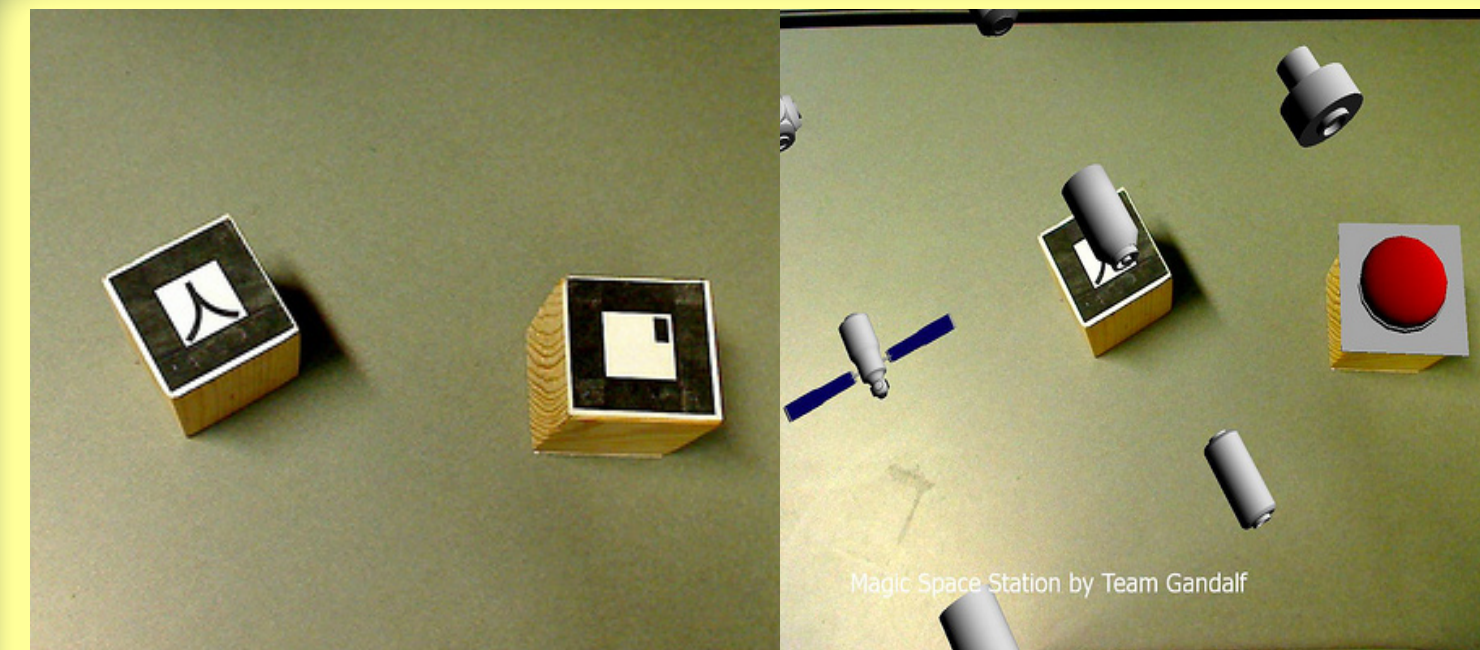


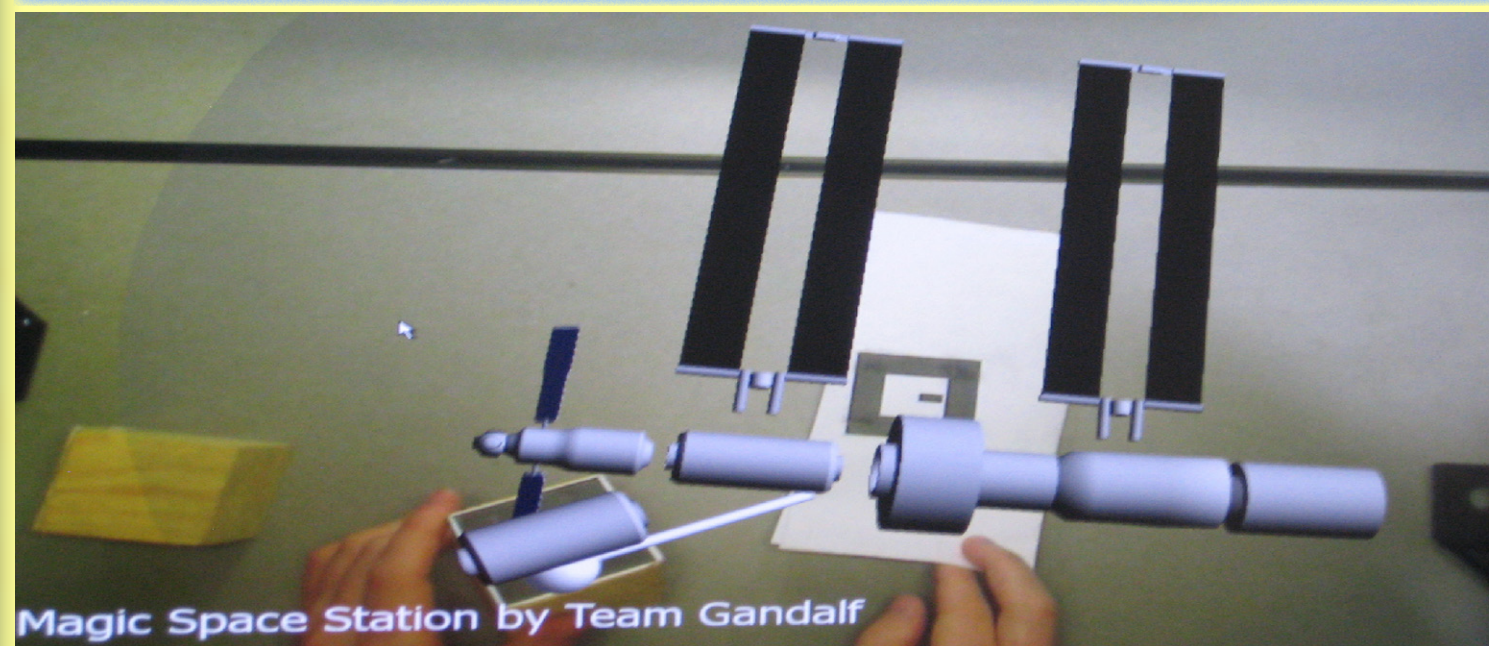
# Implementing Augmented Reality into the Gaming Industry on a Desktop Display Interface

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LEFT: Blocks with the Augmented Reality feature disabled.  
RIGHT: The same blocks with the Augmented Reality feature enabled.



Screen capture of a partially built space station, the parts library, the AR wand, and the "more magic" button.

## Abstract

This project focuses on the desktop display interface portion of augmented reality gaming. With this type of interface, the user is able to look upon a screen and see the augmented images displayed above simple markers. The desktop display alleviates most of the problems associated with head mounted displays (HMDs). The software designed to test the usability is an augmented reality space station construction game created with ARToolkit, OpenSceneGraph, and Maya. With the use of an AR wand, the user is able to design a freehand space station using pre-constructed parts.

**Keywords:** Augmented Reality, Desktop Display, Gaming



Three Dimensional CAD drawings of the Magic Table. The user manipulates the wand to move pieces to the build site. The parts library, wand, reset button, and build site are all displayed.

## Interface Design

The desktop display alleviates the need for bulky head mounted displays. It also allows for multiple user interaction.

Placing the desktop display on an adjustable pivot, allows for a wider range of users and camera angles.

The "AR wand" (wireless pointer) gives the user more freedom to move and copy components than simple block manipulations.

## Software Design

The user has control to modify the space station even after components are placed.

