

1. Problem

- It is currently difficult to use technology to automatically determine peoples' location indoors
- GPS works well in many outdoor contexts, but generally does not work indoors
- Current indoor positioning technology is:
 - Expensive to install
 - Complex to set up
 - Requires design of specialised maps
- Often map information is unavailable; either it does not exist in suitable form or it is private

2. Our Approach

We aim to provide a new form of flexible and powerful location tracking and display that can:

- Exploit arbitrary **symbolic** maps
- Exploit arbitrary positioning technology

3. Motivation

Where are you? A considerable amount of work has gone into solving this very simple question. The yet unsolved problem is how to use low-cost information from available existing infrastructure for dynamic and personalised mobile displays.

We have designed a new mechanism that enables people to determine their location on a range of symbolic, intuitive maps that best meet their current task.

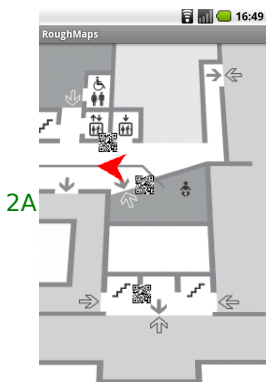


Figure 2: Client Application (above) & Administration (below); Australian Museum, Level 2

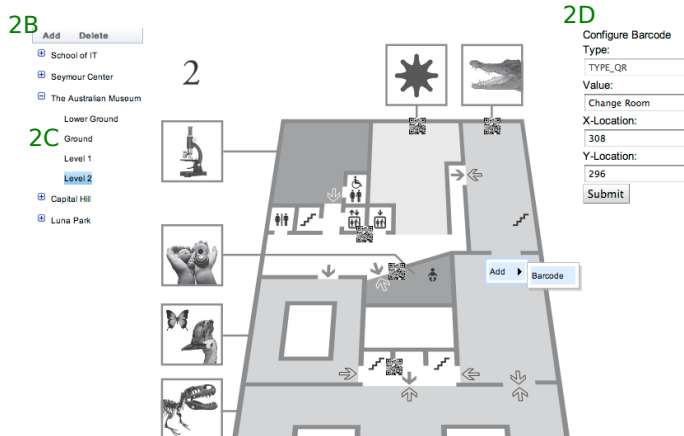


Figure 1: Architectural Diagram

4. Overview of Architectural Elements

- Model for storing information regarding:
 - symbolic maps relating to particular tasks (see examples, Figure 3)
 - indoor positioning infrastructure for indoor environments
- Administration interface (see example, lower Figure 2) for configuring:
 - new buildings and maps (see Figure 2B)
 - buildings with available symbolic maps (see Figure 2C)
 - positioning infrastructure on a per-map basis (see Figure 2D)
- Exposed web (REST) service for queries relating to:
 - nearby buildings supported by RoughMaps
 - symbolic maps available for a particular building
 - searches for nearby buildings supported by RoughMaps
- Prototype client written for the Android platform:
 - list available RoughMaps buildings and symbolic maps (see Figure 3A)
 - interface for viewing symbolic maps (see Figure 3)
 - display calculated position based on available infrastructure information for current symbolic map (see Figure 2A)

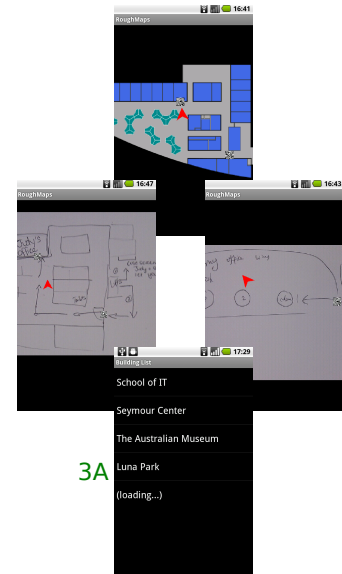
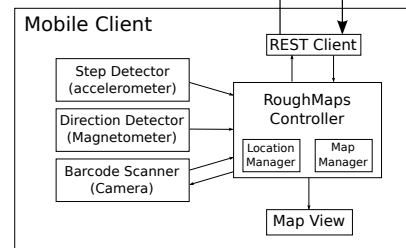
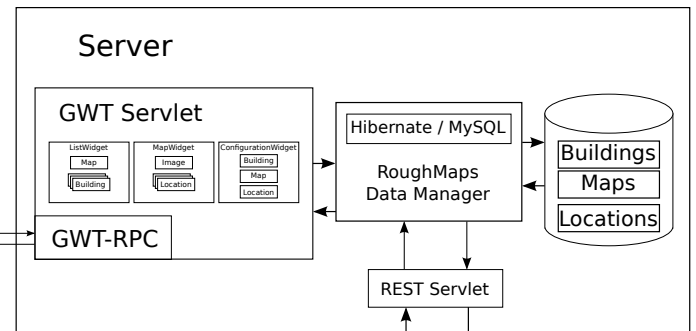


Figure 3: Client Application; Examples of maps of the same area in the School of IT, one SVG symbolic map created for showing people's positions in offices and workspaces, two hand drawn maps for a particular task.

5. Contributions

- Design of Architecture for Indoor Location Modelling
- Architecture implementation in RoughMaps platform (see Figure 1)
- Operates in terms of locations on a symbolic map
 - For modelling
 - For display
- Validation
 - Five listed buildings
 - Several symbolic maps: 5 based on existing high quality maps; 4 based on hand-drawn task-orientated maps