

# **IPRO 305**

**Applications of Pervasive Computing**

# Overview

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

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# Definition

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**

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# The Team

<b>Application</b>	<ul style="list-style-type: none"><li>• <b>Derek Downey</b></li><li>• <b>Nathan Johnston</b></li><li>• <b>Sarah Newman</b></li><li>• <b>Ashwin Nair</b></li></ul>
<b>Location Awareness</b>	<ul style="list-style-type: none"><li>• <b>Tyler Butler</b></li><li>• <b>Jacques Marcotte</b></li><li>• <b>Go Nakagawa</b></li><li>• <b>Jonathan Holley</b></li></ul>
<b>Content Development</b>	<ul style="list-style-type: none"><li>• <b>Kylie Klint</b></li><li>• <b>Brandon Low</b></li><li>• <b>Ilya Mazya</b></li><li>• <b>Heather Minor</b></li></ul>

# The Leaders

**Faculty**

**Dr. Xian-He Sun  
Professor Dan Ferguson**

**Graduate  
Assistant**

**Nehal Mehta**

**Student  
Leader**

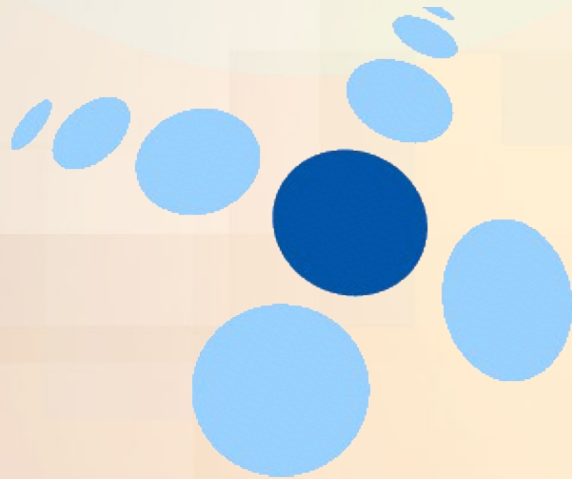
**Tyler Butler**

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# Location Awareness Goals

- **Compatibility**
- **Scalability**
  - **New locations**
  - **Multiple devices**
- **Accuracy (10 feet or better)**
- **Quickness**



