

**3 Axis Accelerometers**  
**Originated by James Caison (BIOS) on May 9, 2013**

**From: James Caison (BIOS) on May 9, 2013**

Does anyone have or know of a self-contained, standalone, logging accelerometer that has a +5000m rating. I'm looking to attach it to a deep MC-800 deployment. Maybe our Arduino experts are up to the challenge? The only catch is that I need it in two weeks.

Thanks

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James Caison  
Marine Technical Services Manager  
R/V Atlantic Explorer  
Bermuda Institute of Ocean Sciences

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**Reply From: Andrew Girard (WHOI) on May 9, 2013**

<http://www.x-io.co.uk/products/x-imu/>

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**Reply From: John Haverlack (UAF) on Thu, 9 May 2013**

Hi James,

I have one of these (<https://www.sparkfun.com/products/9836>), but have not yet had any experience using it.

Sparkfun has many to choose from:

<https://www.sparkfun.com/search/results?term=accelerometer&what=products>

The cool thing about Sparkfun is they usually provide all the necessary Arduino Sketches to get thing working in a matter of a few minutes. If you've never used Arduino, but are familiar with microcontroller applications you could probably get this running in 8 hours.

Sorry I can't be of more help.

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John Haverlack  
IT Manager, School of Fisheries and Ocean Sciences  
University of Alaska Fairbanks

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**Reply From: Toby Martin (OSU) on Thu, 9 May 2013**

How about an iTouch in a pressure case?

Toby

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**Reply From: Webb Pinner on Thu, 9 May 2013**

My guess is finding a 5000m housing is going to be the tricky part.

Other "gotchas" that comes to my mind:

- Even if the unit is self-logging how will it be time sync'd with the rest of the data? You can probably get close enough using an Arduino connected to a external real-time clock like a chronodot. <http://www.adafruit.com/products/255> Drift on the chronodot is advertised at less than a min/year and it has it's own battery so it won't forget the time even when the Arduino is off. I've been using one of these for awhile with good success and it was pretty easy getting the clock to sync to an NTP server during initial setup. If you go this route I'd get the Ardiuno Ethernet board since it's got the network adaptor (for NTP sync'ing) and a microSD card slot built-in. Cost is ~\$65.00.

- Power may be an issue too, if the package is heading to 5km at say 60m/min wire out, travel time round trip is 2.777 hours. This does not include however much time is needed on the surface for setup/deployment and however much time is needed on the bottom, plus mid-water stops, etc. Might want to budget enough power for conservatively 8 hours.

Sounds like a fun project.

- Webb

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Webb Pinner  
Capable Solutions

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**Reply From: Brent Evers (OBSIP) on Thu, 9 May 2013**

The arduino/sparkfun option looks like a good one. Also an atmel butterfly (still available?) coupled to a PNI 3-axis accelerometer sensor (The old TCM2, no longer available, was pretty venerable, but I think it was only tilt. Honeywell too, but they are harder to find fast).

Off the shelf, you could use a shipping impact monitor like this:

<http://www.shockwatch.com/products/impact-recorders/shocklog-208/>

and put it in a can.

The other catch was that you didn't say what you were willing to pay! Probably nothin, but I can't blame you for asking.

Overnight the arduino and a 3 axis accelerometer board, and you have a good weekend project (for me, probably a week). Should be straight forward since you aren't asking to do anything with the data (i.e., control something), just log it (I presume).

Other questions to think about - How many times is this going to be deployed? Are you willing to open the can each time or do you need to get the data out/downloaded on a regular basis. Don't forget to keep (good) time on something like this so you can correlate the event of interest.

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So on re-read, the itouch suggestion piqued my interest. There are (at least) 6 iphone apps that will log the built-in accelerometer - could be a winner..., just put it in airplane mode so the battery doesn't drain trying to talk to something.

Brent  
OBSIP

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**Reply From: George Tupper (WHOI) on Thu, 09 May 2013**

James,

Just throwing in my 2 cents as well. There's a company up the road from me on Cape Cod - Onset Computers. They make a variety of inexpensive data loggers.

I've had experience with a temperature logger about the size of a carriage bolt which we used to measure temperatures in the deep brines of the Red Sea, about 68 C., which would fry a normal CTD. These measurements were made at 2000-2500 meters. I offer this experience not as a solution, but as an example of the reliable devices they make. Data offloads are quick and easy with a usb connection.

They do make an accelerometer(\$75) which might be what you're looking for - which you would have to put in a pressure vessel - and here's the link.

<http://www.onsetcomp.com/products/data-loggers/ua-004-64>

With all the advice you're getting, I'm thinking you will be successful one way or the other.

George Tupper

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**Reply From: "Powell, Christopher M." (ODU) on Fri, 10 May 2013**

Arduinos are cheap enough, why not do away with the pressure case and just pot the whole assembly in epoxy, with a breakout pigtail for USB/battery/etc...

later  
cp

Christopher Powell  
Equipment Manager  
Dept of Ocean, Earth and Atmospheric Sciences  
Old Dominion University

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**Reply From: "David Gassier" (LDEO) on Fri, 10 May 2013**

Hi James,  
What sampling rate would you like to record this accelerometer?

David Gassier  
Columbia University

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**Reply From: James Caison (BIOS) on Fri, 10 May 2013**

..some very good links and ideas from everyone. We will likely end up trying a couple of different methods. Thanks!

Hi David, I would think 5-10Hz would be enough data but that depends on the memory capacity too. We'll have to record for 4-5 hours.

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James Caison  
Marine Technical Services Manager  
R/V Atlantic Explorer  
Bermuda Institute of Ocean Sciences

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**Reply From: Thomas Wilson (Stoneybrook) on Fri, 10 May 2013**

Hi James,

I second George's recommendation. It looks like the accelerometer HOB0 is exactly what you need - just put it in a pressure case and you are done, and if you notice the dimensions it can be a very small pressure case!

Onset is a great company, although I have never forgiven them for discontinuing their original line of TattleTale general purpose dataloggers that were my go-to microcontrollers for over 20 years. I actually drove to Cape Cod and had a meeting with

an Onset Vice President, asking them to design a new Tattletale when the chips in their TFX-11 and TT8 models were discontinued but no dice because they were making way too much money on their HOB0 dedicated loggers. The tears in my shop were ankle deep.

I'm working with Arduino and Raspberry Pi now. They look good for the future but neither fits exactly into the specifications niche the Tattletales occupied. Arduino is a little cramped on program space (the newer ones with 128K flash may solve this), the Pi eats way too much power for battery operation without lots of tricks. Microcontroller boards that have the combination of low power and sufficient capability are way above the Tattletale's price point, plus we're back to single vendor solutions that could evaporate tomorrow. Finally, nothing runs the 20 stacked feet of source code I developed for the Tattletales.

Thanks for letting me vent 😊

Tom

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