
Prototyping for Physical and Digital Products

Kathryn McElroy

Beijing • Boston • Farnham • Sebastopol • Tokyo

O'REILLY®



SHROFF PUBLISHERS & DISTRIBUTORS PVT. LTD.
Mumbai Bangalore Kolkata New Delhi

Prototyping for Physical and Digital Products

by Kathryn McElroy

Copyright © 2016 O'Reilly Media. All rights reserved. ISBN: 978-1-491-95275-7
Originally printed in the United States of America.

Published by O'Reilly Media Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472.

O'Reilly books may be purchased for educational, business, or sales promotional use. Online editions are also available for most titles (*safari.oreilly.com*). For more information, contact our corporate/institutional sales department: (800) 998-9938 or *corporate@oreilly.com*.

Editor: Angela Rufino

Production Editor: Colleen Lobner

Copyeditor: Jasmine Kwityn

Interior Designer: David Futato

Cover Designer: Randy Comer

Illustrator: Rebecca Demarest

Printing History:

March 2016: First Edition

Revision History for the First Edition: 2016-03-11: First Release,

First Indian Reprint: May 2019

ISBN: 978-93-5213-839-5

The O'Reilly logo is a registered trademark of O'Reilly Media, Inc. Prototyping for Physical and Digital Products, the cover image, and related trade dress are trademarks of O'Reilly Media, Inc.

While the publisher and the author have used good faith efforts to ensure that the information and instructions contained in this work are accurate, the publisher and the author disclaim all responsibility for errors or omissions, including without limitation responsibility for damages resulting from the use of or reliance on this work. Use of the information and instructions contained in this work is at your own risk. If any code samples or other technology this work contains or describes is subject to open source licenses or the intellectual property rights of others, it is your responsibility to ensure that your use thereof complies with such licenses and/or rights.

For sale in the Indian Subcontinent (India, Pakistan, Bangladesh, Sri Lanka, Nepal, Bhutan) and African Continent (excluding Morocco, Algeria, Tunisia, Libya, Egypt, and the Republic of South Africa) only. Illegal for sale outside of these countries

Authorized reprint of the original work published by O'Reilly Media, Inc. All rights reserved. No part of the material protected by this copyright notice may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, nor exported to any countries other than ones mentioned above without the written permission of the copyright owner.

Published by **Shroff Publishers and Distributors Pvt. Ltd.** B-103, Railway Commercial Complex, Sector 3, Sanpada (E), Navi Mumbai 400705 • TEL: (91 22) 4158 4158 • FAX: (91 22) 4158 4141
E-mail: spdorders@shroffpublishers.com • Web: www.shroffpublishers.com
CIN : U22200MH1992PTC067760 Printed at Decora Book Prints Pvt. Ltd., Mumbai.

Table of Contents

Prototyping for Physical and Digital Products.....	1
What Is a Prototype?	2
Why Do We Prototype?	7
How Is Prototyping for Physical and Digital Products Similar?	10
Prototypes for Physical Products	15
Prototypes for Digital Products	32
User Testing with Prototypes	41
Conclusion	47

Prototyping for Physical and Digital Products

There seem to be hundreds of new smart objects and apps reaching the market every day. With all of this competition, how do you know that your idea will be influential and that people will buy it? You've done the market research and found a viable sector, or you're working with a team that has an idea and is rushing toward a minimum viable product (MVP). But how can you truly know that your ideal customer will benefit from your new product or app?

Prototyping and user testing is the best way to make viable products that are impactful for your users. By creating incrementally better prototypes throughout your process, you can get valuable feedback to improve your product. By using real people, instead of merely trusting your gut, and observing how they interact with your prototypes, you'll see exactly where they get stuck, what they don't understand, and their visceral reaction to the entire experience. Prototyping is a key to developing a good experience and good user experience design.

In this report, I'll begin with the basics of what prototypes are, with examples from different industries. Then I'll explain why prototyping is important, including the many reasons for and value of prototyping. I'll dig into current approaches and more specifics for prototyping for physical and digital products. Finally, I'll explain how to set up and run user tests with these prototypes.

Physical products in the context of this report means physical-computing, electronics-based products, including smart objects, wearable technology, and Internet-connected devices, whereas digi-

tal products are software and apps that we use on devices that are usually screen-based. This report focuses on the abundant opportunities that we have designing for the Internet of Things and how to get started in electronics. It does not cover how to prototype for industrial design or product manufacturing.

By the end of this report, you'll understand how to create cheap, fast prototypes at a variety of different fidelity levels and how to user test them to get the best insights to improve your product. You'll feel empowered to take the next step in prototyping for your current project, and I hope that you do!

What Is a Prototype?

Prototypes are created every day for all sorts of situations. Even if you haven't consciously been making prototypes, they have most likely intuitively been part of your process or even your daily life. A prototype is “a first, typical or preliminary model of something, especially a machine, from which other forms are developed or copied.”¹ This “preliminary model” can be anything that takes an idea that's in your head and gives it a form to test. As long as your goal is to always improve your idea, everything is a prototype. They can be sketches, sculptures, or intricate drawings. Or they can be coded, soldered, and fully functional products.

All sorts of industries create prototypes of their work to test and try out different ideas, as you'll read in the following sections.

Architecture

In architecture, prototypes include floor plans (which are drawn and redrawn based on user input and needs), form studies, aesthetic models (Figure 1-1), air-flow models (testing ventilation throughout a space by showing how air will move through the rooms), and daylight models (improving window design by testing how much light they let in at any point in the day or year—see Figure 1-2). Each of these prototypes has a specific use and improves the building based on the testing of the models.

¹ “Prototype,” Merriam-Webster, accessed January 10, 2016, <http://www.merriam-webster.com/dictionary/prototype>.