COMPUTATIONAL ANALYSIS OF

FIRST-PERSON SHOOTER LEVELS

By

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A Thesis Submitted to the Graduate

Faculty of Rensselaer Polytechnic Institute

in Partial Fulfillment of the

Requirements for the degree of

MASTER OF SCIENCE

Major Subject: COMPUTER SCIENCE

Approved:

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April 2011
(For Graduation May 2011)

ABSTRACT

Level design for video games has long been a heavily qualitative process. In addition to the solely mechanical considerations that a level designer must take into account when designing a level, there exist many emergent factors that must be carefully identified and balanced in order to develop a map that is considered fun and challenging by its players. In first-person shooters, these factors include the placement of sightlines, the presence and location of chokepoints, and the balance of the gameplay utility of a given location versus the danger to the player at that location. To assist level designers in the creation of balanced level layouts, I describe a method through which a computer program can analyze these emergent factors. Using a variety of methods, this program identifies sightlines and chokepoints, then displays a visual representation of the overall utility and danger metrics, providing a fast and easy way to identify potential problems with a level in a first-person shooter. To assist this analysis, I describe a method for decomposing complex polygons into its convex components as well as a method for densely packing complex polygons of arbitrary shape with circles.