

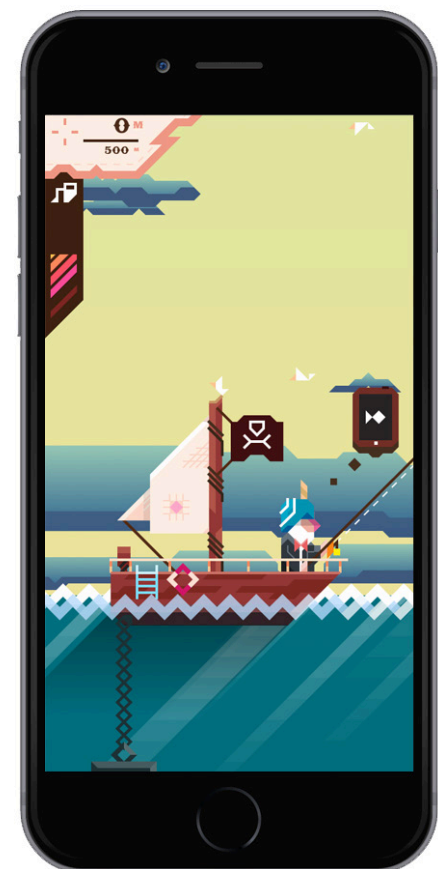


Abstract: Creating a Normal Map Editor

In this project, we designed and built Paranormal, a free and open source normal map editor on OSX for 2D graphic artists. Apportable's goal is to fill a missing link in the open source toolchain of applications that developers use to create iOS games. Normal maps make it possible for artists to incorporate 3D effects such as lighting and refraction, into 2D mobile games.

Mobile Graphics: The Elusive Third Dimension

Mobile games, designed for smartphones and tablets, are split into two main categories:

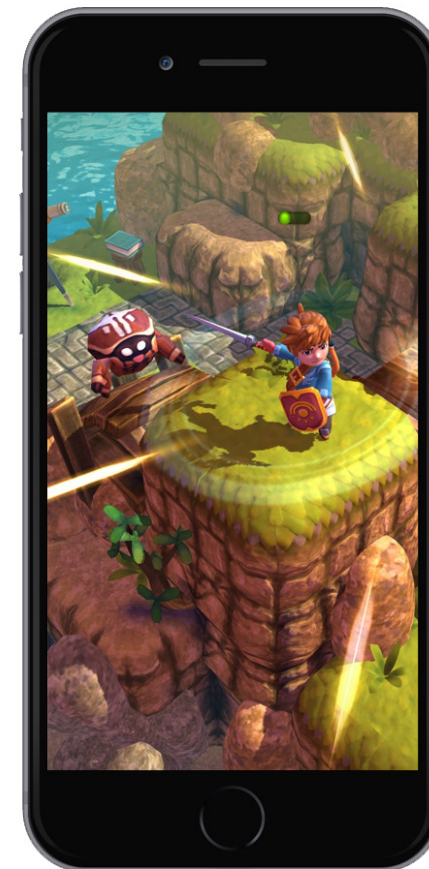


2D Graphics

- Simple and quick for artists to draw
- Fast rendering on slow processors
- Intuitive interface on touch devices
- 90% of the mobile game market

3D Graphics

- Requires full modeling of 3D assets
- Demands 10x more artist time
- Realistic appearance
- Dynamic lighting
- 10% of the mobile game market



Normal Maps: Bringing Dynamic Lighting to 2D Art

Normal maps allow artists to bring 3D dynamic effects to their games without the extra work needed to create full 3D models. A normal map encodes information about the shape of a surface in an RGB image, where the color at every point on the normal map encodes direction of the surface normal.



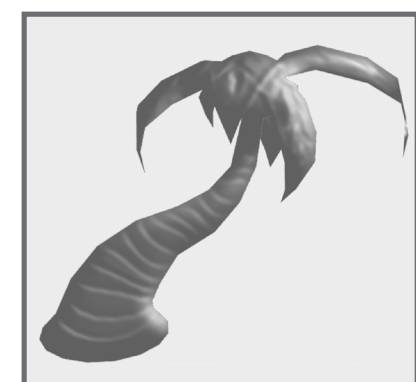
Diffuse Map

Original image, drawn by an artist, with flat lighting effects



Normal Map

Normal map, encoding information about the shape of the image's surface



Lit Image

Lighting applied to the surface, with dynamic shading



Final result

Lighting and diffuse map are combined for the final result



The appearance of a sprite is dynamic. It changes based on the location of lighting sources.

