



VisUN-3D: Visualization of User Navigation Using 3D Maps in Virtual 3D Walk-spaces for Mobile Users



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NOVELTY AND INVENTIVENESS

VisUN-3D is a mobile user navigation system using 3D model in a pervasive computing environment. The uniqueness of this work is that, we built a visualization of 3D campus maps inside 3D workspace at our campus environment to navigate several users at the same time by using their mobile devices such as PDAs. The 3D rendering and GPS navigation are embedded into various wireless PDA or smart phone devices to allow the navigation of the users. This approach could navigate more than 2 users in a 3D walk-space and at the same time navigate the users by showing their whereabouts in 3D projection mapped on the same picture. The map shows the location of the user in the scene to navigate to the location of another user to meet on the same image plane. This approach can be expanded to be used for tracing elderly people with dementia especially Alzheimer disease and missing children.

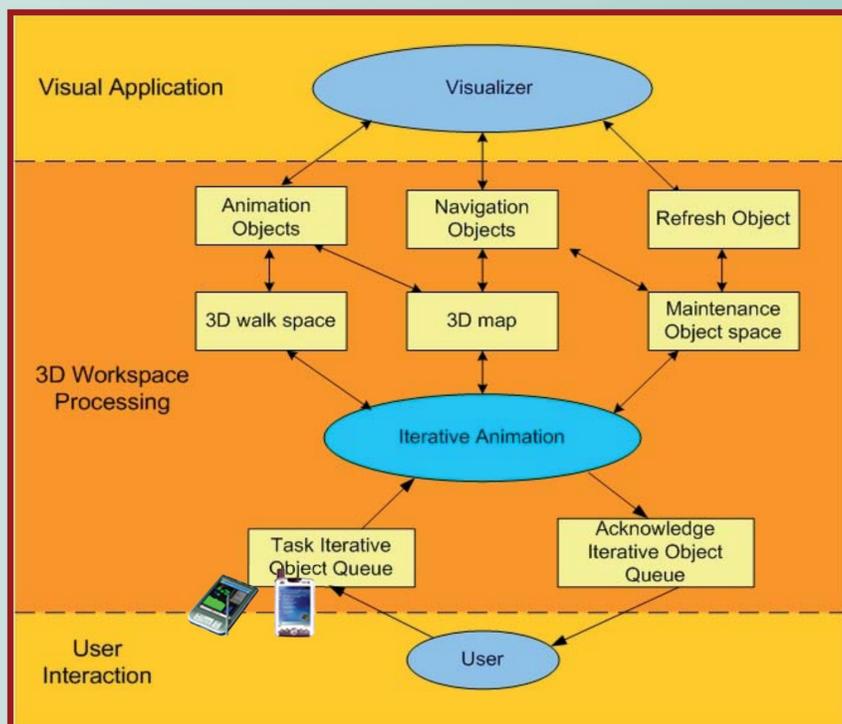
USEFULL AND BENEFITS

- To provide easy interactions between users by providing user location in 3D maps for mobile users using small mobile devices (PDAs, Smart Phone, Handheld, etc.)
- To provide solution/facility for elderly users to get real-time location, using a push concept, rather than a pull concept
- To develop VisUN-3D as a life scenario on how computing environment can deliver intelligent responses, directly, to the users, based on user location, in the form of 3D maps

METHODS AND PRINCIPLES

VisUN-3D aim is to support users to navigate better and to learn the structure of the graphical space with the help of the real-time connection between the 3D maps and the 3D walk-spaces model based on landmark knowledge. 3D walk-spaces refer to 3D space environment that allow a user to freely walk in those spaces/areas

VisUN-3D coprocessing interactive architecture



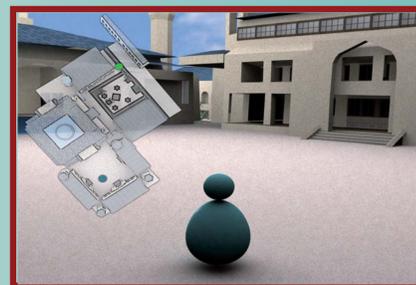
VisUN-3D principles:

- The map must be congruent with the environment it represents
- The upward direction on a map must show what is in front of the viewer
- The focus and context (distortion, zooming, elision, animation and multiple windows)
- The ornament-scale uses a near-photorealistic virtual 3D walk-spaces to make easier for the viewer to recognize the environment.

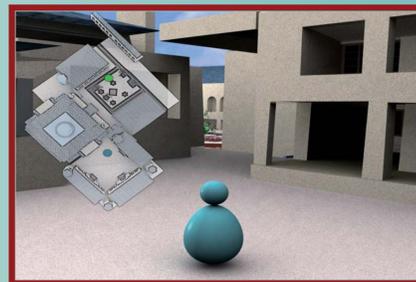
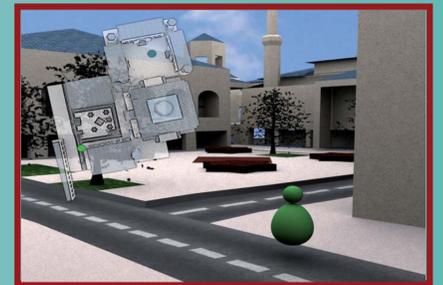
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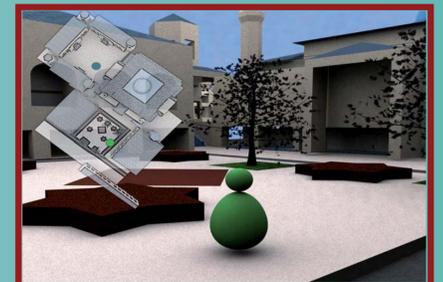
RESULTS AND DISCUSSIONS



3D walk-space transitions: user 'blue' will meet user 'green' from different angle.



The distance of user blue and user green is getting closer and they can estimate based on time and distance between them.



User 'blue' in a meeting with user 'green'



3D walk-space with 3D map inside, in PDAs

When a user clicks on and enters a wrong location, it is easy to realize the error with animation and compare to the real environment.

3D graphics is not yet very fast in PDAs, we customized by reducing the quality of the image of VisUN-3D model.

The VisUN-3D prototype is sometimes in-accurate due to the fact that the GPS signals in urban canyons are often blocked or reflected. This is a common problem, which could dramatically reduce the accuracy.

COMMERCIAL POTENTIALITIES AND TARGET MARKET

The commercial potentialities of VisUN-3D:

- Represent a real place, this makes easier for a user to perceive proportions, distances, and landforms, and to recognize landmarks
- Rightly interactive and allow unrestricted movement
- Enable augmented or wholly immersive virtual spaces

Target Market

- People who visit a non familiar location
- Disability or elderly people with dementia
- Parents who are worried of missing their children
- Anyone who are on the move and likes to keep updated on their location

CONCLUSIONS

- VisUN-3D animation helps users to make decisions (for their direction)
- Orientation movement during navigation (i.e. skilled way-finding) was improved by the increased spatial knowledge of the environment. Spatial knowledge can be described as three levels of information: landmark knowledge, procedural knowledge, and survey knowledge
- VisUN-3D enables users to view the locations of services and real places in an intuitive and user-friendly way
- VisUN-3D can be used for predicting and determining the distance and time between users or to certain landmark in a environment