

# INTERACTIONS

SAMPLE LOGO



## ProbeTools

DIY user research devices

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# ProbeTools: Unconventional cameras and audio devices for user research

Interaction Research Studio



TaskCams can be made in a variety of configurations and housed in paper or 3D-printed cases.

ProbeTools are fully self-contained digital devices robust enough to be used in the field. Each one offers a unique and engaging way for people to tell you about themselves and their everyday lives. At the outset of a study, you configure the devices and lend them to participants to use independently. Once they're done, they return the ProbeTools to you. Simply download the pictures and recordings, and enjoy interpreting new glimpses into other people's worlds.

**TaskCam** lets people take pictures in response to prompts ('tasks')

displayed on a small screen on the back of the camera. Participants can scroll through tasks, select one, and take a picture in response. Each new image is stored along with the current task that prompted it. Both the tasks and the pictures are stored on an enclosed Micro SD card, allowing you to customise the tasks before your study, and download the pictures when participants have returned the device.

TaskCam is an updated version of a classic Cultural Probes camera, and the workhorse of the ProbeTools family.

## Does your user research lack colour?

### Switch to Probetools

Is user research letting you down? Are you finding the results a bit... drab? Do you sometimes feel trapped by your data, held back from the dizzy heights of inspiration?

Perhaps it's time you tried ProbeTools!

ProbeTools are unconventional cameras and audio devices you lend to people to document their own lives. Designed by design researchers for design researchers, ProbeTools' unusual affordances guarantee intriguing surprises, providing 'just enough' empirical grounding while leaving plenty of room to dream....

Don't settle for information - try ProbeTools today!

[probetools.net](http://probetools.net)

USER RESEARCH MONTHLY

JANUARY 2019

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VisionCams come in vertical or horizontal orientations. Swivelling the lens cap activates the camera. Ribs on the casings facilitate attaching accessories, including commercially-available USB battery packs for power.

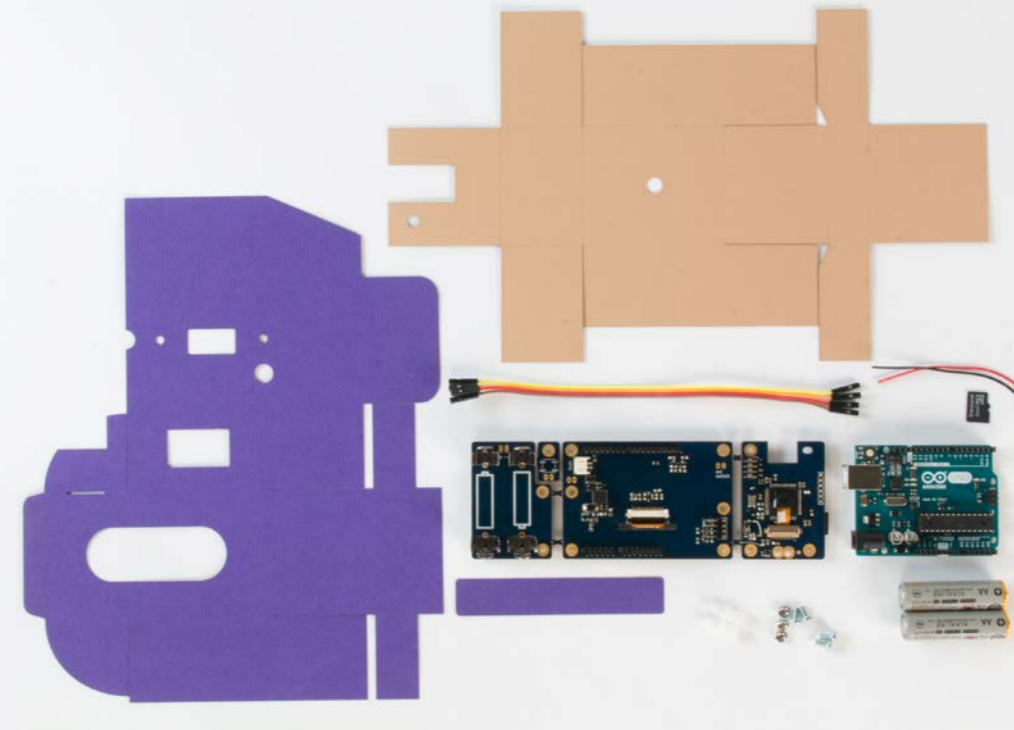


Interviewer can be made with 3D printed or textile cases to suggest various cultural connotations. Pressing the button plays a question, after which participants are given several seconds to record their answer.

