



Adding New Dimensions To Geospatial Data

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SimWright - Providing Speed and Accuracy for Geospatial Data Extraction

Corporate Background: Early in 1997, a small group of computer modeling and simulation professionals came together to form a new company. The team had extensive backgrounds in computer visual modeling and in the processing of photogrammetric data for military use in precision targeting. Their goal was to make advanced geospecific visualization technologies affordable for civilian applications. In so doing they hoped to enable broader use of these technologies in state and local government as well as in the engineering and planning firms supporting these agencies. Six years later, SimWright has successfully developed a number of tools that dramatically decrease the cost of data extraction from imagery while at the same time providing greater accuracy and resolution.

SimWright's processes and tools have been used to :

- Decrease the cost of collecting transportation asset data
- Decrease the time required to model complex visual simulation databases by well over one-half.
- Decrease the cost of collecting elevation and feature data for storm-water management
- Decrease the time to assess airport obstruction clearance assessment.

SimWright tools are designed to free the users from excessive dependency on proprietary hardware and software designs. Our tools are designed to provide ready access to photogrammetric data together with tools to use this data on desktop PC's. SimWright's approach is to choose best of breed software packages and integrate our unique capabilities with them. This enables our tools to be provided as low cost extensions and plug-ins to such products as Computer Associates MultiGen® Creator™ and ESRI's ARCGIS™ products.

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Developing tools and providing services for:

- Photogrammetric processing to produce accurate geocoded R3D stereo pair datasets
- Pan-sharpening, ortho-rectification, and accuracy improvement of imagery
- Applications that utilize stereo imagery to create geospatial databases
- Visual scene modeling to create accurately geocoded 3D renderings of cultural features
- Real-time visual simulation (4D rendering) for training, planning, analysis, public forums, etc.

Stereo Imagery Datasets Provide Process Foundation

Rapid technology advances in software and hardware have revolutionized the use of accurate geospatial data both for engineering processes and for 3D visual simulation. There are many workflows in use to create visual simulations but the basic process always begins with databases containing information about the area of concern. The information generally includes aerial photography or satellite imagery. The preferred approach for creation of 3D visual simulation is to use stereo imagery to ensure accurate three dimensional data about the area of interest. The overall process can be viewed simplistically in 5 distinct process steps. All of SimWright's processes begin with accurately geocoded 3D stereo imagery datasets created with what we call the R3D process. The R3D data production process is based on DOD precision munitions targeting algorithms to ensure the accuracy of the data extracted and created in subsequent steps.

The 5 process steps are described below:

- **Photo imagery processing**– The process of digitizing, geo-coding and storing stereo photography for future use in geospatial applications

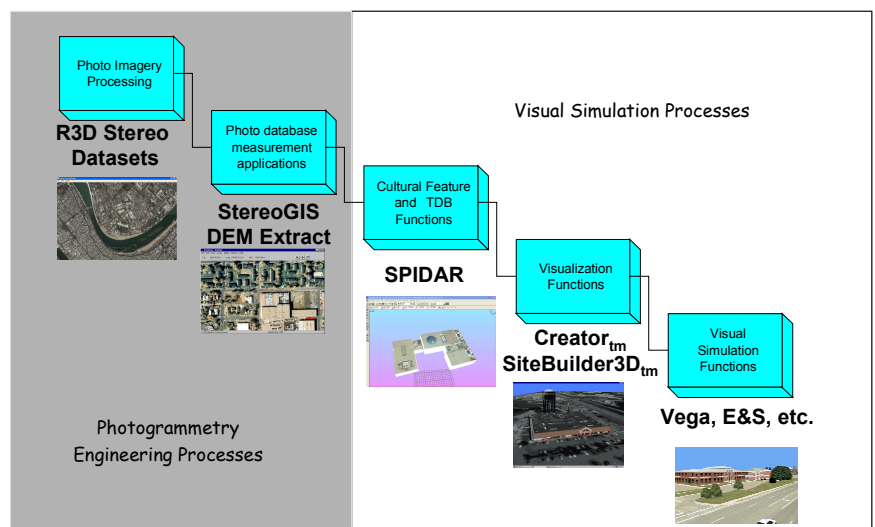
- **Photo database visualization and measurement processes**– The process of using viewers and imagery measurement tools to validate the accuracy of the data and to extract geo-specific data from the imagery.

- **Cultural feature and terrain database extraction functions**– The processing of extracting models and terrain details together with precise geographic location for use in 3D models of these characteristics.

