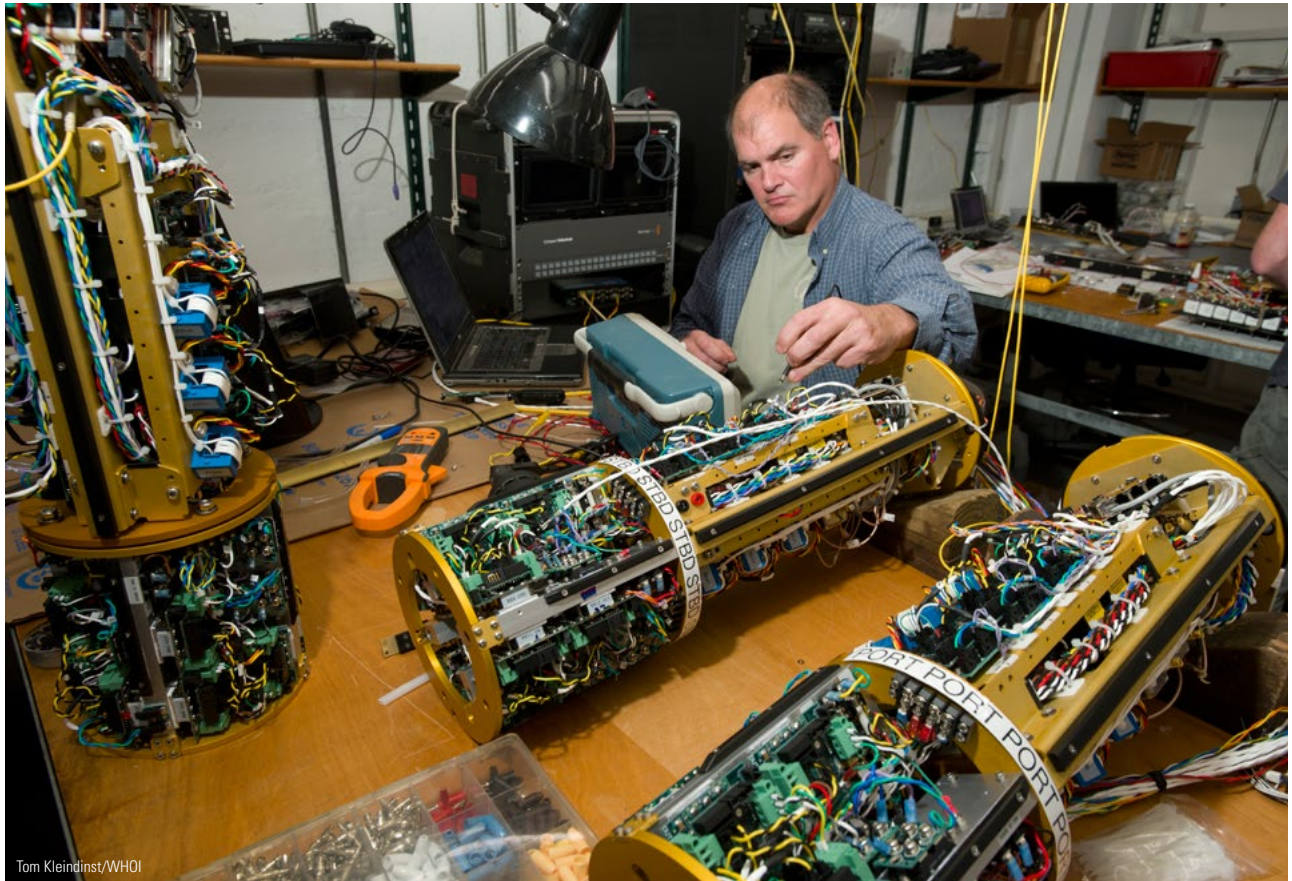


Rick Sanger

RESEARCH ENGINEER



Tom Kleindinst/WHOI

“ These are chassis, the structures that hold the electronics for *Alvin*. They slide inside a pressure housing made of titanium, which we call a bottle.

I was involved in the design process and programming for the electronics for three kinds of bottles—for imaging and illumination, data, and power. There's two of each kind on the vehicle, and we have a spare of each one, so that the vehicle can be brought back to operational capability quickly if one of these were to flood or have serious damage.

The imaging and illumination bottles are responsible for interfacing to the cameras and providing light. The power chassis look similar, but they're a little bit bigger. They interface the battery to anything else in the vehicle that needs power, so there's lots of different channels there. The data chassis are for reading the instruments on the outside of the vehicle that record sonar, temperature, salinity, altitude.

The two yellow wires are the fiber-optics. There's one per bottle. All the data in and out of the bottles, all the commands to tell these chassis how to behave, go through the fibers. Those commands would be things like, 'Turn on the camera,' 'Pan left,' 'Tilt up,' all of that.

There's between sixteen and twenty microcontrollers in each bottle that communicate with the computers in the sphere. In this photo, I was using the oscilloscope to try to diagnose a fault in that communication.

The assembly of the chassis got subcontracted to a couple of companies. When you have something built that way, you're going to get exactly what's on your schematics. Whereas, if you build it yourself, you know what you meant on the schematic. There are some things that are subject to interpretation by a third party that isn't familiar with what you're doing. So there was a little bit of troubleshooting that was necessary to correct a few things on each one of these.

I've been an employee here for just over a year. Before that I worked on this project for several months as a subcontractor. When I got here, there were preliminary designs on paper, but not all of the components had been designed yet. So a processor board that controls switching of a light, for instance, would be represented as a square where a signal comes in and a signal goes out. But what was in that square hadn't been defined. Some of my early tasks were turning that square into a real piece that had the functionality required and would actually fit within the space allocated and draw the appropriate amount of power.

The power, data, and imaging bottles are completely brand-new. Electrical components are constantly improving, and older components are being obsoleted and become very hard to get. A major overhaul on a vehicle like this is an excellent opportunity to make sure that you are using components that you're going to be able to get in the future, so that the service life of the vehicle is what you expect it to be. ▲