Each piece snaps to the closest point on an invisible grid in the closest ninety degree position.

The program is divided into a basic and advanced version. The basic version allows users to build the station using preconstructed parts. The advanced version keeps track of energy and resources used and incorporates technology trees, both of which limit the player's ability to build the station at random.

## Benefits of AR Gaming on a Desktop Display

AR provides for more interactive game-play than traditional video game platforms.

It increases visual perception of the gaming environment because the user is directly manipulating the components [1].

Desktop displays cause less fatigue and motion sickness than head-mounted displays [2].

AR gaming allows for an increased ease in collaboration and multiple users.

## Future Work

The user currently uses a wand to manipulate the objects in the game. It is possible to have the user wear a glove with hand markers to build the station. A further application would be to incorporate haptics to add another sensory enhancement.

The game itself can be upgraded to incorporate advanced game play rules, like a timer, and random mission scenarios the user must complete.

It may also be possible to simulate construction and breaking points with the incorporation of a physics engine.

### References:

- [1]. Ohan, O; Lister, L; White, S; & Feiner, S. "Developing an Augmented Reality Racing Game." Proceedings of the 2nd International Conference on INtelligent TEchnologies for Interactive Entertainment, Games Session. (2008): Article 2.
- [2]. Riva, Giuseppe. "Virtual Reality." Wiley Encyclopedia of Biomedical Engineering. International Ed. 2006.