Automating the Process of Constructing Electronic Gadgets

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Abstract
The goal of Gadgetron is to allow a wide and general audience to be able to design and construct electronic gadgets. We are building web-based interfaces to allow users to design gadgets as well as a back-end toolchain for automatically creating the plans for the gadget.

Building and Testing
To test the functionality of the tool chain and the accuracy of sensors, we prototyped gadgets and built them using the web tool. To measure the accuracy of moisture sensors and thermistors, we prototyped a Garden Gadget and a Mood Orb gadget and built the gadgets using the web tool. The Garden Gadget automates the process of gardening. Using a moisture sensor and thermistor, the gadget recognized when plants needed watering or light and would tend to the plants' needs. The Mood Orb gadget was used to detect the "mood", or temperature, of a room and change the colors of an RGB LED accordingly. This gadget tested the functionality of RGB LEDs and thermistors. Building these gadgets through the tool chain helped widen the selection of components in the Component Catalogue, helped reveal bugs during schematic compilation, and helped improve the design of the existing web tool.

Schematic Compilation

<table>
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<th>Selection</th>
<th>Mapping</th>
<th>Inclusion</th>
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<tbody>
<tr>
<td>Electrical components are selected by compiler based on user's design.</td>
<td>Abstract interfaces connect components which produces a graph.</td>
<td>Utility elements are added.</td>
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<td>Connection</td>
<td>Resolution and Unification</td>
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<td>Interfaces are connected together.</td>
<td>Compiler retrieves electrical schematics for each component and the schematics are unified.</td>
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Design
User designs gadgets by adding components without needing to specify utility elements.

Schematic
Utility elements are added and components are connected together.

CAM Files
Components are placed and electrical connections are routed.

Gadget
A gadget is produced!

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