Teacher Guide

Unit 6

Location Aware Computing

For first teaching from September 2013
For first assessment from Summer 2014

For first award in Summer 2014

space science technology

Level 2 Certificate

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UNIT 6: Location Aware Computing

Learning outcome 1: Understand how a located media experience works
Learners can:

1.1 *Show how GPS enabled devices use satellites to provide feedback on a user's location e.g. satnav programs*

- Global Positioning Systems (GPS) underlie location aware computing. This technology uses satellites to provide information to users about their position, particularly useful for navigation.

- The candidate could use a satnav program such as NavFree, based on OpenStreetMap information, to illustrate how a GPS system can pick up its position from satellites and provide route information for people navigating a landscape. The navigation satellites currently in use could be explored, including USA and Russian systems, and the recently launched Chinese system, alongside the EU Galileo system currently being deployed. Each of these systems uses around 25 satellites, operating at 20,000 kilometres above the earth's surface. The more satellites visible to the GPS unit, the more accurate the location can be plotted.

- Some limitations of the systems can be noted. If the OpenStreetMap, or other base mapping system, is inaccurate or has omissions, the routes provided to the user may not be the most effective. Without a clear sight of at least a couple of satellites, the device will not provide accurate readings. The more satellites that can be accessed, the more accurate the position will be plotted.

- Candidates could use OpenMaps or NavFree and produce a number of screenshots showing the operation of the systems, what they can do and what their limitations are. A brief description or a podcast explaining the satellites and how they are deployed, could form the evidence for this learning outcome

- Details about NavFree

  http://www.navmii.com/navfree/

  A user pdf guide for NavFree is found here

  http://www.navmii.net/bin/Navfree_UserGuide_v1.0.1.pdf

1.2 **Investigate how georeferenced information can be programmed to appear on a handheld computer, triggered by the user's location**

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- Ideally the students can experience a located Mediascape such as The Walls of Derry, Londonderry or Donegal and Queen's Quay. Alternatively they can see what the experience entails at http://www.bbc.co.uk/northernireland/mobilelearning/.

- A video showing primary school pupils discussing their georeferenced information (called a Mediascape) can be viewed at http://www.bbc.co.uk/northernireland/forteachers/technology_in_action/mediascape.shtml

- Some Apps for iPhones and other devices can be downloaded and demonstrated. Most allow the content to be browsed without being in the location for which they are intended as georeferenced programs. Try searching the AppStore or other sites for 'Bristol Myths' or 'Edgeware Road'. A very good local example, played as a game, is 'Ghosts of Nendrum'. These have been created using AppFurnace, which candidates may choose to use in Learning Outcome 5.

For Example: Make a paper-based plan for your Mediascape.

- Using a map of a local area, plan what content should appear when a user goes to that place. The content may be an audio file, or a photograph, a video or other digital asset. Sound files will probably be the most effective content in a finished program, as it allows users to navigate the area without having to constantly peer at a small screen, when it is transferred to a portable device. Consider carefully the positioning of the assets and what 'story' you are trying to tell. You could recreate the Bristol Myths app with stories of local happenings told by local people.

Learning Outcome 2: Be able to use digital recording software

Learners can:

2.1   Use a digital sound recording program to input voice and sound effects and/or copyright-free music

- A number of free programs are available in which sounds can be recorded with a microphone. Perhaps the best known and the most fully featured, while remaining relatively easy to use, is Audacity. This is a free download, or it may already be available in your school or institution. You can download the program from www.sourceforge.net or another download site, if it is not already available on the device you are using.

- Candidates may have to be made familiar with copyright restrictions and the need to access sounds free of copyright (e.g. in the Freesounds site www.freesound.org, which is a collaborative database of sounds licenced under Creative Commons). Some knowledge of Creative Commons and how it works would be useful for the candidates here, and would also help them to locate suitable material for Learning Outcome 3.

- While externally sourced sounds and music are likely to be able to be uploaded into the digital audio editor you are using, perhaps it is easier for the candidates to create their own sound files using a microphone. These could be sound effects, music or the spoken word. This is also a good way of avoiding any issues of copyright (so long as the music is your own composition).

- Candidates should save to their portfolio the sound they create or upload, before any manipulation has been carried out to it. It would be useful to label the source of the sound file i.e. created by the candidate or with the source named. Note that sounds likely to have copyright restrictions should not be used.

2.2 Edit the soundfiles created in 2.1 and provide a description of the modifications

- The sounds imported or created are unlikely to be completely satisfactory in its raw state. Candidates should show that they can edit the sounds, perhaps by moving, copying or deleting parts of the file. Often the impact of voice recordings can be improved if the 'ers' and 'ums' are removed, for example, or if at the beginning or end of the recording a silence is removed if too long, or introduced is the sound starts too abruptly.
- In Audacity, for example, it is possible to crop a sound file easily, removing the end or beginning or both or to delete portions of the file. Zoom in for maximum accuracy.
- Candidates should save a copy of the sound file with those edits made, using a suitable filename and provide a description of the modifications made to improve the sound file

2.3 Apply at least three filters to improve the quality of the soundfile created in 2.1 and provide a description of the modifications

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- Generally some further manipulation is required to ensure that the sounds are as you want them to be. Here you are asked to apply filters to the sound file, but those suggested are merely examples. Candidates may choose to apply wahwah, repeat, or echo filters in imaginative ways for example, perhaps also employing changes in pitch, speed and tempo to the original sound.