**VisionCam** captures time-lapse images when it is activated, and uses computer vision to retain only contour animations, similar to line-drawings, to protect privacy and enhance aesthetic interest. It is designed to be a non-invasive way to record events over time at home or in public spaces. Participants can choose where to place the camera, and adjust the density of contours, to control what is shown and in how much resolution. As with all the ProbeTools, when participants return the devices, the results can be downloaded for your review.

**Interviewer** asks people questions that you record, then pauses for a short time to record their answers. Digital audio processing is used to change both the questions and the answers to anonymise voices. Participants can borrow the Interviewer, loaded with the questions you want to ask, and use it at their own pace wherever they please – they can even answer questions more than once. When combined with playful questions, its disarming form is designed to evoke spontaneous and intimate replies.

ProbeTools create a space of possibilities for learning about people – from the answers they give to your questions, to pictures they take themselves, to animations recorded passively. Use them together or separately to gain new access to what your participants get up to when you're not around. Better yet, ProbeTools are completely reusable. Simply clear the memory, load up new tasks or questions, and you're ready to run a new study.



### Making ProbeTools

There's only one catch to ProbeTools: you can't buy them online or in stores. You have to make them yourself!

ProbeTools are DIY devices — fully finished designs that people can make themselves with little or no technical expertise. Most of electronics simply slot or snap together; many versions do not even require soldering. For the most part, they rely entirely on off-the-shelf components that can easily be ordered online, combined with software that we make available for download. The only exception is the TaskCam, which relies on a custom Arduino shield that we sell on a not-for-profit basis from our website, [www.probetools.net](http://www.probetools.net).

The finished devices can be housed in a variety of ways. For instance, we offer templates for cases made of card or paper, patterns for sewing textile cases for the Interviewer, and complete specifications for a range of 3D printed housings. Our aim is to make the ProbeTools accessible and easy to make and use for even the least technically-minded designer, practitioner or researcher. Think of them as flat-pack furniture of the technology world (except with better instructions).

ProbeTools can also be seen as open-source products, in which all the specifications needed to build a hardware product are made available for anyone to build, modify and improve. We have released full, editable specifications for the ProbeTools' hardware and software to encourage customization. We welcome contributions from people who want to add new features, try new components, offer new housings, or spin off completely new designs.

A lot of specialist knowledge is needed to engage with most open-source products, from programming to 3D CAD modelling. This means that, in practice, they are mainly accessible to expert users. We see DIY devices like ProbeTools as spanning from the world of open-source products towards the easy-to-build electronics kits sold by companies like Technology Will Save Us ([www.techwillsaveus.com](http://www.techwillsaveus.com)). By designing them to be extremely easy to make and use on the one hand, and absolutely open to modification on the other, we hope to have made ProbeTools accessible and appealing to audiences ranging from technological newbies to hardcore tech fanatics.



### Make, Use, Interpret

ProbeTools are designed to be used in a three stage process:

1. Researchers *make* the devices and configure them for their study.
2. Participants *use* the ProbeTools to document their lives.
3. Researchers *interpret* the images and sounds when participants return the tools.

The result is a kind of dialogue between researchers and participants, with plenty of room for surprising twists and interesting digressions.







(Above) VisionCam can be placed to record everyday events unobtrusively. (Below left) Participants can answer Interviewer's questions whenever and wherever they like.



ProbeTools are aesthetically finished and technically robust so participants can bring them along in their day to day activities.



### Using ProbeTools

Once you have made the ProbeTools, you can hand them over to your study participants who will use them to document their worlds.

Each of the ProbeTools is designed to be simple and intuitive to use.

Participants can take their TaskCam with them wherever they go. Scrolling through prompts on the camera, looking for one that inspires a picture, can be a pleasant diversion. Alternatively, the TaskCam can be used spontaneously when your participant

sees something that reminds them of one of the tasks. Either way, TaskCam shows how many times they've responded to a task, allowing them to keep track of how they're doing.