- **Visual Database Creation**– The process by which the data extracted from the imagery is incorporated into a realistic 3D visual database that accurately reflects the area of interest.

- **Visual Simulation Creation**– The process of populating the 3D visual database with vehicles, people, and other objects together with dynamic behaviors to create a visual simulation that incorporates time, interactivity, and environmental factors to create a realistic real-time scenario in the area of interest.

When developing solutions for these processes, SimWright focuses on “process oriented” solutions as opposed to “product oriented” solutions. This ensures that SimWright solutions are as “open” as possible. It also ensures that our tools and data can be used in a variety of workflows regardless of the products upon which the workflow is based. SimWright uses tools that we have developed as well as off the shelf tools to address each of these process areas. This helps us to focus on “best of breed” process solutions.



SimWright provides tools and services to improve the use of geospatial imagery for visualization, training, operations, and planning

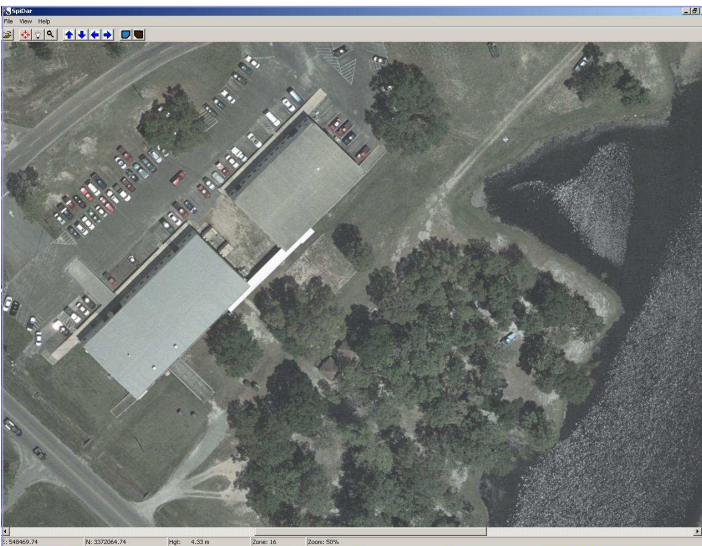
Accurate, high resolution photo imagery processing is the key to creating accurate, usable geospatial products. SimWright has developed photo imagery processing software based on algorithms originally developed for the Department of Defense. SimWright's stereo dataset production process has been demonstrated on a broad range of imagery sources including:

- Conventional digitized panchromatic and color aerial photography
- Large format digital color imagery from the Z/I Digital Mapping Camera
- Ikonos 1M pan-sharpened color stereo imagery from Space Imaging
- Quickbird .61M pan-sharpened color stereo imagery from Digital Globe

The dataset production process is extremely cost competitive and provides a digital imagery archive in which every pixel is geocoded to the accuracy and resolution of the underlying imagery. This database can then be used for creating visual simulation databases or feature extraction for other geospatial databases.

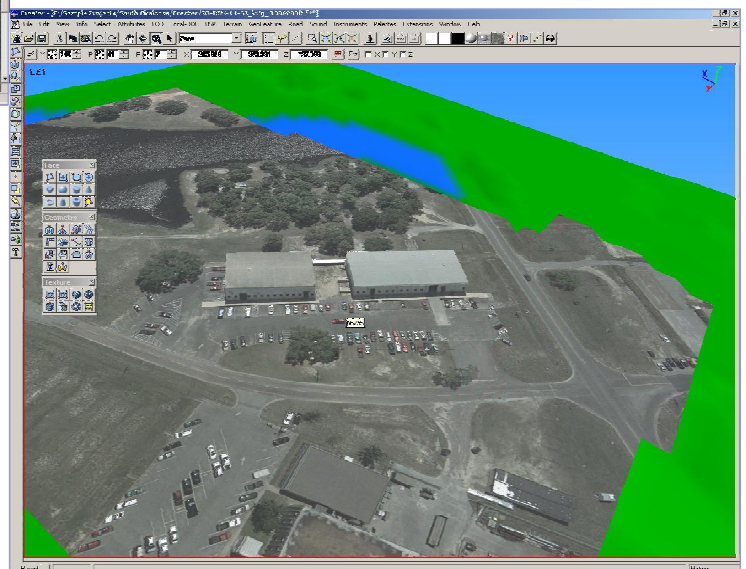
SimWright can use client imagery to create R3D datasets or can provide the tools and training to allow clients to perform this task on their own.

