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| HCI - COMP 171 |
| Assignment 10 |
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**Summary of paper**

Link To Paper - <http://dl.acm.org.ezproxy.library.tufts.edu/citation.cfm?id=1375714.1375754&coll=DL&dl=ACM&CFID=99611400&CFTOKEN=47503798>

This paper “Surface Fusion: Unobtrusive Tracking of Everyday Object in Tangible User interface” discusses an approach that combines RFID technology and image processing to support tangible interactions with everyday objects on an interactive surface. RFID technology reads information tag under each physical object placed on the surface whereas Computer vision detects movement of these objects such as the addition, removal or changes on the surface using cameras. By synchronizing these two sensing techniques, this system can detect changes in the image as events in the RFID data which can be used to get the previous position as well as to identify objects on the surface. In this setup placing an RFID tagged object displays the associated images/information allowing user to add, update or remove this associated information from the object. Addition, removal or movement operation is performed by comparing current frame with the previous frame. The experimental system consists of a rear-projected tabletop system, camera, RFID tagged objects, RFID reader, transmitting and receiving antennas.

This technology provides new opportunities for combining the physical and virtual worlds. The system has its shortcomings in that two objects cannot be added at the same time but it still has potential to be used in a variety of applications.

Including this technology in Restaurant Locator application will make the system simpler, user friendly and also an enjoyable experience. It will allow user to operate restaurant locator from a table top allowing user to manipulate the screens as per their choice.