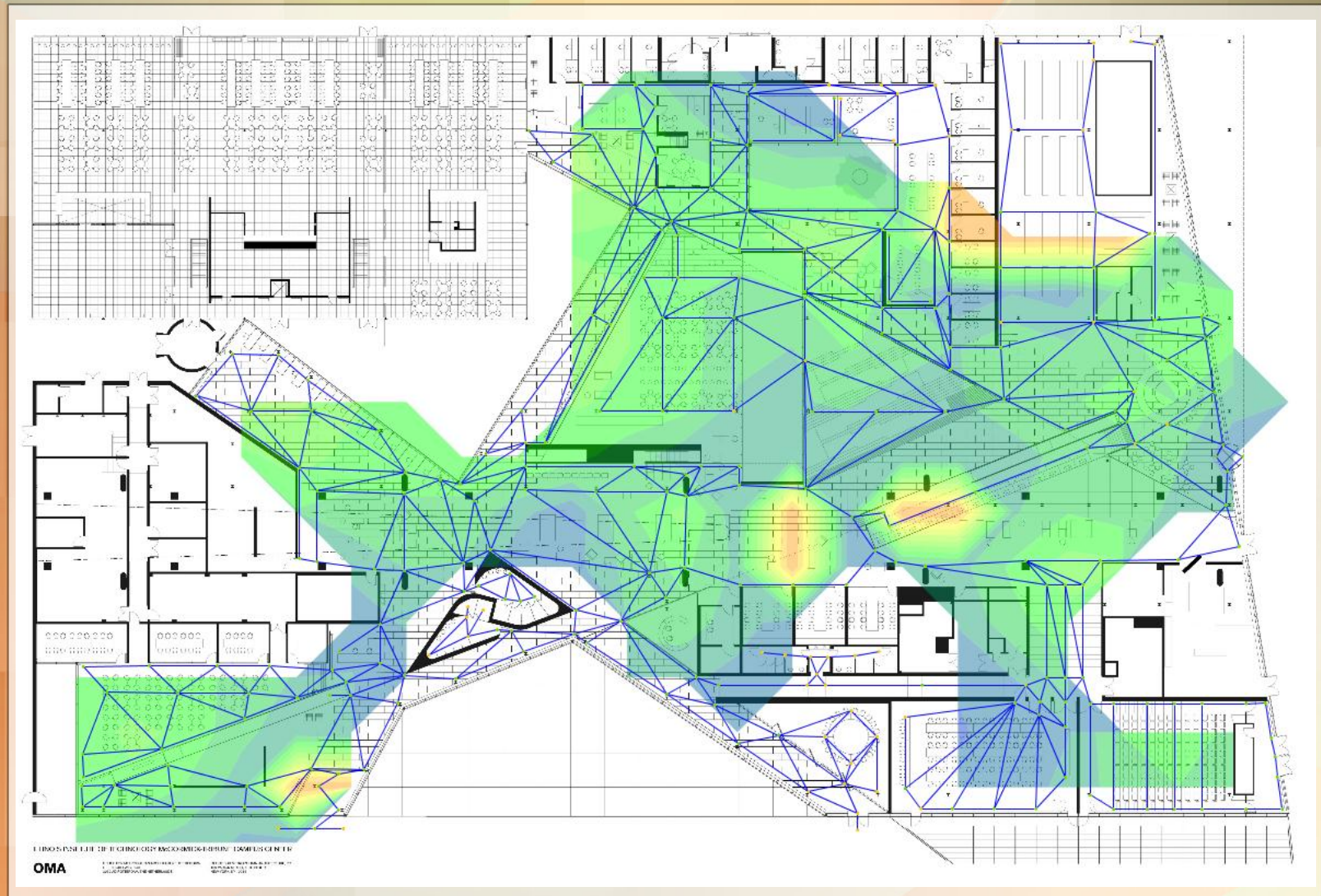
# ekahau

- **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**

# Coverage Map



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# **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”**

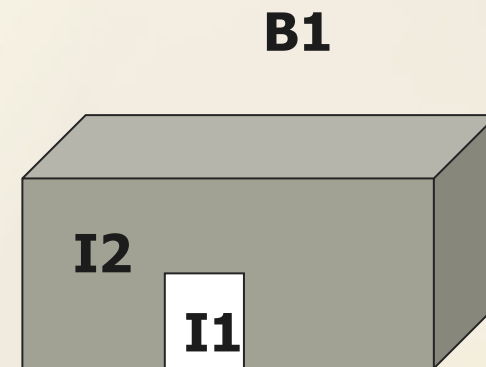
# **Types of Tours**

- **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)**



O1

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# 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

