

日本ではあまり見かけないような気がするが、Web をみると Advanced Realtime Tracking GmbH( そのまんまの名前だ) というドイツはミュンヘン近郊の会社らしく、フランホーファー研究所のサイトにも写真があるので、ヨーロッパでは流行中なのかもしれない。液晶シャッター

眼鏡にも、偏光眼鏡にも、必ずといっていいほど、白い実のなった枝がついていて、スクリーンや画面の上方に赤外カメラがついている。

Advanced Realtime Tracking GmbH: <http://www.ar-tracking.de/>

## ラク楽実践 VR ■コラム

## お役立ち SHOP 情報 (USA)

### U.S.Store Introduction Report

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Doing research in the field of VR often requires creative solutions to specific hardware problems. Using the "engineering method" of building several, incremental prototypes involving hardware and software, evaluating and improving the design with each iteration, can be aided by being able to quickly acquire basic hardware components.

In the USA, there are several good online sources for ordering electronic parts of all kinds. Most places offer different shipping options, including overnight shipping. In addition to parts, some places also carry equipment for outfitting a lab, such as variable power supplies, soldering irons, oscilloscopes, or static mats. As with all shopping, it is a good idea to compare prices on different parts from different sources. For example, when building our latest advanced prototype device, we purchased about 70% of the parts from one vendor, 20% from another, and 10% from a third. This "comparison shopping" is an especially good idea for the most expensive parts of a given prototype, such as microcontrollers, clock crystals, and breadboards. Because most places have a section on their Web sites where they list "Current Specials" or something similar, we can often reduce the (already low) cost of the parts significantly. These places also have free printed catalogs you can order if you prefer. The main online shops that we use are Digi-Key Corp. ([www.digikey.com](http://www.digikey.com)), Jameco Electronics ([www.jameco.com](http://www.jameco.com)), and All Electronics Corp. ([www.allelectronics.com](http://www.allelectronics.com)). Others exist, so it is best to search for others if you need some specialty parts not found at these places.

After a few design iterations using breadboards, it often becomes attractive to build a more-robust prototype using a Printed Circuit Board (PCB). There are some good online options for creating prototype PCBs at very reasonable prices. We have had great success with Advanced Circuits, Inc. ([www.4pcb.com](http://www.4pcb.com)). The cost of a single, two-layer PCB in quantities of one is around \$35. Submission of the Gerber files (standard output from PCB CAD packages) can be done online when the order is placed, thereby automating the entire process. In addition, their telephone support is excellent, so it is possible to ensure the proper result.

In addition, a well-known chain of physical stores called RadioShack ([www.radioshack.com](http://www.radioshack.com)), often carries more-mainstream electronic parts. If there is a need to get a part more quickly than overnight, this may be a good source, as you can just walk in and purchase. Located all throughout the US, the parts carried at any one store varies, so it is always better to phone them first before visiting. We have found such parts as rugged plastic boxes, gender changers, serial connectors, and audio cable. It is a bit more expensive than ordering from the Web or a catalog, but may be more convenient.

In closing, there are a number of surplus stores that often carry interesting items that may be of interest to VR researchers. One in particular, American Science & Surplus ([www.sciplus.com](http://www.sciplus.com)), I have found to be a great source for odd items, such as vibrating pager motors, LEDs, variable power supplies, and much more. They have a very entertaining monthly catalog describing the items available each month. A creative person can find many devices that inspire new ideas for use in VR by reading this catalog.