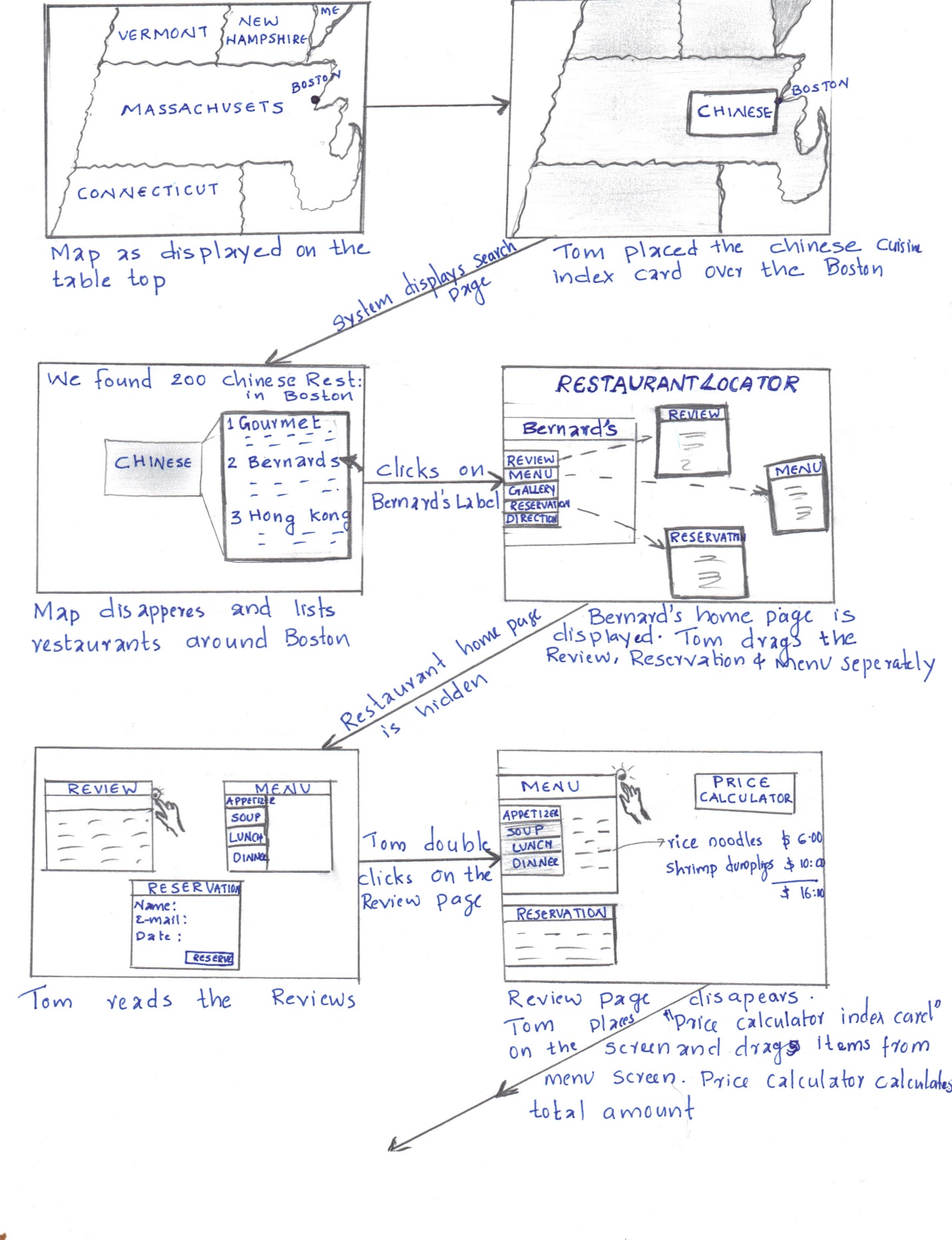
**Storyboard and Discussion**

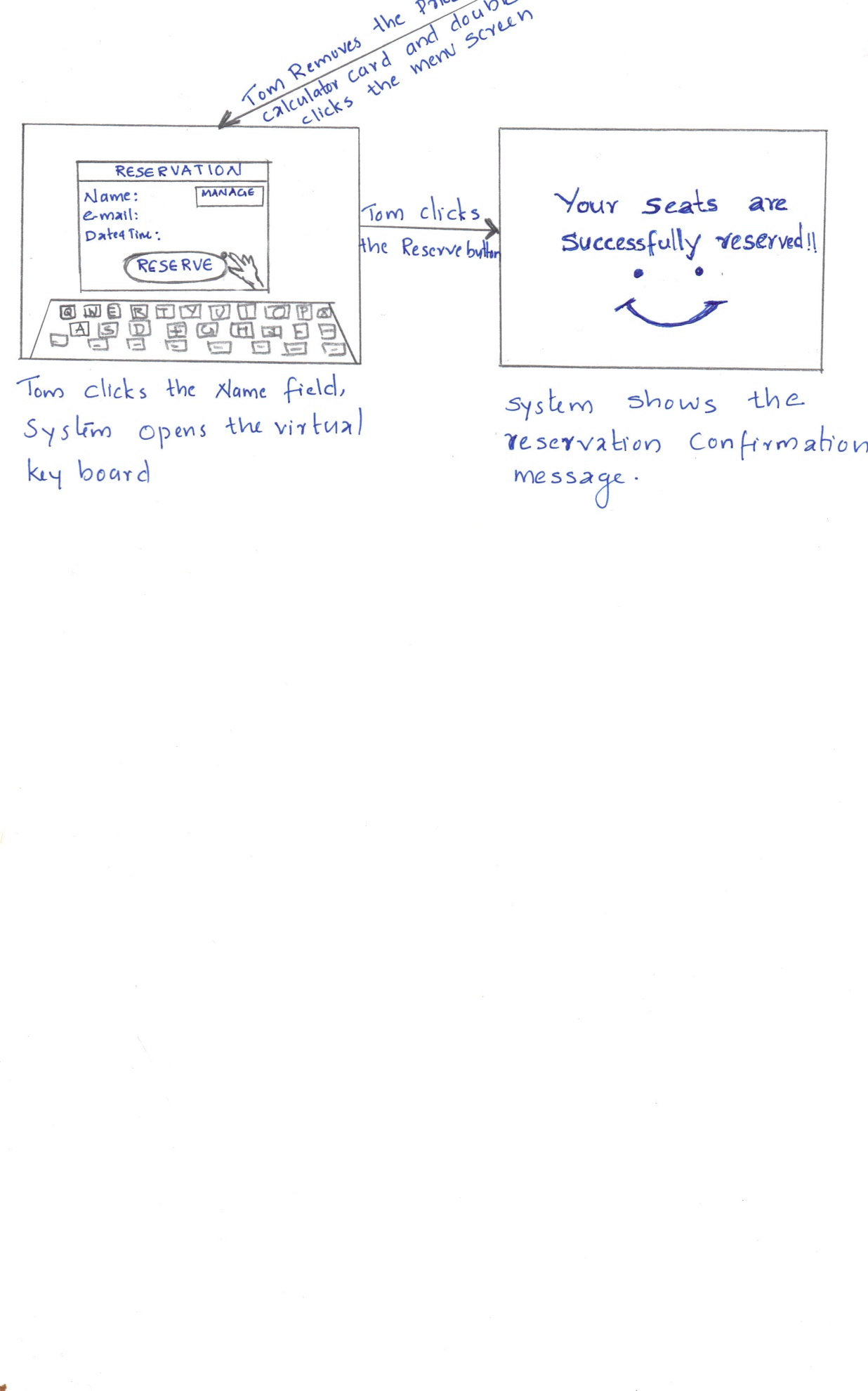
The storyboard is based on the below scenario.

Customer: Tom, 60, Male

**Search a Restaurant check Menu, Review and Reserve a Table:** Tom is retired from Army living in Medford. He wants to eat outside with his wife. He opens restaurant locator application on table top. He places the Chinese cuisine image index paper over Boston on the map displayed on the table top screen. He then selects one Chinese restaurant from the search result screen. From the restaurant home page Tom drags the menu screen, review screen and reservation screen and drops them on the side of the table top. He then scrolls and checks the previous review and menu. He places Price Calculator index card over the table top surface and drags the items from menu screen, Price Calculator now displays the total amount for the items of his choice. Once satisfied he goes ahead and makes a reservation at the restaurant.