## FTP

- Easy for storage
- File directory structure
- Web Interface

## Database

- Database Design
  - Keyword searchable
  - Extensible
- Web service Interface

# Virtual Tour



McCormick Tribune Campus Center



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# **Application Goals**

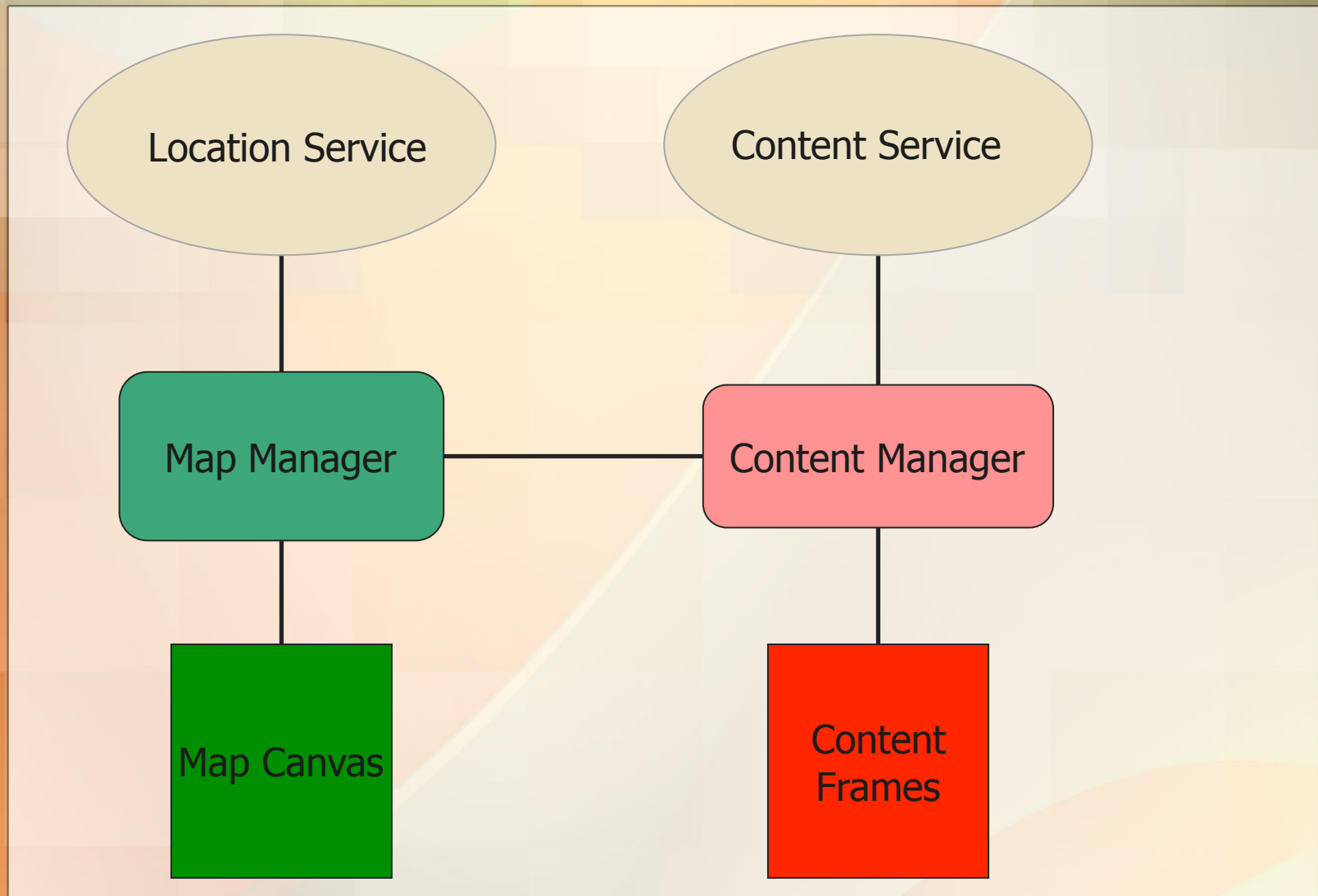
- **Associate location with content**
  - **Internal representation**
  - **Data exchanged with services**
- **Develop Graphical User Interface**
  - **Intuitive**
  - **User-friendly**
- **Implement application logic**