VisionCam can be used in two ways. You can instruct participants to use it in specific locations or situations – for example, to record an evening meal, or activities in their front hallway, or even a walk to work. Alternatively, you can use more open-ended requests – “a place to slow down”, for example, or “the taste of morning” – to prompt

participants to find their own ways to use the device.

Interviewer can be used whenever participants have the urge. They might decide to answer all the questions in a single session, perhaps somewhere private at home or in a secluded spot outdoors. Or they might carry it with them as a kind of companion, answering a question or two in their off moments. There's no limit to the number of times they can answer the same questions, so different situations might give rise to different responses.

### Retrieving the Results

You can ask participants to return the ProbeTools to you by a deadline, or simply when they feel they've spent enough time with them. Returns can be made face-to-face, occasioning conversation about the tasks and how participants chose to address them. ProbeTools are also robust enough to return by mail: the feeling of overcoming distance to communicate can also be evocative for design.

It's exciting to see the images and recordings piling up as you download them from the devices' SD cards. We usually organize them by participant and task, but many strategies are possible.







Images and recordings can easily be retrieved from the ProbeTools and used to inspire design sessions.

### ProbeTool Returns

Interpreting probe returns can be daunting. It's not always clear why a particular picture has been taken in response to a certain task. Is it meant to be the cat in the foreground that is 'beautiful', or the view out the window? Why is a picture of a bus an appropriate response to 'something broken'?

There are a few tactics for using probe returns that can help. One is to look for landmarks – individual returns that stick out as particularly salient or interesting. Another is to focus on textures across returns, ignoring details to get a feeling for the combination of person and place that they reveal. Sometimes TaskCam questions don't matter so much, for instance, as the unusual views into

people's lives that they elicit. Finally, it is useful to imagine the person behind the returns. What does an interview response suggest about motivations, hopes, fears? What does a VisionCam animation suggest about somebody's home life? Can you extrapolate to how your participants might orient to other situations? You won't be sure of your answers, but your guesses might still lead to new and productive ideas.

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Someone once compared interpreting probe returns as being like flying a kite. Anchored by their origins in participants' realities, your interpretations are borne aloft by imagination, but will travel only so far as you choose to let them go.

There are no right answers when it comes to probes. They are designed to be empirically grounded, yet open to interpretation. They rely on imagination and provisional speculations. Their purpose is not to produce validated, detailed accounts of participants' lives, but hints and clues that can be a starting point for design. The ProbeTools embody this ethos, offering new ways to collect evocative data for design.

### DIY Designs

There are several reasons for designing ProbeTools as DIY devices.

Primarily, we want to support their use by as many researchers and practitioners as possible, because we believe Probes to be a useful method for Design.

ProbeTools are also part of our broader investigation into how design research products can circulate more widely. Typically, practice-based researchers produce only one or a few multiples of the things they design. That means that, as James Pierce [3] has pointed out, most of us never get to live with or gain first-hand experience of the artefacts made by other practice researchers. Instead we encounter them through articles or lectures, or occasionally in exhibitions. This is a shame insofar as these artefacts are thought of as embodying new knowledge, not just in their conceptual design or appearance, but in the lived experiences their use engenders and their changes over time. From this point of view, making ProbeTools available as DIY

products is a test of a new strategy for circulating research products.

The third reason we have made ProbeTools as DIY devices is more political. We are interested in circulating ProbeTools widely not only to promote an approach to research, or to disseminate the outcomes of our practice, but to explore the possibility of designing and distributing computational products independently from the large, profit-making companies that currently dominate our digital lives. To be sure, we enjoy the latest technological offerings from Silicon Valley as much as anybody. But, along with many people these days, we are also concerned with their costs – the incursions into our privacy, the amplification of attention-seeking voices, the commodification of the lowest common denominators of everyday life. We're curious to see if a form of DIY products that span from open-source to flat-pack designs might provide an alternative, less encumbered approach to designing and delivering computational products.

### Batch Production and Dissemination

We have explored batch production as a tactic for increasing the number of people who can gain first-hand experience with the research devices we design. Over a series of projects, we produced different computational products in increasingly larger numbers – from about 12, to 20, to 35 – culminating in a large-scale study in which we produced 130 technically-sophisticated mobile devices for use in a large-scale field study in London [2].