Spidar™ Feature Extraction Tool



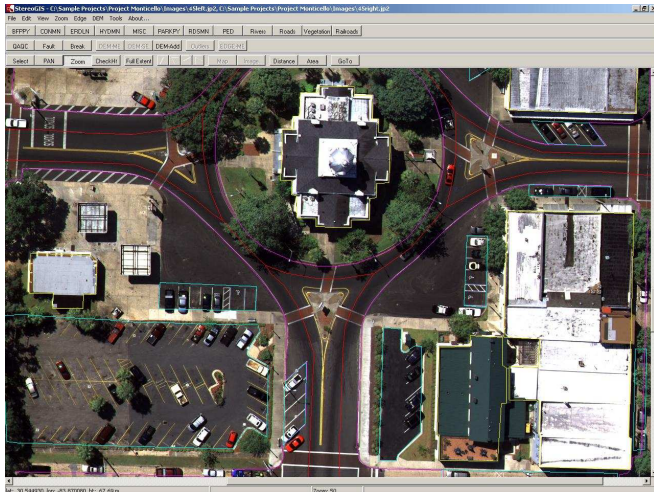
The Spidar™ stereo modeling tool operates as a plug-in to MultiGen-Paradigm®'s MultiGen® Creator™, ModelBuilder3D™, or SiteBuilder3D™. Spidar™ allows the user to view stereo imagery data pairs within the MultiGen-Paradigm® application of choice and extract polygonal models of buildings and other cultural features. The extracted features are geocoded so no further georeferencing is needed to place the features properly in the scene.

Spidar™ then enables the user to rapidly apply precision textures extracted directly from the imagery. Manual manipulation of textures is no longer required of the user. Textures extracted using Spidar™ are automatically spatially referenced and placed accurately in the 3D model environment. This allows for the collection and application of textures as the model is constructed.



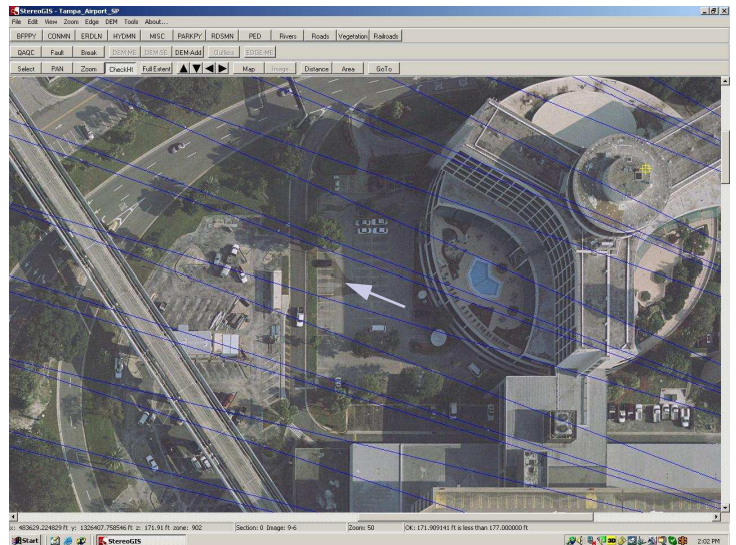
StereoGIS Feature Extraction

StereoGIS™ provides a fast and accurate method to extract 2D and 3D planimetric data, digital elevation data and topographic contours from digital stereo imagery data sets. It also provides the ability to overlay vector data onto stereo imagery and to view that vector data in stereo. This allows the user to perform QA/QC and editing functions on existing and newly created geospatial datasets.



StereoGIS™ has been proven as an extremely effective tool for geospatial dataset production. It allows the user to view R3D™ datasets in stereo and to extract the desired data from the imagery easily. These extracted features can then be exported into the ESRI shapefile format. An editable tool bar allows identification and extraction of specific types of feature sets. The accuracy of the stereo data also makes StereoGIS™ a useful tool for the QA/QC of existing datasets.

Recent modifications to the tool have adapted StereoGIS™ for use in automatically assessing compliance with the FAA's height obstruction clearance requirements. This variant of StereoGIS™ is called AeroGIS™ and is currently under evaluation by the FAA and several other airport agencies for general use in evaluating new and proposed development in the proximity of civil airfields. StereoGIS™ is also capable of providing 3D data to the FAA's existing 3DAAP program.



StereoGIS™ and AeroGIS™ are available as off the shelf software tools for use with R3D™ datasets. SimWright can also provide image processing services for stereo aerial photography and satellite imagery to create R3D™ datasets.



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