- Candidates should bear in mind what the eventual purpose of the sound will be, in the georeferenced program - if a serious intent, the sound file should have noise removed and silences introduced or shortened. The sound may need to be amplified and faded in or out as well. Other uses may require sound to be manipulated to recreate a sound effect, and will be more amenable to experimentation.

- Save the file with the filters applied.

2.4   Export the sound file in an appropriate format to retain quality while reducing file size and retaining compatibility

- This can take a little bit of trial and error, but candidates should be encouraged to save their files in a number of formats and compare the quality and size of the saved files. Generally the better quality will take up more megabytes than lesser quality files. However, as the files are intended for uploading online, candidates should aim to reduce the quality to a level which is still acceptable, while keeping the file size to the minimum. The MP3 format is probably the most compatible format presently, with good levels of compression and so reduced file sizes.

- Audacity requires a plugin to export files as mp3s. This is the LAME encoder, which can also be downloaded from www.sourceforge.net. Once stored on your computer and navigated to the first time an mp3 is exported, it will not need to be found again.

- Candidates should save the sound file into their portfolio and, in an accompanying document, explain the edits made, the filters applied and the parameters used when saving the file, with a brief justification for each change.

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Learners can:

3.1 Create a located media experience using appropriate software by

3.1.1 Importing at least one digital sound file
- A number of online software programs can be used here. Calvium's AppFurnace, when you sign up, is free for developing and testing digital georeferenced experiences. If you want, you can export these as Apps which will run on Apple iPhones or Android phones. Access it from www.appfurnace.com. Create an account and you are ready to start creating. Note that, at the time of writing, AppFurnace only worked on Google Chrome and Safari web browsers. There is also a cap on the total size of the files uploaded, but this is generous enough to create quite complex experiences.

- When in AppFurnace, the candidate can create an App and open it. Then the candidate can access the Files area and use Upload to bring in the assets that are going to use in the experience (probably the sounds and images created earlier).

3.1.2 adding a map
- The candidate should select map in the Widget list on the left hand side of the screen and drag the map symbol that appears to the right of the Widget screen onto the iPhone-like screen in the centre of the computer screen. This map is just for reference - the actual location can be set later. The candidate can change the amount of the screen used for the map. Generally it is most effective to drag the map to fill the iPhone screen.
- Map Properties will appear on the right hand side of the computer screen. It is important to set the centre latitude and centre longitude and the zoom level to suit where you are going to make your experience work. To do this, select Location from the top menu bar.
- Navigate to wherever the experience is to be located - you can use the search facility just above the map to out in a Post Code if you know it to get you to the correct area. Note also that you can change the 'map' using the dropdown to the top right of the map to select Satellite, OpenStreetMap or Street (Google Maps). Select the type which will help you to find the location that will

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be used. If OpenStreetMap, the data that candidates added or updated in the Mapping the World unit should be visible if the located experience is being made in the same area. Note that online help for this is provided at https://appfurnace.zendesk.com/entries/21266451-tutorial-5-using-location-gps. There is also considerable online help in the site for other aspects of creating the experience.

- When the area to be used is displayed, place the cursor in the centre of that area and note the latitude and longitude as shown in the bottom right corner of the map e.g. -6.677818 55.149333. This is the longitude and latitude of the cursor.

- On return to the layout screen, these numbers should be entered into the Map Properties. Here the map will be seen on the screen can be selected - Google satellite, Google Streets and OpenStreetMap. The level of Zoom should also be set, with the higher the number, the closer the zoom. Try a Zoom of 17 initially and it can always be changed later. Select the name of the Page under the Widget menu (probably Page 1) and change in the Page Properties to Map. After this, save the experience (which should be done regularly when building) and Preview on Screen to ensure that the map is set correctly.

3.1.3 Adding points

- Returning to the Location screen, the candidate is ready to begin to build the experience. Add points (or zones if you prefer, but avoid sharp corners) to the map in places where a sound is to play, or an image is to display. To do this click on Add Point and click on the map to add it where it is required. Each zone will open Properties, similar to the Map Properties earlier, and the radius of the point can be changed. It would be unwise to make the points too small.

3.1.4 Geolocating an Audio file

- Return to the Location screen. There is a space for Audio for each point and there you could add the file name which you uploaded earlier. Note that if you put the file into a folder which you renamed it may have a filename like Music/Birdsong.mp3 (if the filename was Birdsong and was put in a folder called Music in AppFurnace). This will attach the file Birdsong to that zone or point. The full filename path can be copied and pasted from the righthandside screen if the file is highlighted in the File menu.

3.1.5 Saving the completed experience.

- Note that the experience can be tested using mobile devices such as Android or iPhones. Select Preview on Phone and scan the QR Code or use the url to download the Mediascape. You can then navigate the area and hear the experience. However, it is not a requirement to do that, as not all schools or organisations will be able to readily access such devices.
- If the experience is not going to be used in situ, the candidate should preview the Mediascape online by saving their work, and selecting Preview Online. This allows a figure to be clicked across the map and into the zone which has been programmed. The sound file(s) should play and the images on the pages should display.