The results were amazingly rich and rewarding. But the cost, both in effort and money, was prohibitive. It took many person-years, and tens or even hundreds of thousands of dollars, to produce even 130 devices. For research purposes, then, our conclusion is that it doesn't make sense to batch produce more than about 20 copies of a research product depending on its complexity. For dissemination, on the other hand, this is far too few. Batch production does not seem a viable option for circulating research products widely. Far more promising, it seems, is to design DIY devices that people can make themselves.

(Right) Examples of images guiding the construction of TaskCam Paper Long. Full, illustrated 'recipes' for making ProbeTools can be found on [www.probetools.net](http://www.probetools.net)



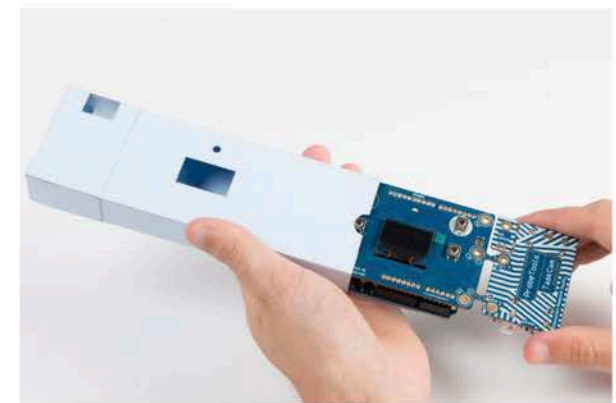
Step 19 Tape the flaps down on to the side of the case



Step 20 Tape the flaps down on to the side of the case



Step 21 Leave the other side of the casing open to insert the electronics



Step 22 Insert the assembled working TaskCam Arduino Shield into the inner case. The screen should point towards the rectangular cut out for the screen. The camera should point out through the camera hole.



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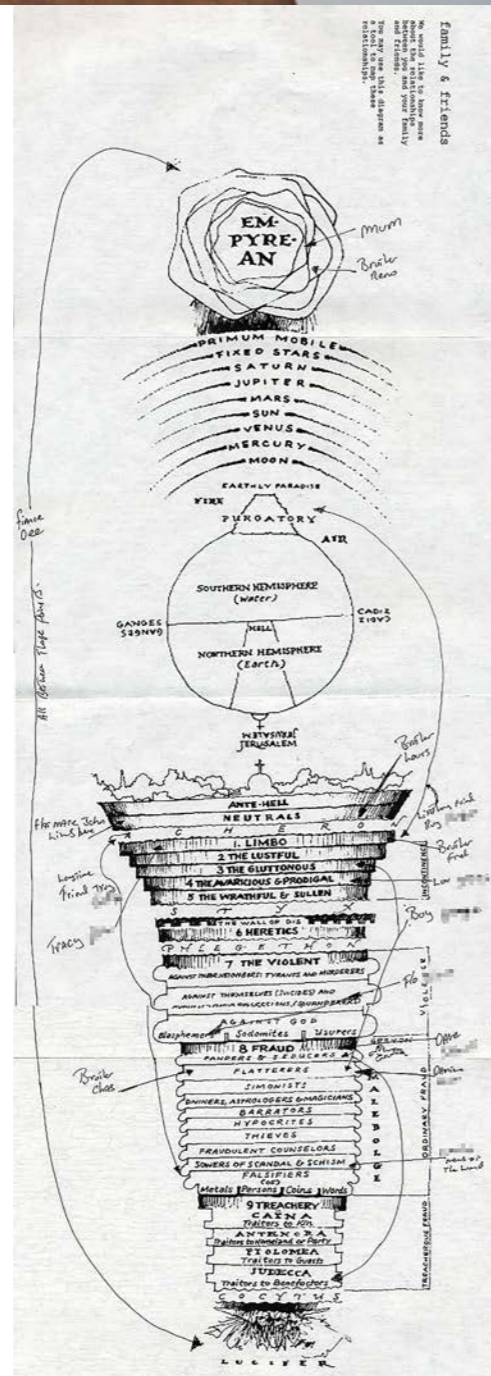
### Cultural Probes

Cultural Probes are collections of evocative tasks given to volunteers to elicit inspiring responses. Probes were invented in 1999 by Gaver, Dunne and Pacenti for a project set in three different European communities [1]. The impetus was to avoid questionnaires or focus groups, which were felt to prefigure or homogenise responses, and instead find a more exploratory, expressive form of self-documentation.