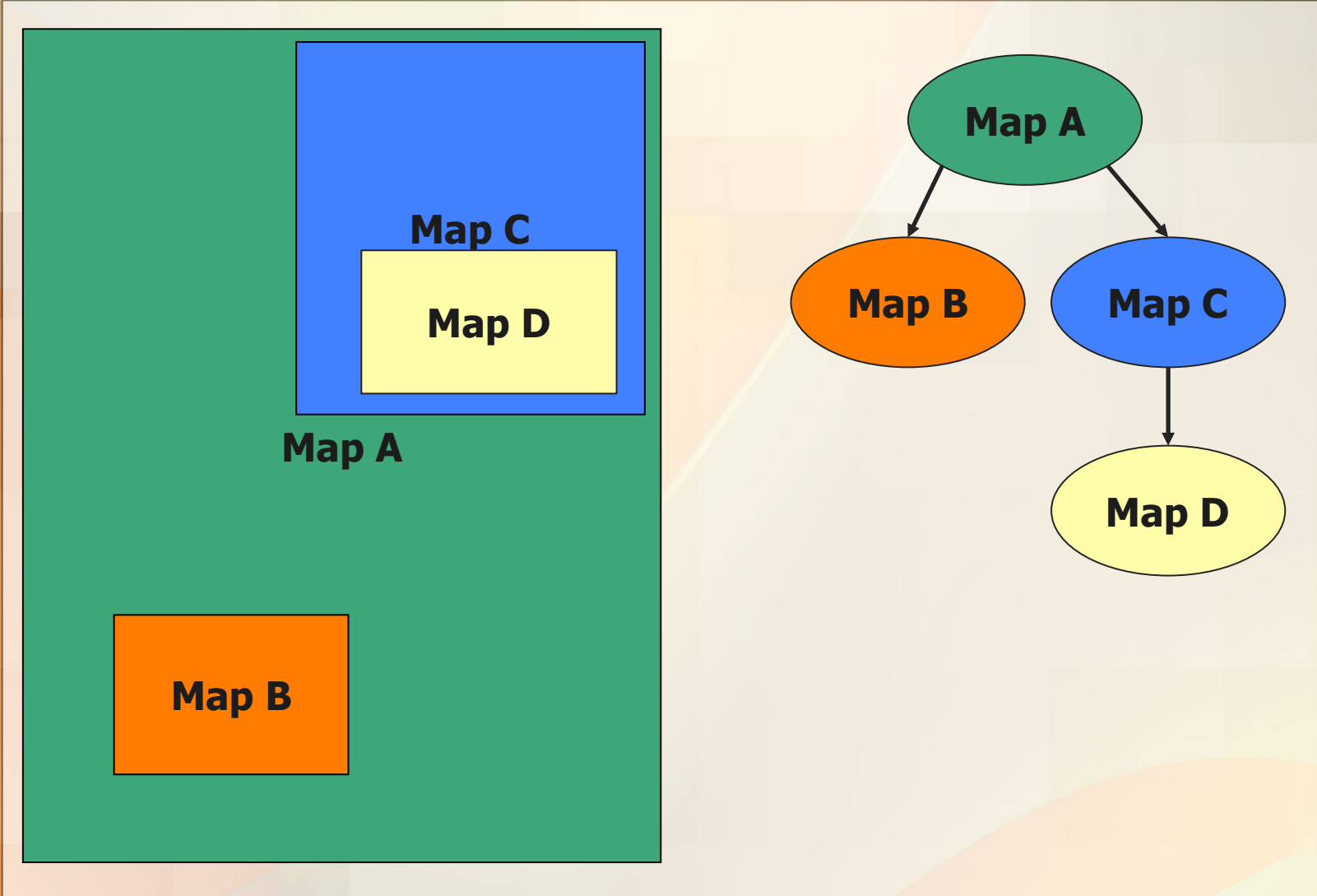
# Internal Data Representation

- **Maps**
  - **Physical location (i.e. room or building)**
  - **Single picture for every map**
- **Hot Spots**
  - **Logical locations with associated content**
  - **Types with associated icons**

