

330 West 38 Street Suite 900 . New York, NY USA

www.touchgraphics.com . p: 212-375-6341 . f: 646-452-4211

hear layered information about the element they touched; or, they will carry out more structured inquiries by pressing buttons to access menu options. Free exploration is the default mode, where information about any location is spoken as any user presses any building, road, body of water, or other map element. This information is delivered in three layers: name, description, location. Layer 1, the name, plays whenever a part is touched for the first time, or after no touches have been felt for a five seconds. To access layer 2 (a description of functions carried out there) the user will tap on the same zone again to jump to the next level, or simply continue touching the same part. An additional tap interrupts layer 2 and jumps to layer 3, a short way-finding script that explains the best way to walk to that destination from the model location in Grousbeck Center for Students and Technology. Tapping during layer 3 brings you back to layer 1, the name, and then the cycle starts again.

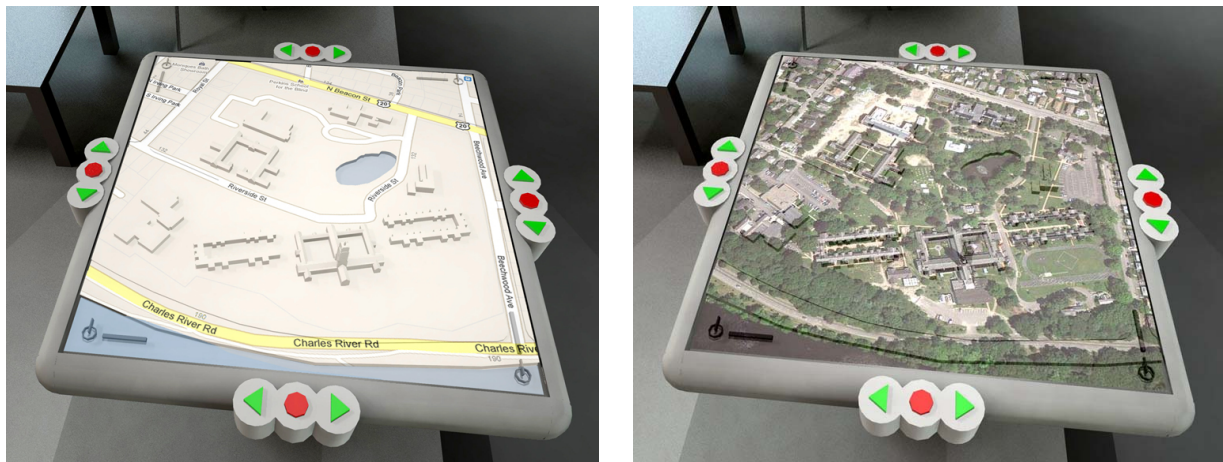


Figure 2 (left): The model illuminated with Google Map data
Figure 3 (right): The model illuminated with Google Satellite imagery

Button Functions

We hope and expect that many users will enjoy exploring the spatial layout of the campus using the interactive audio-tactile model, but prior experiences suggest that a large percentage of potential users will not find the model helpful or interesting, and so it is important to offer other ways to access the same information in non-graphical terms. To this end, we will provide illuminated push buttons for scrolling through menu options that are both spoken and captioned. Buttons are clustered on all four sides to encourage multi-user experiences.

