

Blowhole: Blowing-activated Tags for Interactive 3D Printed Models

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Blowhole is a system for embedding blowing-activated tags into 3D-printed models to add interactivity. We add acoustically resonant cavities to the interior of a model with unobtrusive openings at the surface of the object. The user can import a 3D model to Meshmixer, and add blowing-activated tags to the desired region, then our recognizer identifies the cavity volume, and its linked actions.

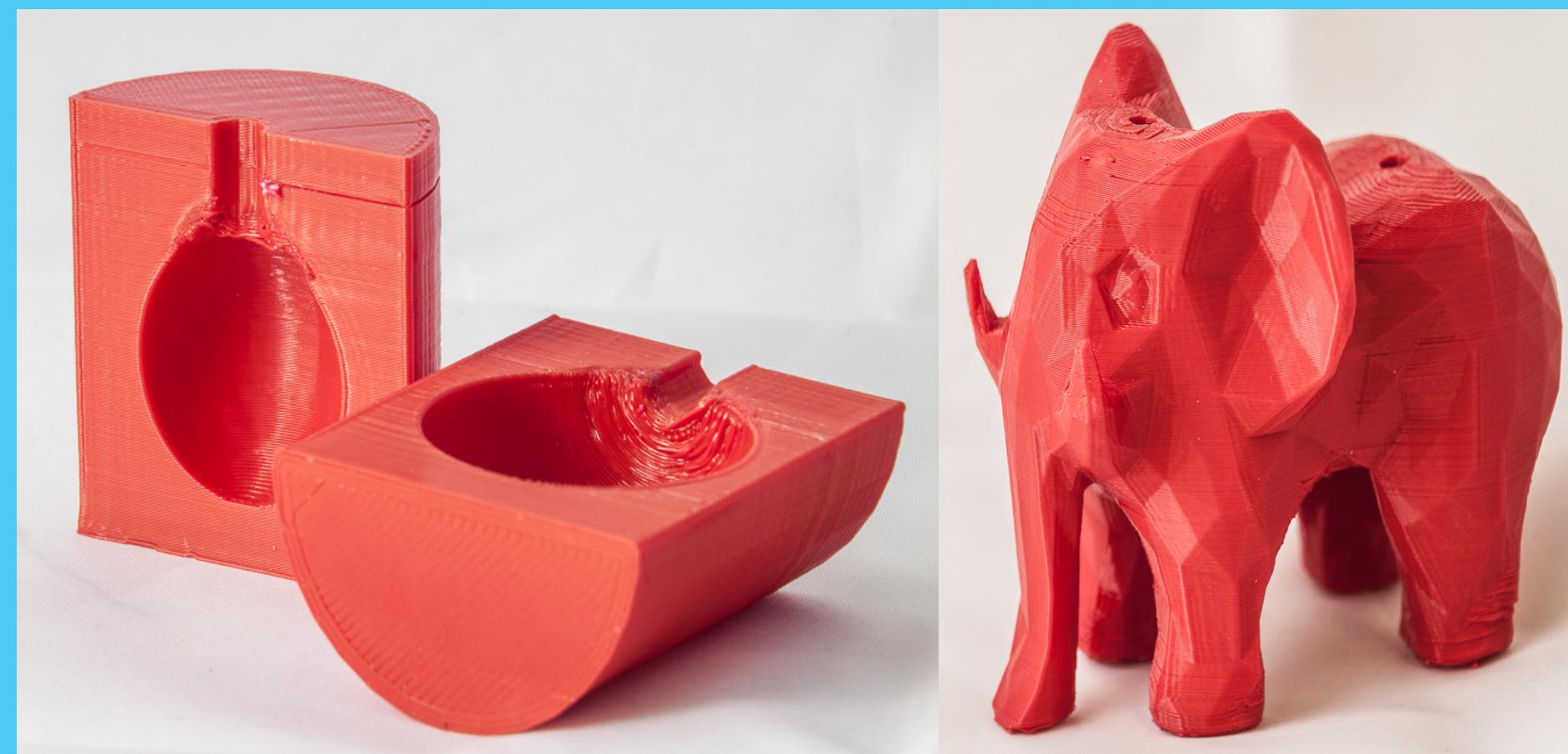


Figure 1. (Left) Blowhole cavities as seen from the inside.
(Right) 3D-printed model with Blowhole tags

Design Software

Our design software is built ontop of Autodesk Meshmixer. To create a Blowhole-enabled model, a user first imports an existing model into Meshmixer. Next, they select a region on the model where they wish to place a blowhole, and click "Add Position" in our software's floating window, specifying the desired action, as well.