Most Cultural Probes are collections of materials posing tasks for volunteers. These typically include a variety of printed items such as maps, postcards or diagrams with requests for people to add information in the form of annotations, drawings or stickers. For example:

- a set of self-addressed postcards which ask questions (“what would you write your local politician?”, “tell us a joke”, “what do you like about where you live”)
- maps with stickers allowing people to mark where they live, where they go to see other people or to be alone, or where they would like to go but can’t
- readymade diagrams (e.g. an image of the solar system) with a request to indicate friends and family.

Tasks and material can change from study to study — there are no pre-defined ingredients. Often they also include simple devices such as



cameras or recorders with requests for certain kinds of content. ProbeTools are designed to augment or replace these devices, which are increasingly becoming outdated, or too fully-featured to offer the constraints that are useful for Probes.

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Important as the Probes’ material forms are, it is the design of the tasks which determines whether or not Probes are intriguing and revealing.

The best Probe tasks balance empirical encounters with playfulness and surprise. For participants, they undermine ideas about research to encourage informal intimacy and creativity. For researchers, they produce observable evidence with enough uncertainty to leave room for the imagination.

In designing probe tasks, the aim is to hit a sweet spot between focused inquiry and entertaining self-expression. Good probe tasks are almost flirtatious, allowing innocent replies while opening the door to more intimate responses. Thus playful, open, or even absurd requests are more rewarding for participants and surprising to researchers than straightforward ones. But clever opportunities for play that don’t reveal anything meaningful aren’t useful either. Balance is essential in designing probe tasks.

It should be clear that the epistemological commitments of Probes are different from many other user study methods. Rather than emphasising the collection of representative, comprehensive and verifiable data, Probes reveal fragmentary insights into peoples’ lives, balancing empirical encounters with a sense of mystery that leaves room for, and ideally stimulates, designers’ imaginations.

ProbeTools are designed to offer affordances that are useful for creating Cultural Probe studies. For instance, the automated animations produced by the VisionCams sacrifice some of the information conveyed by video not only to protect privacy but because the results are more ambiguous, open to interpretation and aesthetically compelling. Moreover, we make ProbeTools available as DIY designs to allow people to build upon these characteristics for their own studies. Of course, it is possible to use ProbeTools to serve more traditional forms of user study – just as it is possible to disguise a conventional questionnaire as a Cultural Probe. We hope, however, that by making ProbeTools available, we will not only encourage the use of the devices themselves, but of the methodological approach behind them.

### Endnotes

Bill Gaver, Tony Dunne, and Elena Pacenti. 1999. Design: Cultural probes. *Interactions* 6, 1 (January 1999), 21-29. DOI: <https://doi.org/10.1145/291224.291235>

William Gaver, Andy Boucher, Nadine Jarvis, David Cameron, Mark Hauenstein, Sarah Pennington, John Bowers, James Pike, Robin Beitra, and Liliana Ovalle. 2016. The Datacatcher: Batch Deployment and Documentation of 130 Location-Aware, Mobile Devices That Put Sociopolitically-Relevant Big Data in People’s Hands: Polyphonic Interpretation at Scale. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI ’16)*. ACM, New York, NY, USA, 1597-1607. DOI: <https://doi.org/10.1145/2858036.2858472>

James Pierce. 2014. On the presentation and production of design research artifacts in HCI. In *Proceedings of the 2014 conference on Designing interactive systems (DIS ’14)*. ACM, New York, NY, USA, 735-744. DOI: <https://doi.org/10.1145/2598510.2598525>

The Interaction Research Studio at Goldsmiths, University of London, brings together designers, technologists and social scientists to pursue practice-based research on technology and everyday life. Studio members are Andy Boucher and Bill Gaver (co-leaders), Dean Brown, Naho Matsuda, Jen Molinara, Liliana Ovalle, Andy Sheen, Mike Vanis and Alex Wilkie.