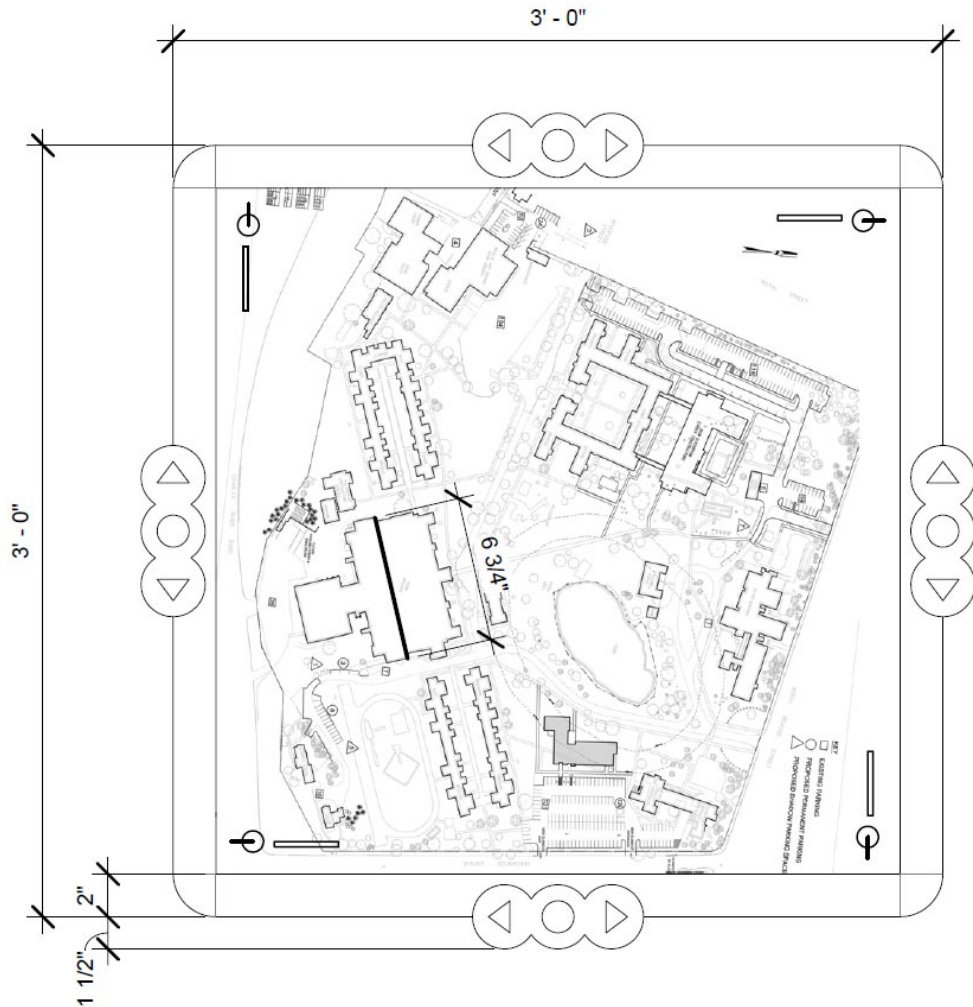


Figure 4: top view of pedestal. Pushbutton controls on four sides permit multi-player games and interactions

The following options are proposed for the menu, accessed by pressing buttons:

- *Perkins School Overview.* Brief description of the campus (location, size, and main features). History of the School and other relevant data.
- *Grousbeck Center Overview.* Brief description of the Center, its functions, layout and relationship to other important places on campus.
- *Index of Places.* An alphabetical listing of all named buildings, streets and other features. The computer coaches them to their destination using spoken, captioned or braille prompts.
- *Settings.* Allows users to change volume, speech rate, and touch sensitivity (the

firmness you have to press the model surface to qualify as an intentional touch). Settings revert to the default levels each time the system resets for a new user.

- *Game*. When this option is selected, players are invited to each touch one side of the model platform. These touches will be detected so that the computer knows how many players and in which positions. Players will answer questions about the campus by touching things and scoring points. If they fail to find something in time, the other players can try to answer the question. The details of this game can be developed in consultation with potential players (students and teachers).

Attract Mode

In the resting state between sessions, the exhibit will issue a pleasing, non-repetitive “attract” sound that will serve to announce its presence and availability for use. Text messages inviting touches will be animated across the surface of the model during the attract phase. As soon as the model is touched, or one of the buttons is pressed, the exhibit will come to life. The user can start interacting right away, or he can wait for instructions. A session, including both map and button interactions, continues until no touches have been detected for one minute, and the exhibit goes back to sleep. In the event that multiple users approach the unit together, it is possible for them all to actively explore and press buttons, and a multi-player interactive exploration game for up to four players can be selected from the Menu (see above).

The touchable model

Each campus building and other structure large enough to include on the model will be 3D printed in solid ABS plastic. Figure 5 shows an example building. This model is about 6.5 inches long and 3 inches tall. It has the general shape of the Howe Building, but very little detail. Using a top-down projector to illuminate the model surface, we will add materials, realistic colors (or bright, high contrast colors to help low vision users), and even smoke curling up from chimneys or a bus rolling by on the road to add visual interest and motion. Therefore, we recommend keeping the model volumes very stripped and simplified to promote good tactile comprehension. Each building will be set into to a contoured site model that will include: water features, roads, and major walls or fences that block travel or that mark an important boundary.