Image Sources
https://s3.amazonaws.com/ngw-misc/SpritebuilderTutorial/Pevedel_Preview.png
http://images.gizmog.com/gallery_img/mobile-games-with-great-graphics-3.png
<http://www.impulse-games.com/graphics/sofball3-3.png>
<http://tstack.imgur.com/pyWD4.png>

http://upload.wikimedia.org/wikipedia/commons/thumb/9/92/Adobe_Photoshop_CS6_icon.svg/2000px-Adobe_Photoshop_CS6_icon.svg.png
<https://lh3.googleusercontent.com/v8U1NnF1h0kUWU-U01cCvAlpk9CuZm00h3HfQz27JN1N6Fms4c8B9W0a4gVgD0hbE803xM6AL7Pc2PzwIbaPPhhQza7GQP0u57JMcYVWVW2h2bw>
<http://www.3dsmax.com/images/rodosculpt01.jpg>
<http://tstack.imgur.com/v1no8WqT1c3g/macxvdsfauh.jpg>

Paranormal: An Interface Designed for 2D Artists

Editor

The main window of our application, where the artist can use any of Paranormal's tools by clicking and dragging over an area with the cursor. The editor can display either the normal map, lighting, or the live preview.

Preview

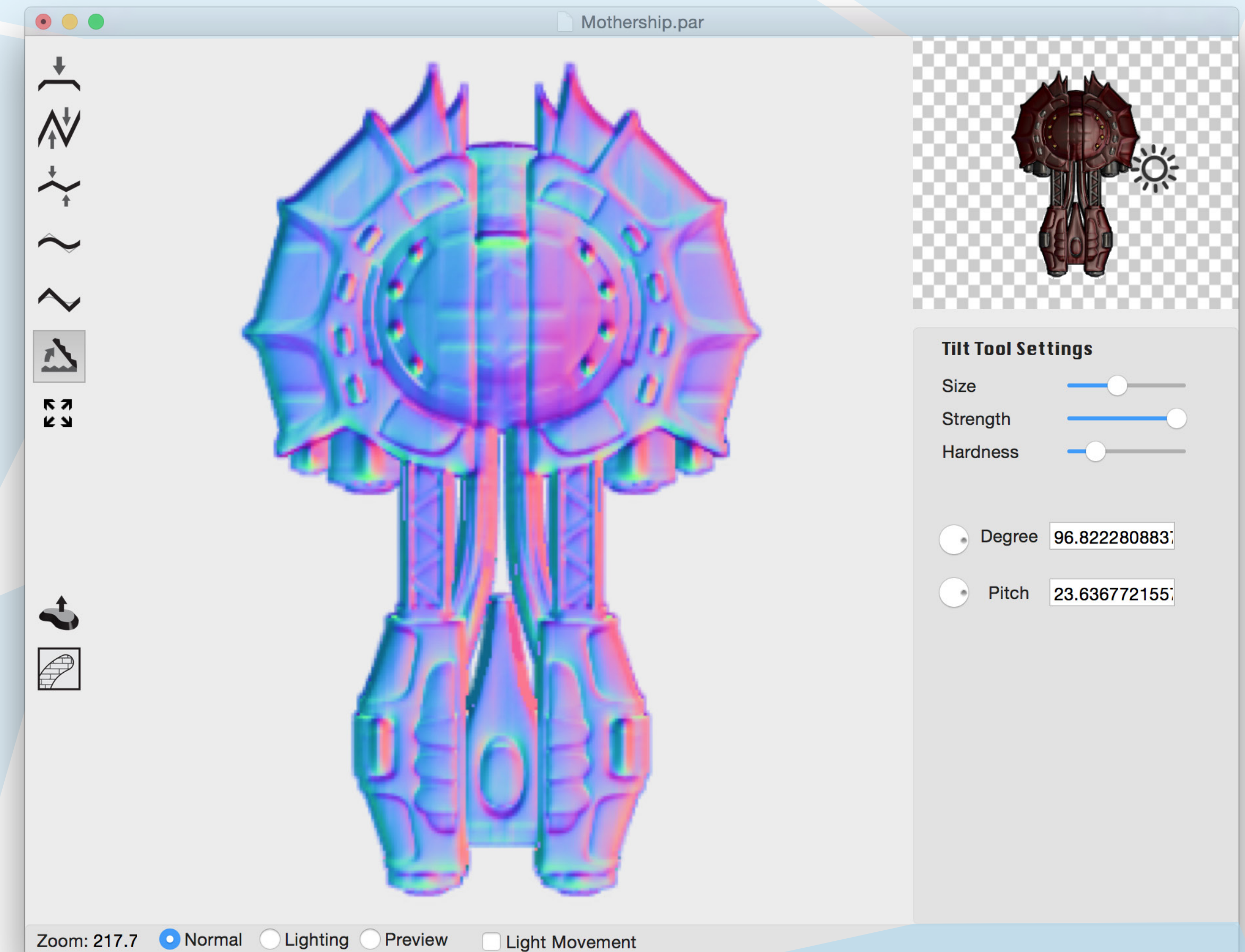
The preview gives the artist instant feedback on how their final lighting effects will look.