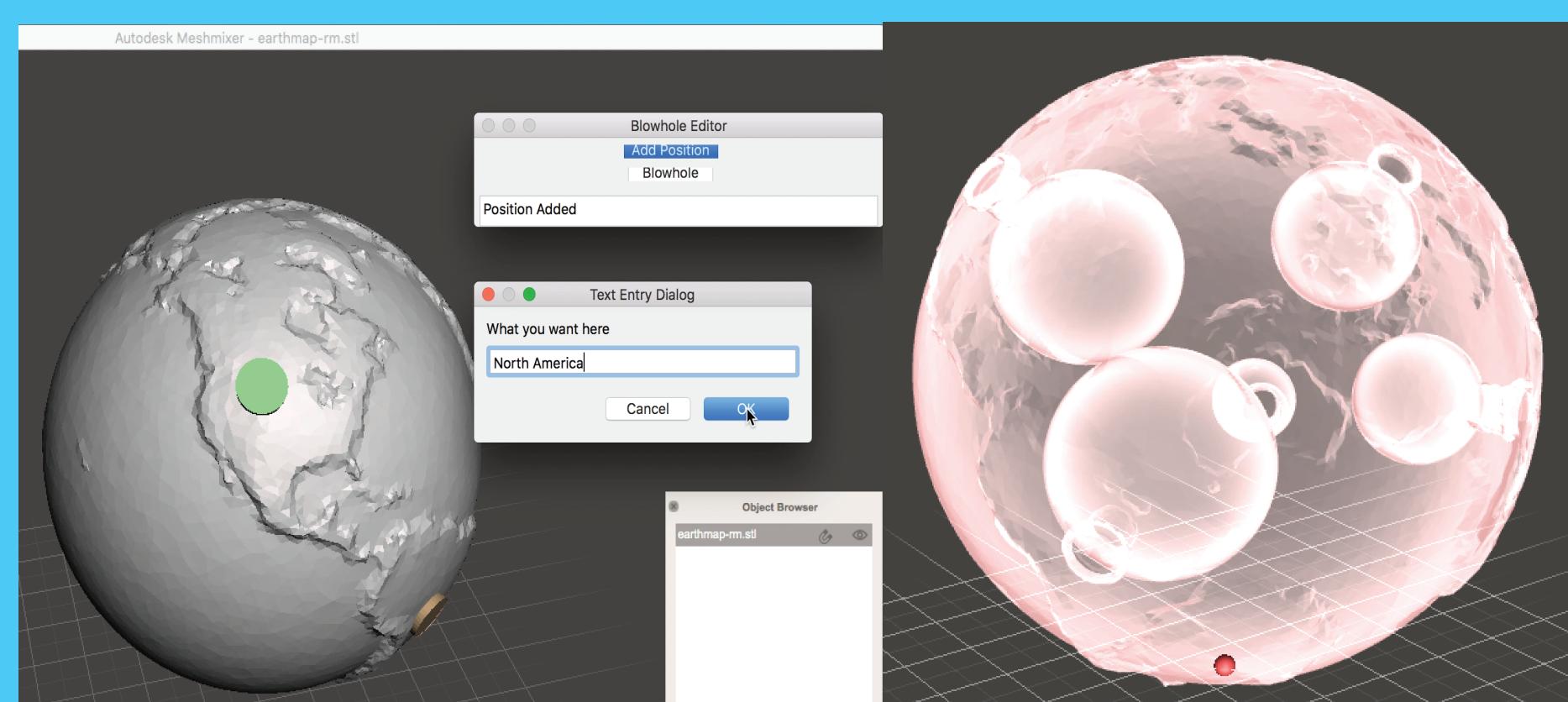


Figure 2. Meshmixer plugin for adding blowholes to a model.

Blow Sound Recognition

We disregard incoming noise by only analyzing audio chunks that meet a heuristically established root mean square (RMS) value, saving all the signals that meet said threshold. Once these aggregated chunks have a length of at least 0.7 seconds, we proceed to extract the fundamental frequency of said signal, and extrapolate the cavity radius using a developed mathematical equation.



Figure 3. User interacting with Blowhole.



Figure 4. Blowhole applications (Top Left)
Interactive globe. (Top Right) Reorganizable bar charts. (Bottom Left) Interactive Cell Model
(Bottom Right) Music Controller.