Mobile augmented reality with audio

Supporting fieldwork of Cultural Sciences students in Florence

Fred de Vries

InSuEdu 2012 workshop at SEFM 2012, Thessaloniki, 1 October 2012
Authors: Stefaan Ternier, Fred de Vries, Dirk Börner, Marcus Specht

Centre for Learning Sciences and Technologies
• Real environment
• enriched with virtual objects

• Virtual environment
• enriched with virtual objects

IEICE Transactions on Information and Systems, E77-D(12), pp. 1321-1329.
Augmented Reality

Centre for Learning Sciences and Technologies

Open Universiteit
celstec.org
Augmented Reality: Locatory (preliminary experiment)
Augmented Reality: Locatory (preliminary experiment)
Augmented Reality: Locatory (preliminary experiment)
Augmented Reality: Locatory (preliminary experiment)
Augmented Reality: Locatory (preliminary experiment)
Augmented Reality: Locatory (preliminary experiment)
Augmented Reality: Locatory (preliminary experiment)
Augmented Reality: Locatory (preliminary experiment)
Augmented Reality: Locatory (preliminary experiment)
Augmented Reality: Locatory

• The App absorbed all attention of users

• ‘tunnel vision’ discovering environment looking through the camera of the smartphone

• AR usability pattern: explore effects of alternative pattern: **audio augmentation layer**.
ARLearn: listening

Centre for Learning Sciences and Technologies
ARLearn: listening

Centre for Learning Sciences and Technologies
ARLearn Architecture

- Serious game engine
  - Score
  - Progress
  - Team play
- Android and streetview clients
- Excursions possible
- Notification framework
- Rich media: video, audio, multiple-choice questions, ...
- Location based assignments and triggers

Media
## ARLearn Case studies

<table>
<thead>
<tr>
<th></th>
<th>Florence case OUNL</th>
<th>Amsterdam case OUNL</th>
<th>Hostage case UNHCR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Game design</strong></td>
<td>Scavenger game</td>
<td>Adventure game</td>
<td>Decision game</td>
</tr>
<tr>
<td><strong>Delivery Channel</strong></td>
<td>augmented reality</td>
<td>augmented virtuality</td>
<td>augmented reality</td>
</tr>
<tr>
<td><strong>Pedagogic approach</strong></td>
<td>situated learning</td>
<td>expository learning</td>
<td>learning through decision taking</td>
</tr>
</tbody>
</table>
Study visit Cultural Sciences, Florence

- Pilot A in 2010 + Pilot B in 2011
- Pilot October 2012 ... also BYOD
- Individual study tasks, not overlapping
- Each student has 2-5 assignments of tutor in audio, triggered by location
3 tasks for student (one with visual)

Op bijgaande tekening kun je zien hoe Brunelleschi's ontwerp voltooid had moeten worden. Bedenk dat de geleding ervan 'klassiek' wordt genoemd; hoe uit zich dit dan?

Maak van deze hoek zo goed mogelijk een foto en spreek in vijftig woorden in hoe hij de hele gevel heeft geleed.
Tutor gives assignment or information

- for everyone
- for a specific student
Tutor gives assignment or information

- for everyone
- for a specific student
Students make notes

- replay / editing during fieldwork
- collect data for their essay
Students make notes

• replay / editing during fieldwork

• collect data for their essay
hexagons luca della robbie -- 2010/10/26
15:20:42
Enter a NAME and specify the RANGE.

Name: Paleisbout intro

Range:
- 10m
- 40m
- 70m
- 100m

Attach AUDIO and/or IMAGE and/or TEXT.

Audio: http://sites.google.com/site/firenzesummerschool/arlearn/

Image: [Open]

Text: Aan de Piazza Signoria is het Palazzo Vecchio gelegen, dat in de loop der eeuwen tot een gigantisch complex is uitgegroeid. Het oudste

Optionally ASSIGN specific people by email address (separate by comma).

Assign: arlearn5

[Update] [Delete]
# Questionnaire (5 point Likert scale)

<table>
<thead>
<tr>
<th>Questions asked in Pilot A and B</th>
<th>A (n=6)</th>
<th>B (n=8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Smartphone support for fieldwork is usefull”</td>
<td>4.56</td>
<td>4.24</td>
</tr>
<tr>
<td>“Creating notes by typing text is usefull”</td>
<td>2.00</td>
<td>n.a.</td>
</tr>
<tr>
<td>“Creating notes by taking pictures is usefull”</td>
<td>4.83</td>
<td>4.75</td>
</tr>
<tr>
<td>“Creating notes by recording my voice is usefull”</td>
<td>3.50</td>
<td>3.11</td>
</tr>
</tbody>
</table>
Notes collected in portfolio of students

<table>
<thead>
<tr>
<th>average number of notes with....</th>
<th>A ((n=6))</th>
<th>B ((n=8))</th>
</tr>
</thead>
<tbody>
<tr>
<td>typed text</td>
<td>2.17</td>
<td>n.a.</td>
</tr>
<tr>
<td>pictures</td>
<td>4.83</td>
<td>4.86</td>
</tr>
<tr>
<td>voice recordings</td>
<td>3.50</td>
<td>3.50</td>
</tr>
</tbody>
</table>
Results - taking notes

- virtual keyboard complicated for text notes (pilot A)
- picture notes most popular - easy and suiting the purpose in their fieldwork
- voice notes effective and fast, initially students are uncomfortable to speak to themselves
- notes in portfolio helped students in “more systematically descriptions of their observations” according to tutor
Results - students

• Navigate vs. Exploration
  • Application designed for exploration
  • Navigation can be used to find your way besides paper map
• accuracy of GPS-signal!
• fade in - out of audio too subtle to notice (pilot A)
• signal for new assignment, no auto-play (pilot B)
Results - tutor

- Multitasking
  - tutor can monitor different students real-time
  - checking continuously the online portfolio to check the progress and answer of students
- Intervene sometimes with instruction or extra assignments
- Assignments were sometimes too complex, tasks need to be split in smaller ones. (pilot A, B)
Lessons Learned

• Choose a location for fieldwork with proper GPS reception
  • High buildings, narrow streets :(  
• Reserve time for users to make themselves acquainted with the smartphone 
• Battery life ~ GPS/network operations offline use?
Conclusions

• Broadening our vision on Augmented Reality; developing Open Source toolkit + more learning designs for use in different contexts.

• Augmented reality aspects appreciated, but KISS

• Note taking by recording voice + pictures is powerfull.

• Explore more social aspect: private notes or shared notes linking to essays of the Cultural Science students.
Conclusions - sustainability

- visit Florence all alone with the App and not depend on an organized study-trip
- Access can be limited to vulnerable artefacts in Florence; portfolio’s with annotated data of other students can make studying the artefacts in real more efficient, protecting the treasures.
- Cloud application without need to run your own server.
- Created designs can be re-used (if you allow)
Try ARlearn yourself

- **Overview**
  
  [http://portal.ou.nl/web/topic-mobile-learning/home/-/wiki/Main/ARLearn](http://portal.ou.nl/web/topic-mobile-learning/home/-/wiki/Main/ARLearn)

- **Authoring environment in the cloud**
  
  [http://streetlearn.appspot.com/Authoring.html](http://streetlearn.appspot.com/Authoring.html)

- **Android client for smartphone**
  
Thank you!

- fred.devries@ou.nl
- +31455762860
- Skype: fjdevries
- Twitter: freddevries
- LinkedIn: freddevries