

# Using mobile devices to facilitate visitor interaction with the landscape: a student perspective

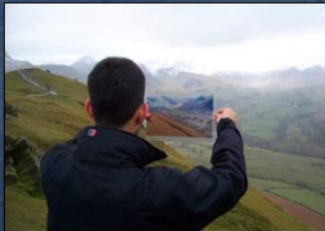
Elizabeth FitzGerald and Gary Priestnall

Institute of Educational Technology (OU) and  
the School of Geography, University of Nottingham

# Aims

To assess a range of techniques for exploring the use of digital geographic information to augment real scenes in the field

Create a student-led exercise to encourage critical evaluation of these techniques to support the field experience (and mobile tourist guides).



# Approach

- Fieldwork – education in the field... mobile!
- 3<sup>rd</sup> year Geography undergraduates + some MSc
- ‘Mobile and Field GIS’ module, focus on appropriate use of Geographic Information in a landscape context
- Student presentations
- Videos + observation
- Follow-up focus groups



Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
Image IBCAO  
Image © 2009 IGN-France  
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# Supporting learning about the landscape


Sir Hugh Walpole Video



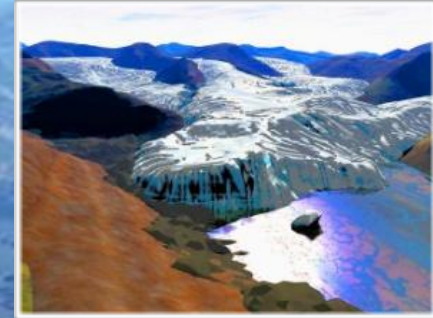
**The Tale of Mrs Tiggy-Winkle**  
(Beatrix Potter, 1905)

"Once upon a time there was a little girl called Lucia, who lived at a farm called Little Town..."

You can see Little Town about 1km up the Newlands Valley



**BEATRIX POTTER** was born in London in 1866. Her love of the countryside stemmed from her childhood holidays in the Lake District. The landscape gave inspiration for her books, and became her home from 1913. When she died on 22 December 1943, aged 77, Beatrix Potter left £211,836, 14 farms and 4000 acres of land to the National Trust, together with her flocks of Herdwick sheep.




**Herdwick sheep (14pt)**

Herdwick sheep are the native breed of the central and western Lake District and live on the highest of England's mountains. They are extremely hardy and are managed in the traditional way on the Lake District fells that have been their home for generations (13pt).

The word "Herdwick", meaning sheep pasture, is recorded in documents going back to the 12th century. Herdwick sheep are the most hardy of all Britain's breeds of hill sheep, grazing the central and western dales of the Lake District with fells running to over three thousand feet (12pt).

Herdwick farms have typically less than 100 acres of lower, more productive land and rely on the common grazings of the high Lake District fells. The lambs graze with their mothers on the "heaf" belonging to that farm instilling a life long knowledge of where on the fell they should be grazing. This is crucial as the central Lake District fells are inaccessible and a sheep which strays from Borrowdale to Eskdale will involve a 100 mile round trip by road for the farmer to collect it (11pt)

The Herdwick's hardiness and ability to graze over a wide area of fell is key to the maintenance of the Lake District landscape as we know it. By purchasing Herdwick products you are giving the farmers that manage this candidate World Heritage Site a sustainable future (14pt)



**THE NATIONAL TRUST**  
for ever, for everyone

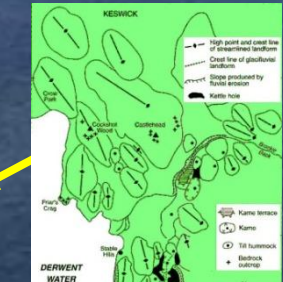
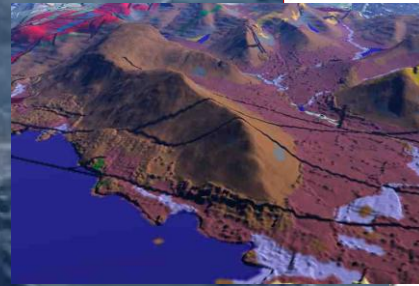
The National Trust's first acquisition in the Lake District, Brandlehow Woods, is located between your current location and the shores of Derwent Water



Current Location

This area, covering more than 25,000 acres, includes over 1,000 ancient specimens including pollards of ash, wych elm, small-leaved lime, oak, rowan, holly, birch, yew, hawthorn, hazel and crab

[Source: www.woodland-trust.org.uk/ancient-trees/our-woods/focus/cumbria.htm]



# 1. Computer-generated Acetate





3

207°

**Fault Line**  
Location of Goldscope  
Copper Mine

**Glacial Trough**  
(‘U’ shaped valley)

**Little Town**  
Home to Mrs Tiggy-Winkle,  
Beatrix Potter (1905)

Glacial Till Deposits

Mudstones



## 2. Custom PDA-based application

### Stage 1: Lab-based Creation of 3D Views and Transfer to PDA



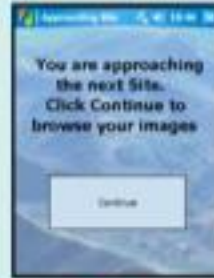
Current, past and hidden views output for each chosen waypoint. Images transferred to PDA, along with coordinates, using data loader application.

