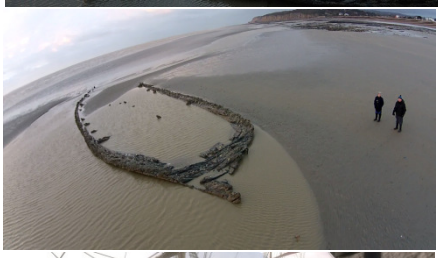
UNIVERSITY OF BIRMINGHAM

The Virtual Mayflower

University of Birmingham Human Interface Technologies

The Background



The *Virtual Mayflower* project concept came about following a presentation by the University of Birmingham's Human Interface Team at the 2015 Annual Meeting of Dartmouth Museum's Supporters. Part of the presentation, backed up with "live" demonstrations afterwards, introduced attendees to a Virtual Reality project conducted in 2014 and early 2015, focusing on a 17th century ship, the wreck of which exists on Pett Level Beach near Hastings. The *Anne* was a 70-gun third-rate ship of the line, built by Phineas Pett at Chatham Dockyard as part of a late 17th century restoration of King Charles II's Royal Navy, overseen by Samuel Pepys. Launched in 1678, the *Anne* was beached twelve years later during the Battle of Beachy Head. Under the command of John Tyrrell, the vessel was deliberately torched to prevent her from being captured by the French. The wreck is now owned by the Nautical Museums Trust (the Shipwreck Museum Hastings) and it is with this Museum that the HIT Team collaborated in an attempt to "resurrect" the *Anne* using Virtual Reality (VR), Augmented Reality (AR – superimposing the 3D model of the ship over its real-world wrecksite) – and small unmanned air vehicle, or "drone" technologies. The 3D model of the *Anne* was developed at two key levels of detail, one to support on-site AR visualisation trials (and subsequent online interactions) and a higher fidelity version to feature at special presentations and events, or in museums.

The Goal

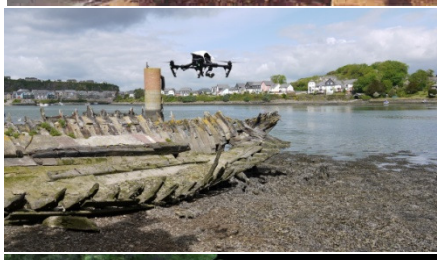
Unlike the *Virtual Anne* project, the *Virtual Mayflower* presents more of a challenge, as the intent is to develop much more than simply a "walkthrough" of a ship moored alongside. The *Virtual Mayflower* will be both a collaborative and educational exercise, involving members of the public, local historians, schoolchildren, artists, actors and many more "stakeholders", all of whom will contribute to the development of the virtual models and scenes. For example, it is a goal of the project to involve local schoolchildren in early research relating to the history of Bayard's Cove, its buildings, occupants and local trades. In addition, the schoolchildren will be taught how to develop basic 3D models that will ultimately "frame" their research and become incorporated into the final educational VR experience.

Another goal is to involve local artists who will contribute to the development of these scenes by providing rich visual materials that will be used to "paint" the 3D models and bring them to life with colour and texture. It is also hoped that the *Virtual Mayflower* project will develop an international angle, involving similar groups and talents in the USA, thus delivering a truly "hands across the Atlantic" cultural legacy.

The Technologies

The hardware and software items required to develop the *Virtual Mayflower* are many and varied, especially given the need to interact with the final versions online, on PCs and laptops, tablets, Smartphones and possibly even gaming consoles. To build the 3D model, the two main toolkits will be

Autodesk's *3ds Max* and Trimble Navigation's *SketchUp*. These software packages allow developers to build each part of the ship to precise levels of geometric detail, including its contents, such as cargo, and even *avatars*, representing the passengers and crew. Then, to provide those components with a visually realistic finish, representations of flag, sail and clothing material, woodgrain effects, even skin texture, will be generated using image processing packages such as *Photoshop* or *Paint.net*. These will support the design of textures, or help to manipulate digital images, including those provided by artists, that can then be "pasted" onto the 3D geometries. Once the models and scenes have been constructed, they can be imported into a VR or game "engine", which enables the developer to add special effects, such as simulated weather, ocean movement, time of day changes, sound effects and many others. The same engine enables the end user to explore the scenes in real time, using a variety of control technologies, and to interact with a variety of objects, including the avatar passengers.



As well as the computing hardware and software, the *Virtual Mayflower* will be viewable in 2D and 3D using VR head-mounted displays, high-definition and ultra high-definition screens and projectors, Smartphones, tablets, and so on. Exploration and interaction will be possible using a wide variety of devices, including keyboard and mouse, gamepad controllers, joysticks, gesture and motion capture systems.

Another exciting set of technologies that will be used during the project are based on "drones", mentioned earlier. Recent developments have equipped some of the more professional drone systems with the capability to conduct detailed aerial surveys of buildings and historical sites. Using special video processing software, it is now possible to develop quite accurate 3D models of these locations directly from the footage captured whilst the drone is in flight. Dartmouth Castle will be one of the locations to be surveyed using this technology.

Finally, once the 3D version of the *Mayflower* has been developed, there will be opportunities for the residents of Dartmouth and elsewhere to test out some of the new Augmented Reality technologies and, using tablets and/or special head-mounted displays, bring the *Virtual Mayflower* back to the *real* Bayard's Cove (or any other waterfront location for that matter).

Further Information