



## Final Works Report

### Work Title

***The Creature Scanner***

### Collaborators

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(with Deb Polson)



### Concept Outline

*The Shardup Hunt* is an augmented reality game where players must search their real world environment for various instances of a shady character known as Shardup. They search using a special scanner that reveals where the Shardup's are hiding. When the player sees a Shardup on the scanners display, they depress the scanners trigger which emits a tractor beam. If aimed correctly, this tractor beam will grab the Shardup and drag and hold him onto the nozzle of the scanner device. The player then has a limited amount of time to aim the scanner at the *Shardup trap* before the tractor beam loses energy and releases the Shardup.

Once aimed at the *Shardup trap*, the player releases the trigger and the Shardup is sucked into the trap, which holds him suspended in a vortex from which he cannot escape. After all Shardup's have been captured, the game is won.

### Game Play Scenario

The game begins with various Shardup's around the real world environment. The user must seek each of these Shardup's. Whilst idling, the Shardup's issue taunts and jump around providing realism and an increased sense of immersion for the player.



The player must aim the device at the Shardup. When aimed correctly, the player presses the trigger and a laser is fired. The system determines if the Shardup's marker is within the viewfinder. If so, the Shardup is dragged onto the front of the camera.



When on the front of the camera, the Shardup struggles to get free. The user has ten seconds to put the Shardup into the Shardup Trap. To put the Shardup into the Shardup Trap, the user aims the device at the marker that relates to the trap and releases the trigger. If aimed correctly, the Shardup is sucked into the trap.



When in the trap, the Shardup circles around in the swirl of the traps vortex. Once all Shardup's have been captured, the game is won.



## Device Design

The physical components the game requires relate to two objects – a base station that houses the computer which drives the game and a scanner which is wielded by the user in order to investigate the environment. Different versions of these components are described below. In addition the project will require several large printed boards to carry the markers.

The computer required to run this program should conform to the following minimum specifications:

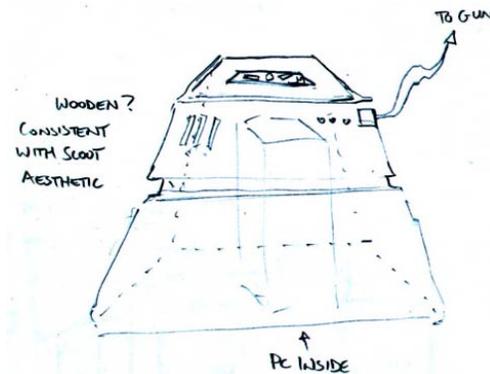
Windows XP  
512Mb RAM (1Gb Preferred)  
1GB Spare Hard Drive  
3GHz Pentium 4 Processor

Two designs have been provided for the housing of this computer (the *base station*). One is mount on the players back, the other is a shell which would house the computer. In the first case a laptop would be required, in the second a desktop computer would be possible.

The device created would be composed of a small LCD screen, a trigger button that is mapped to keyboard input and a web camera. Therefore, the device would need to receive visual output from the computer to the screen, and provide visual input from the web camera and keyboard input from the trigger. Additionally, speakers would need to be positioned in the space for the ambient and game sounds. The desired device would allow the user to move around the room carrying the device. It would enable them to point the camera in any direction they desire. Therefore a strong link would be required to ensure that the cables are not damaged or pulled from the computer.

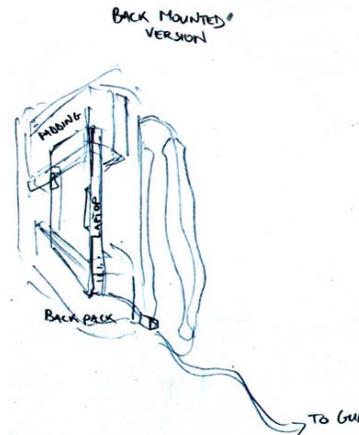
### Base Station Design Option A

This is the more feasible design as it is merely a decorated workstation. The unit encloses the computer running the game and is fixed to the ground at one point. This unit should be consistent with the general Scout aesthetic but also contain other embellishments that make the unit appear “high tech” and futuristic to add to the notion of the scanner. There should be a strong cable leading to the scanner unit that will be able to withstand hard pulls and attempts at stretching.