### Stage 2: Roaming between sites

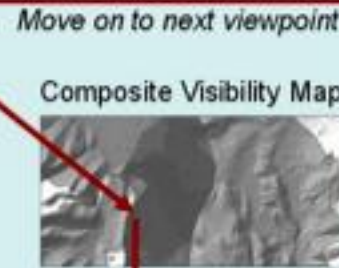
Next site: Green  
Visited sites: Grey  
Future sites: Purple

Current user position updated by GPS

Distance and direction to next site



### Stage 3: Onsite Landscape Visualisation and Field Sketching



Cell X, value = 23  
Decoded as 1,2,4,16

Play Audio files 1,2,4 and 16 relating to landscape units in view



Save annotated image

Interactive legend





# Screen visibility can be an issue



... this is as good as it gets

# 3. Mediascape on a mobile phone

**YOU ARE HERE**

**Audio of Wainwright**

**VIDEO from Derwent Water**

**Herdwick sheep (146)**  
 Herdwick sheep are the native breed of the central and western Lake District and live on the highest of England's mountains. They are extremely hardy and managed in the traditional way on the Lake District fells that have been their home for generations (130f).  
 The word "Herdwick", meaning sheep pasture, is recorded in documents going back to the 12th century. Herdwick sheep are the most hardy of all Britain's breeds of hill sheep, grazing the central and western dales of the Lake District with fells running to over three thousand feet (130f).  
 Herdwick farms have typically less than 100 acres of lower, more productive land and rely on the summer grazing of the high Lake District fells. The farms grow with their mothers on the "fell" belonging to that farm creating a life long knowledge of where on the fell they should be grazing. This is made as the parent Lake District fells are inaccessible and a sheep must drop from somewhere to fellside will involve a 100 mile round trip by road for the farmer to collect it (130f).  
 The Herdwick's hardiness and ability to graze over a wide area of fell is key to the maintenance of the Lake District landscape as we know it. It is an ancient tradition and one of the things the farmers that manage this wonderful landscape are proud to share.

**Catbells 1461**

**High point and crest line of Shearwood Sandform**  
**Creep line of glacially sandstone**  
**Slope produced by fault erosion**  
**Kettle hole**

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**Brandlehow Wood**

**Current Location**

This area, covering more than 29,000 acres, includes over 1,000 ancient specimens including pollards of ash, wych elm, small-leaved lime, oak, rowan, holly, birch, yew, tawntown, hazel and crab.

[Source: www.woodland-trust.org.uk/ancient-tree-forum/at/scapes/focus/cumbria.htm]