Tools

Paranormal's tools have interfaces like Photoshop's brushes. They perform intuitive modifications to the underlying surface. Tools include Flatten, Emphasize, Tilt, Sharpen, and Smooth.

Operations

Operations are one-time effects applied to the surface: Chamfer the edges, or add any texture.



Editor View Modes

Change the Editor mode to directly see changes to the normal map, the lighting effect, or the full preview.

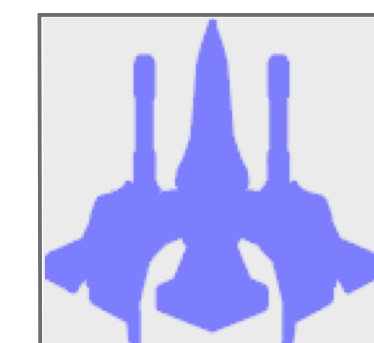
Tool Settings

Settings for the currently active tool control the tool's size, strength, hardness, and direction.

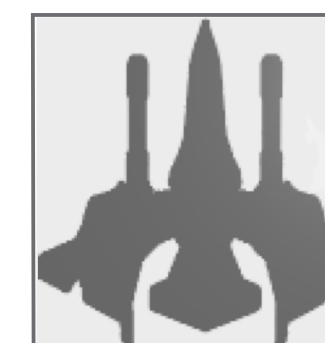
Sample Workflow

1 The artist creates a new project with a spaceship sprite. Paranormal automatically starts with a flat normal map for that sprite.

Normal Map

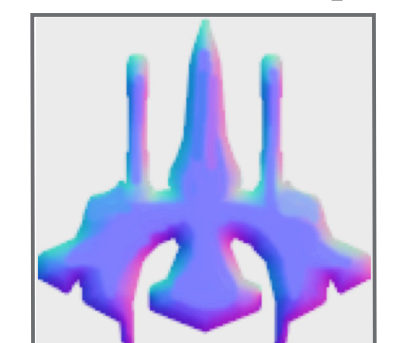


Lighting

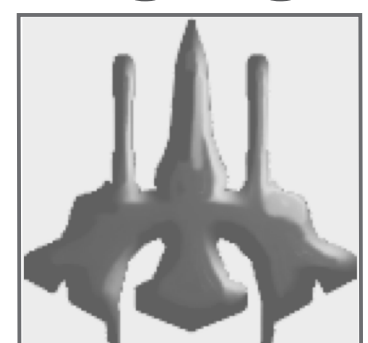


3 Next, the artist uses the Plane tool, drawing a flat surface on each panel to specify its direction.

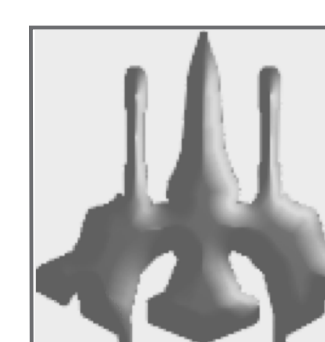
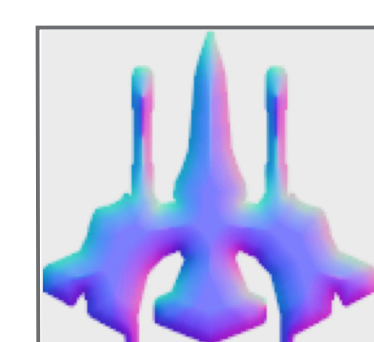
Normal Map



Lighting



2 To modify the sprite's edges, the artist selects the Chamfer operation. This creates a curved edge, making the whole sprite pop out.



4 Finally, the artist fills in details with the Tilt, Smooth, and Flatten tools, and exports their normal map to use in their game.