# Application Design



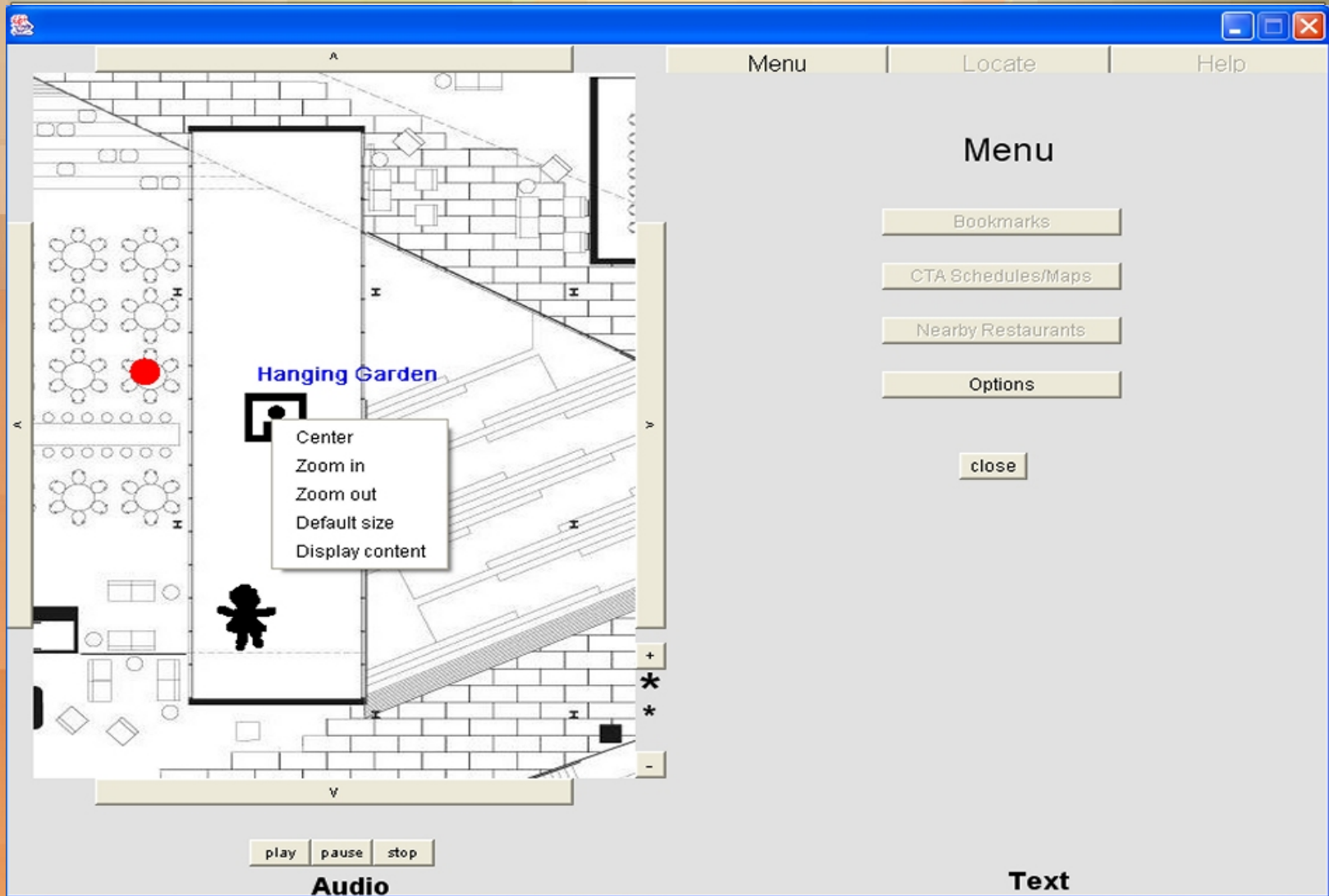
# Map Structure



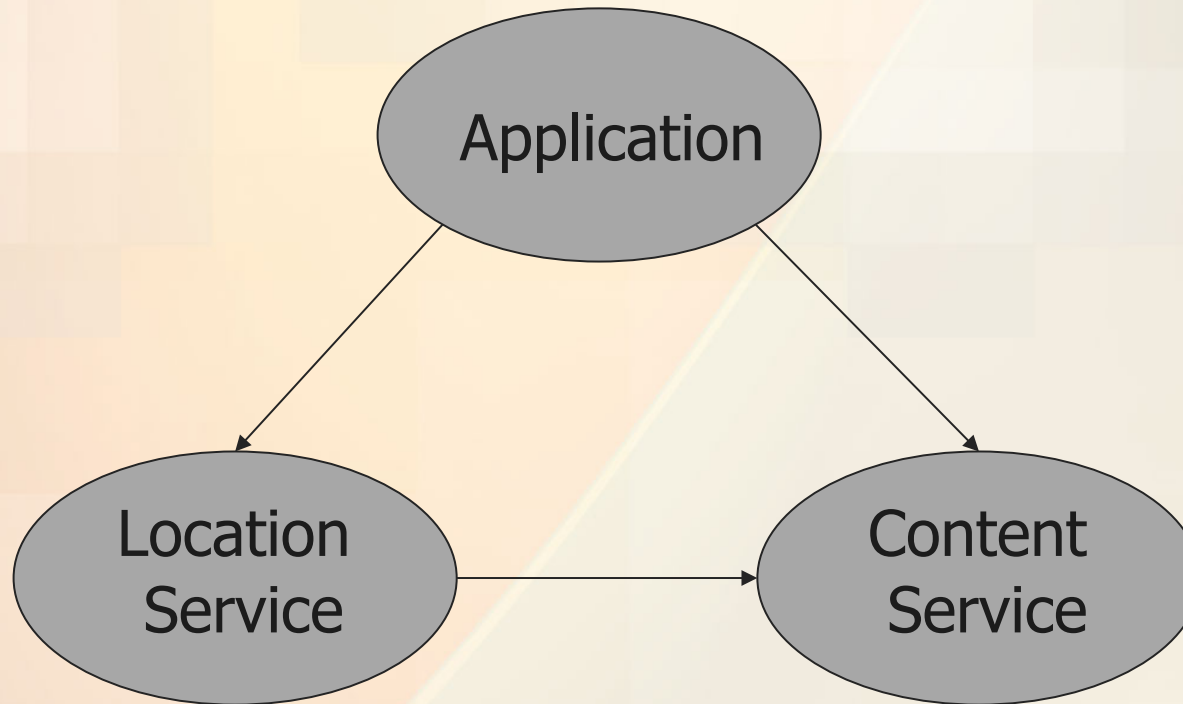
# User Interface

- **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



# System Structure



# Challenges

- **Functionality Definitions**
- **Communication**
- **Focus Change**
- **Time Constraints**

# **Future Work**

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



# Questions