**OS**

**Photo**

# Phone-based mediascapes



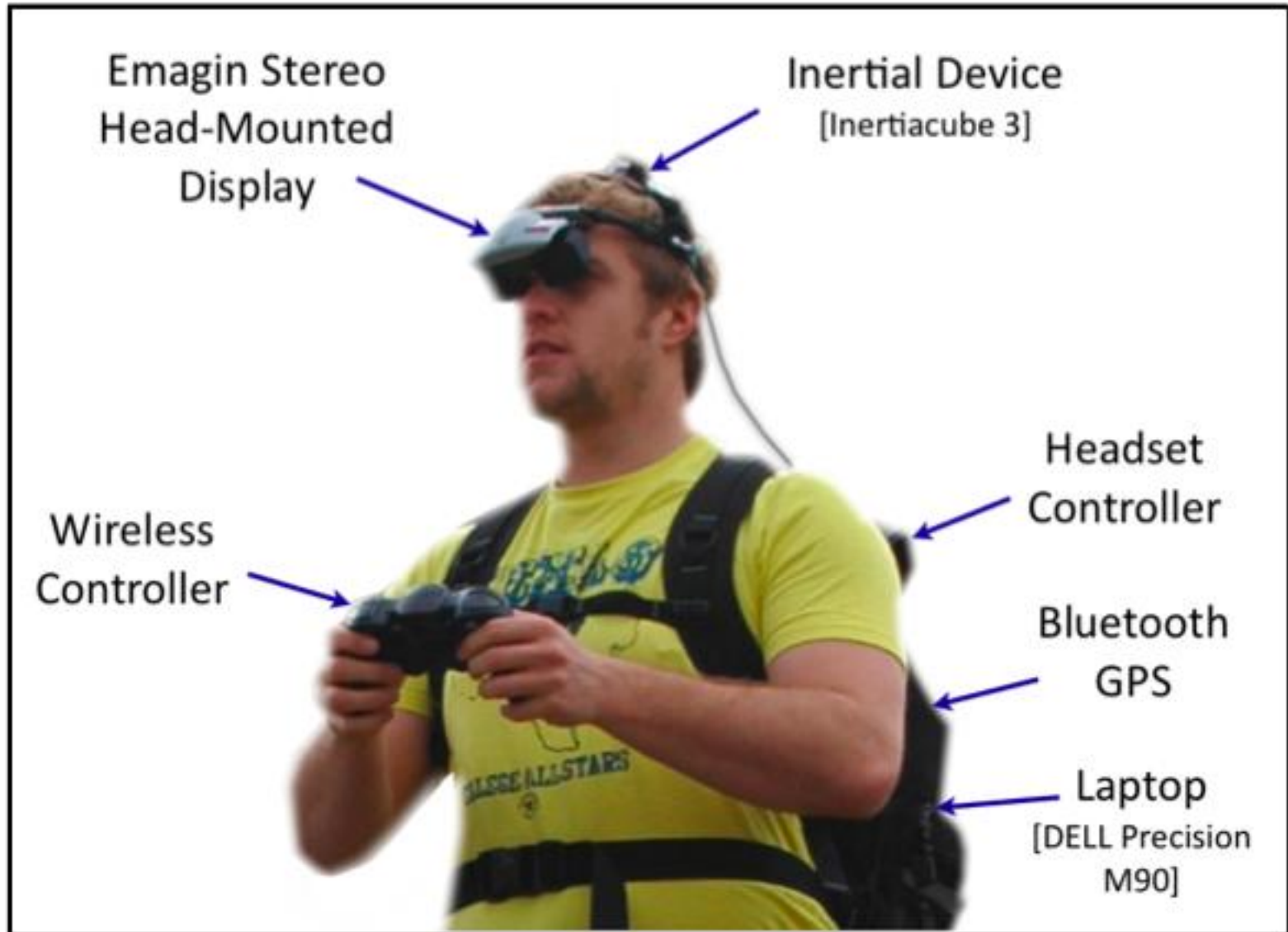


## 4. Google Earth on a Tablet PC





# 5. Head-Mounted Display (partial VR)



*Geovisionary (Virtalis, Univ. Leicester, Univ. Nottingham)*



# 5. Head-Mounted Display (HMD)





# Extract from Student Video Diary

## Cat Bells, Cumbria

Gary Priestnall, Elizabeth Brown, Mike Sharples, Gemma Polmear  
Mlearn 2009

# Summary of student findings

- **Computer-generated acetate:**
  - ☺ Successful format/simple, 'electronic acetates' a vision for the future?
  - ☹ Difficult in windy conditions, predetermined viewpoints a drawback.
- **Custom PDA application:**
  - ☺ Sketching, legend & audio popular (but relevance?)
  - ☹ Stability, incl. GPS connectivity. Screen visibility in bright sunlight.
- **Mediascape on a mobile phone**
  - ☺ Easy authoring (control over media placement)
  - ☹ Screen size and visibility, graphical media less effective.
- **Google Earth on a tablet PC**
  - ☺ Large screen and Google Earth's data exploration environment popular
  - ☹ Screen visibility, battery life, pen-based interaction (GE designed for desktop)
- **Head-Mounted Display**
  - ☺ Fun, engaging, good for heavily graphical information
  - ☹ Technical complexity, robustness, heavy, not waterproof!



# Reflections on exercise

- Relating digital information to features in the real world
  - How can digital representations be mapped onto the real world by the user
  - Information doesn't always relate to neat trigger regions
  - How do we mimic the in-field expert pointing things out?
- In-field evaluation
  - Asking students to develop their own evaluation schema
  - Video diaries a promising technique
- The role of graphics
  - Seek alternatives to heavily graphical representations
  - More emphasis on design of audio for in-field use.
- Ease of use
  - Even tech-savvy students didn't have time for complex mapping apps
  - The demand for simplicity was in evidence across all interactions

# Implications and future work

Beginning to exploit real-time handheld Augmented Reality



Caistor Roman Town,  
East Anglia, UK.  
Data from Will Bowden  
(Archaeology)



Need to develop design rules for mobile field guides which mimic the field expert.

Reduced emphasis on graphics, new challenges in making geographically relevant audio.

Simple but effective? – all new geospatial and handheld AR applications will need to strive to move from being novelty apps to becoming killer apps.



Google Maps  
Navigation for  
Android 2.0

# Related references

- FitzGerald, E., Sharples, M., Jones, R. and G. Priestnall (2011) Guidelines for the design of location-based audio for mobile learning. International Journal of Mobile and Blended Learning 3 (4): pp70-85.
- Brown, E. (ed.) (2010) Education in the wild: contextual and location-based mobile learning in action. A report from the STELLAR Alpine Rendez-Vous workshop series. University of Nottingham: Learning Sciences Research Institute (LSRI). ISBN 9780853582649. Available to download at <http://tinyurl.com/edwild>
- Priestnall, G., Brown, E. and M. Sharples (2009) A student-led comparison of techniques for augmenting the field experience. Proceedings of the mLearn 2009 Conference, Orlando, Florida, 26-30 Oct 2009, pp 195-198.

**N.B. Preprints available at <http://open.academia.edu/LizFitzGerald/Papers>**



# Thanks for listening

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