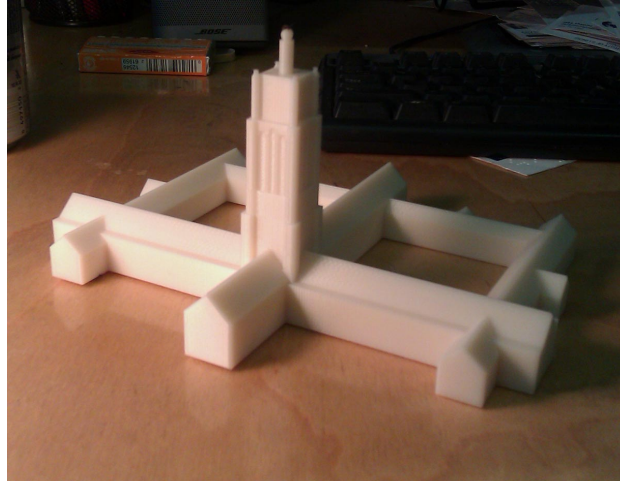


Figure 5: Howe building 3d print

Construction documents

We have begun to develop drawings for specifying materials and appearance of the exhibit cabinetry. These documents are included at the end of this report in a half-sized version. Since our design has not been approved by PSB, these documents should be understood as preliminary and subject to change; however, given the very short time frame for completing the project, it is important to jump in and make rapid progress, even if that means revising things.

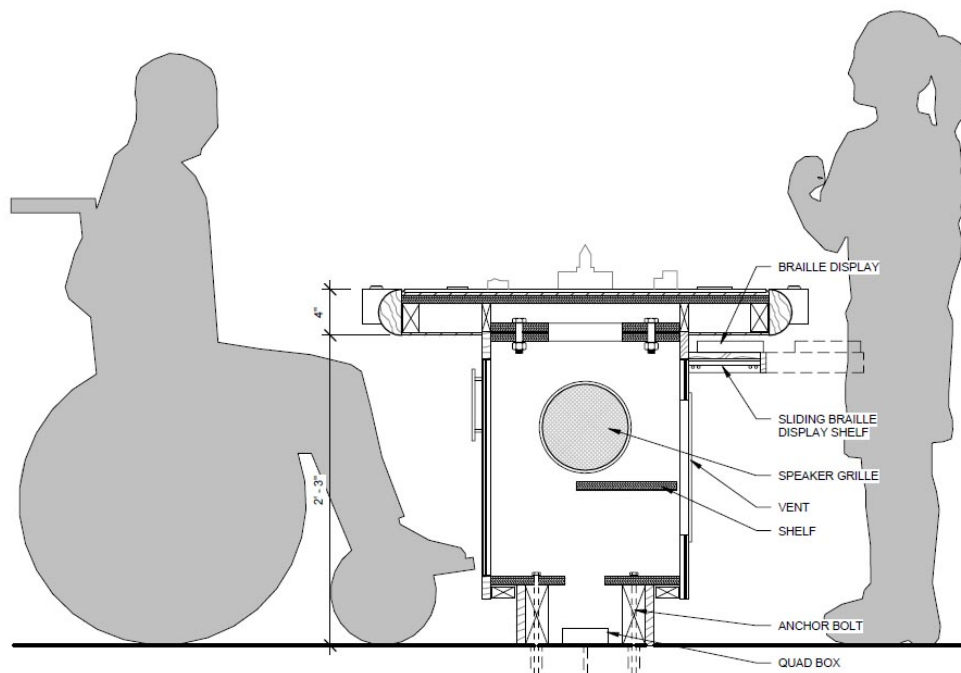


Figure 6: Section through pedestal

Database

All of the information about the physical campus that will be provided by the system through

spoken descriptions, braille, and captions must be assembled, reviewed before the exhibit can open in September. To make it easy for PSB staff to generate this material and revise it as conditions change during the life of this exhibit, we have created a shared on line spreadsheet that can be edited by anyone with permission to do so. The spreadsheet can be accessed by clicking [here](#) (if you are reading this document on line, not in pdf form).