IPRO 305
Applications of Pervasive Computing
Overview

- Pervasive Computing
- Team Division
- Location Awareness
- Content
- Application
Overview

- Pervasive Computing
- Team Division
- Location Awareness
- Content
- Application
per·va·sive (pĕr·vā’siv) adj.

Having the quality or tendency to pervade or permeate:

the pervasive odor of garlic.
What is pervasive *computing*?

- Computers everywhere interacting with each other
- Utilization of context information
- Providing enhanced user experience
- Invisibility to user
Freedom

• Mobility
• Communication
• System interaction
• Invisibility
• Context Awareness
Objective

- Put pervasive computing in practice
- Develop a prototype of a context-aware tour guide application
  - Display map
  - Display media content
Overview

- Pervasive Computing
- Team Division
- Location Awareness
- Content
- Application
# The Team

<table>
<thead>
<tr>
<th>Application</th>
<th>Derek Downey</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nathan Johnston</td>
</tr>
<tr>
<td></td>
<td>Sarah Newman</td>
</tr>
<tr>
<td></td>
<td>Ashwin Nair</td>
</tr>
<tr>
<td>Location Awareness</td>
<td>Tyler Butler</td>
</tr>
<tr>
<td></td>
<td>Jacques Marcotte</td>
</tr>
<tr>
<td></td>
<td>Go Nakagawa</td>
</tr>
<tr>
<td></td>
<td>Jonathan Holley</td>
</tr>
<tr>
<td>Content Development</td>
<td>Kylie Klint</td>
</tr>
<tr>
<td></td>
<td>Brandon Low</td>
</tr>
<tr>
<td></td>
<td>Ilya Mazya</td>
</tr>
<tr>
<td></td>
<td>Heather Minor</td>
</tr>
<tr>
<td>Role</td>
<td>Name</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Faculty</td>
<td>Dr. Xian-He Sun Professor</td>
</tr>
<tr>
<td></td>
<td>Dan Ferguson</td>
</tr>
<tr>
<td>Graduate Assistant</td>
<td>Nehal Mehta</td>
</tr>
<tr>
<td>Student Leader</td>
<td>Tyler Butler</td>
</tr>
</tbody>
</table>
Overview

- Pervasive Computing
- Team Division
- Location Awareness
- Content
- Application
Location Awareness Goals

- Compatibility
- Scalability
  - New locations
  - Multiple devices
- Accuracy (10 feet or better)
- Quickness
• Developed by the University of Helsinki’s Complex Systems Computation Group
• Utilizes wireless signal strengths
• Analyzes radio signals at sample points
• Has 3-1/2 foot average accuracy!
What We’ve Done

- Investigated Locating Options
- Completed signal coverage analysis
- Purchased Ekahau
- Wrote web service
- Completed site survey
Content Goals

- Specify tour types
- Select content delivery points
  - Campus-wide
  - Building-specific
- Develop database to organize content
- Collect and prepare data
  - Images
  - Text
  - Audio recordings
- Create “virtual tour”
Types of Tours

• Architectural
  – Building history
  – Design significance
  – Campus layout

• Prospective Student
  – Campus selling points
  – Offices/Information centers
  – Student activities
Hot Spots

Locations where system delivers content to user

- **Campus-wide**
  - Observation points (O1)
  - Buildings (B1)

- **Building-specific**
  - Intersections (I1)
  - Areas of interest (I2)
Info and how its collected

• What is of significance?
• Text
  – Published works & quotes
• Image
  – IIT archive & digital photos
• Audio
  – Same data as text, but in audio form
## Data Organization

<table>
<thead>
<tr>
<th>FTP</th>
<th>Database</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Easy for storage</td>
<td>• Database Design</td>
</tr>
<tr>
<td>• File directory structure</td>
<td>– Keyword searchable</td>
</tr>
<tr>
<td>• Web Interface</td>
<td>– Extensible</td>
</tr>
<tr>
<td></td>
<td>• Web service Interface</td>
</tr>
</tbody>
</table>
Virtual Tour

McCormick Tribune Campus Center
Overview

- Pervasive Computing
- Team Division
- Location Awareness
- Content
- Application
Application Goals

• Associate location with content
  – Internal representation
  – Data exchanged with services

• Develop Graphical User Interface
  – Intuitive
  – User-friendly

• Implement application logic
Internal Data Representation

- **Maps**
  - Physical location (i.e. room or building)
  - Single picture for every map

- **Hot Spots**
  - Logical locations with associated content
  - Types with associated icons
Map Structure

Map A

Map C

Map D

Map B

Map C

Map D
User Interface

• Intuitive map interface
• User-friendly
  – Easy navigation in four directions
  – Support for three information modes
  – Intuitive Icons for Hot Spots
  – Simple screen layout and menu designs
User Interface

- Map of Hanging Garden
- Menu options:
  - Bookmarks
  - CTA Schedules/Maps
  - Nearby Restaurants
  - Options
- Audio controls:
  - Play, Pause, Stop
- Text controls:
  - Menu, Locate, Help
System Structure

Application

Location Service

Content Service
Challenges

- Functionality Definitions
- Communication
- Focus Change
- Time Constraints
Future Work

- Pathing
- Integration with campus services
- Campus-wide content
- Outdoor location awareness
Questions