Abstract

Manual soldering is used extensively for assembling and repairing electronics. For students and hobbyists unable to buy specialized tools and fixtures, many of the greatest difficulties with soldering arise from the need to simultaneously hold the iron, the solder, and the component to be soldered (Figure 1). The Solder Buddy is an inexpensive soldering iron attachment that enhances the safety and productivity of amateurs by allowing the user to hold the iron and feed solder into the workpiece with a single hand.

Design Overview

To meet the design requirements, the following features were implemented for the prototype, as shown and labelled in Figure 3.

(a) Ergonomic and unobtrusive button placement
(b) Flexible feed hose enables wide range of feed angles and positions (Figure 5)
(c) Stepper motor controller allows for forward and backward feed at adjustable speeds (Figures 2 & 4)
(d) Adjustable attachment screws can accommodate different iron sizes

Analysis & Results

An analysis of the heat transfer between the iron and the feed hose determined that the attachment should be placed on the handle of the iron instead of near the tip to avoid overheating. The completed prototype was then tested to ensure that the design requirements had been met. The results are presented in Table 1.

Conclusion

The prototype was successfully used to solder several parts to a circuit board and satisfied all of the high priority design requirements. The Solder Buddy allows the solder and iron to be controlled effectively, intuitively, and safely with one hand at under one tenth of the cost of similar devices aimed at the professional market.

Design Requirements

A survey of students who frequently solder electronics established that there was interest in a device that would remove the need to feed solder with a separate hand. A list of prioritized design requirements was derived from the survey results.

• Iron and solder feed operated with one hand
• Light-weight and unobtrusive
• Inexpensive
• Fits most soldering irons

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Measured Value</th>
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</thead>
<tbody>
<tr>
<td>Feed rate range</td>
<td>0.125 – 3.5 in/s</td>
</tr>
<tr>
<td>Iron handle diameter range</td>
<td>0.2 – 1.8 in</td>
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<tr>
<td>Solder diameter range</td>
<td>≤ 0.05 in</td>
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<tr>
<td>Response time</td>
<td>&lt; 50 ms</td>
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<tr>
<td>Attachment weight</td>
<td>0.11 lbs</td>
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<tr>
<td>Estimated manufacture cost</td>
<td>$20</td>
</tr>
</tbody>
</table>

Table 1: Test Results

Acknowledgments

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