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Jarred Swalwell, Denis Klimov

Status:

Miniaturization of SeaFlow instrument is underway, but no funding and it therefore is a side project right now. Potential interest in forming a company, would need to have a design first, license it from U Washington, and so on. On a question, if interested to provide license to MBARI – no, would be more interested to sell. Preliminary cost of miniaturized instrument ~ \$150-200k. The market niche: there are expensive instruments \$400k and more that can do a lot, and there are cheap instruments ~\$50k and less having not so good specs, with no much in between. The miniaturized version of the SeaFlow could do “a lot” and also could be used in the field more readily than many high performance units.

SeaFlow miniaturization:

- Some analog electronics is done, for peak and threshold detection by means of the hardware.
- Data acquisition would be with NI USB controller. Custom analog board would be plugged into such controller directly
- Mechanics is relatively “simple” and could reuse pieces like custom stages etc from Seaflow; new housing of course.
- Flow path would no longer be open space, but using flow cell, supposedly easily replaceable, ~\$10.
- Design is simplified to reduce size, cost, and power
- ~ 10-12 inches wide, ~ 5-6 deep, ~ 4-5 tall
- Cell detection range is reduced to about 2-20 μm .
- Smaller solid-state laser ~ \$8k compare to ~\$30k in Seaflow
- Detectors about \$1k each, 5 detectors?
- Total parts cost ~ 50k

More details on a dynamic range:

- Detecting cells less than several μm “costs” a lot in terms of laser power, optical throughput, and detector sensitivity.
- A reason: forward scattering signal drops with reduction of the size of the cell, even faster than biomass which drops as cube of the size, due to cell size becoming comparable with light wavelength.

On signal processing:

- miniaturized instrument would be less flexible in operation and settings, for instance, reprocessing of primary data with new virtual core may no longer be an option
- this would allow in turn “complete” real time processing with predefined values

On a software:

- software is not a simple issue. Right now Labview is used in SeaFlow, running on NI PXI platform which is expensive (~\$18k)

- Labview *.exe compiler is available as well; this works ok but low performance, and the interface “shows” that it is a Labview
- Would like to redesign in C++ or other language

On topic of platform adaptability:

- Klimov suggested the point of using “adaptability for mobile platform” requirements early on a design stage.
- For instance, if the flow cell is used, it needs to be relatively easy accessible for replacement, preferably without cracking pressure housing. Jarred: “interesting suggestion, have to think about it”
- Some others: general maintenance, safely flooding, vibration, tilt/ pitch tolerance; low-res data for real time decisions, adaptive sampling
- Agreement to exchange information on this.

This year:

- planning visit preliminary in July to train a new Worden’s lab flowcytometer tech
- September, CANON cruise ~ 10 days.
- Has good material for a seminar
- On MBARI side, will try to schedule seminar, if not on Wednesday one, then some less formal one.