**StoryBoard:**





**Discussion:**

After implementing restaurant locator application in the tangible user interface environment user can interact using a table top surface. On opening the Restaurant Locator application the welcome screen will be a map of US where the user can zoom on to the location they want to find a restaurant. After zooming to a particular location user can place the cuisine image index card over it. Cuisine image card will be embedded with a RFID tag. Once the user places the cuisine image the map will disappear from the screen and the system will combine the image as well as the location and will perform a search and will display the search results on the screen. Once the user selects a restaurant link it will lead to the restaurant home page where user will have the option to drag Menu, Review or Directions screens separately on the table top. This will allow user to see different screens simultaneously. After this selection the main screen (restaurant home screen) will hide to the left corner of the table top. If the user needs to see the restaurant home page again he needs to touch on the left corner of the screen. If the user wants to close the screen they just need to double tap the screen. If the user wants to calculate the total price of visiting the restaurant he simply needs to put the Price Calculator index card on the table top. User can simply drag the menu items from menu screen to the price calculator and the system will calculate the total amount and displays it on the screen. Clicking on any of the text fields will open a virtual keyboard using which user can enter any required information and make his reservation.

Below are some pros and cons of this system

Pros:

* It will reduce lot of steps in the current design (Ex: Restaurant locator home screen and search screen will be combined as one screen)
* User can easily manipulate the screen by their hand (Ex: users can zoom in or out, change angle of screen, etc).
* User can multi task at a time (Ex: check menu, review, reservation etc.) it will reduce the time to perform tasks.
* Resultant system will be simple and interactive.

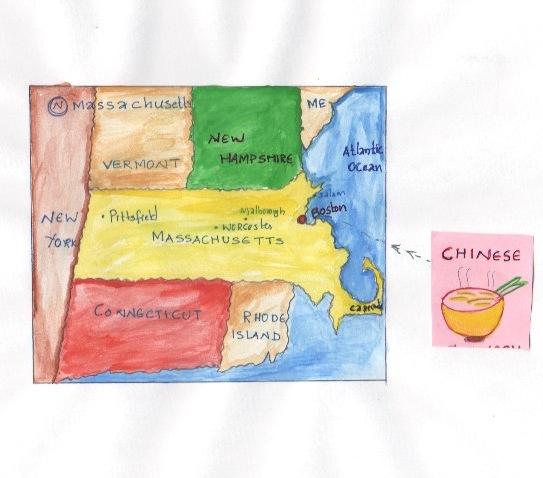
Cons:

* Not portable: Unlike a phone or laptop this cannot be carried by user all the time.
* RFID tags need to be attached to each Cuisine image or objects.
* User needs to maintain the RFID tagged index cards

**Detailed sketches**

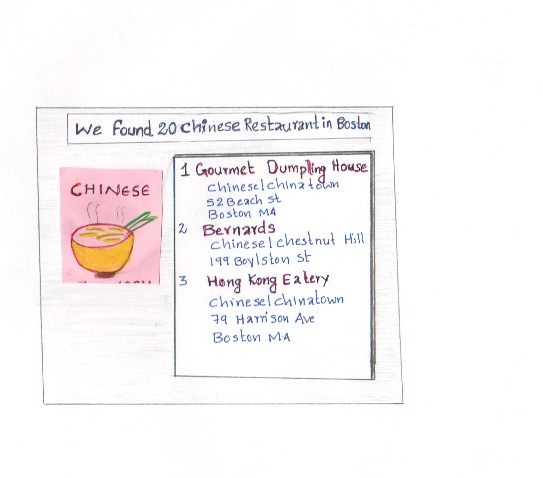
**Screen 1:**

Displays the map zoomed to NorthEast of United States. Customer can zoom-in the location where they want to search a restaurant and then place the cuisine image embedded with a RFID tag over the location.

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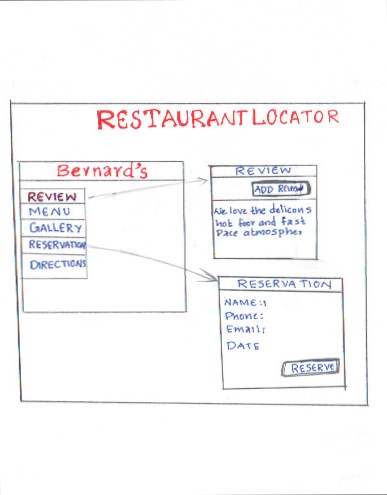
**Screen2:**

Map disappears and the screen displays the search result screen along next to the cuisine image

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**Screen3:**

User can drag and drop the individual screen (Ex: Review, Menu, Directions etc.) from restaurant home page onto the table top.



The idea of restaurant locator in TUI will make the system more simple and user friendly than restaurant Locator in GUI. This environment will allow a user to touch, feel and manipulate screens as per their choice. This implementation will make using Restaurant Locator application a much more enjoyable experience. I had thought to implement a sound based interface where customer can perform operations by speaking but dropped the idea since it won’t support all languages and more over the pronunciation will vary from country to country. In my original design having the cuisine images provided a better visual impact which may lack in the proposed design. But this design makes for that by reducing lot of redundant tasks such as the user does not have to enter the location and they can just place the cuisine at the location they want to find a restaurant in. These reasons make me to think that this would make a good design if implemented.