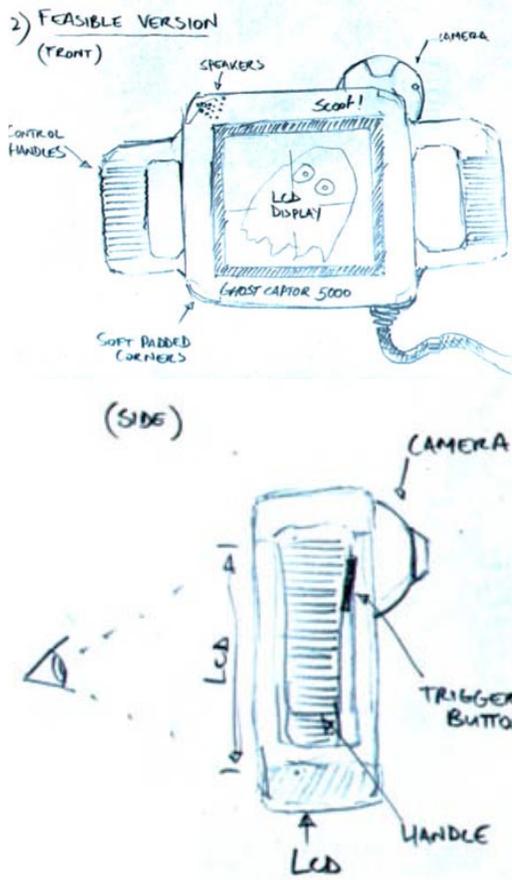
### Base Station Design Option B

A more exotic alternative. This unit is mounted on the players back pack which carries a laptop and broadcasts the audio events via short range radio to the speakers which are tuned to the correct frequency. This backpack could take design inspiration from the backpacks worn by *The Ghostbusters* and again have futuristic embellishments. Additional regard would have to be paid to security as this would be an easily removable device.



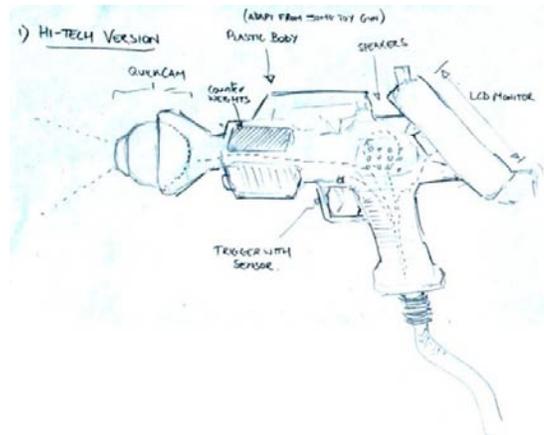
### Hand Held Scanner Design Option A

This version would possibly be easier to manufacture and handle than option A. A small (5" - 7") Lcd is mounted in a box with handles as shown to the right. A web camera is mounted on the back of the apparatus, pointing in the opposite direction to the screen. A small speaker is embedded in the apparatus. A trigger is present on the right handle. A robust cable carries the cables (VGA, usb and audio) to the base station. This is the preferred design for the device. The physical design is very flexible and will be determined mainly by what can actually be feasibly be created. The vital elements are, LCD, Camera, Trigger and robust cable. Inclusion of the speaker is not vital to gameplay, but would be a great addition if it can be done.



### Hand Held Scanner Design Option B

An alternative design for the apparatus. A futuristic gun-like device. The device carries the same functional components, camera, lcd, speakers, but the housing is more exotic and would be more difficult to manufacture.



### Program Dependencies

This game has been built using ARToolkit ([www.hitl.washington.edu/artoolkit/](http://www.hitl.washington.edu/artoolkit/)), an open source marker recognition library. This toolkit provides the ability for this game to detect certain symbols on markers which are

situated in the environment. The toolkit then determines the correct OpenGL transformation matrix required to relocate the origin of a 3D coordinate system to that marker. OpenGL objects may then be drawn, effectively on the given marker. The capabilities of the ARToolkit needed to be extended somewhat to allow for the Shardup's to be dragged from their position in the real world to the scanner. This essentially required finding the difference between the markers local origin and the global origin. This difference is then used to interpolate the Shardup's position from its marker to the scanner.

Originally, objects were drawn using a VRML library, but this library proved to have many limitations that were not conducive to the game, and so we created a similar library that was based on the Alias OBJ format instead. This gave us more control over the way objects were drawn, and in particular the way that they were illuminated.