

# Remote Hydrography - Student's Report

By Layan Sulaimani, Mark Kelly, Fabrice Mukuna & Finbarr Perry

The Hydrographic Society: UK & Ireland (THS:UKI) held its Remote Hydrography Innovation and Applications conference and exhibition on the 22nd - 24th February 2022 in Dublin Castle, Ireland. This event was kindly sponsored by KONGSBERG, L3HARRIS and Clinton, in association with Geological Survey Ireland, Marine Institute and INFOMAR. The event could not have been as successful without all the support from these sponsors, in addition to

XOCEAN, who kindly provided the lanyards and USS (Unmanned Survey Solution), who sponsored the Delegate notebooks, along with all the exhibitors who attended to share their knowledge with the Delegates. The THS: UKI kindly sponsored 4 final year BSc Geographic Science students to attend, and this article highlights the overall positive experience each student encountered.



## Day 1

The first day of the Conference focused on the developments in remote and autonomous survey operations and machine-learning assisted processing of the data. Our experiences were mixtures of surprise and excitement at the possibilities and advancements in marine Hydrography. It was incredible to see the evolution of autonomous and remote survey systems, and it was surprising to see during XOCEAN's presentation that Unmanned Survey Vehicles were not only being tested, but many were already carrying out complete surveys by themselves in the commercial business. Making its first appearance at the exhibition, the XOCEAN operations room gave insight into how their

processors and pilots work remotely. Each set up consisted of 4 monitors, where there were visuals of a live project on screen. It was a fantastic opportunity to speak with the team and engage in a Q & A session of how the system worked.

Of note was the proposal from André Fabik (L3 Harris) that instead of total autonomy for Unmanned Survey Vessels and Data processing, the ideal scenario would be a combination of the human and automated elements. While machine learning has become more independent, there remains the need for human supervision. However, the advent of unmanned surveys was

an interesting one, especially learning about the Armada fleet, a proposed autonomous survey fleet. Admittedly, we felt a slight apprehension regarding the degree of autonomy that these machines are achieving. When a small, unmanned vessel can carry out the same survey as a fully crewed survey vessel for a fraction of the price, carbon footprint and manpower, one may wonder



whether there is a need for surveyors. We wondered where we'd fit in within an automated future. However, after discussing the matter with the delegates, we were reassured that there are many opportunities presented by these developments, if not offshore then onshore in the post-processing stage.

## Day 2

The second day of the conference was focused on satellite-derived bathymetry, artificial intelligence/machine learning, and innovation in the coastal field.

During the third session, (Charles DeJongh, Terratec) described the different services provided by Terratec such as:

- Surveying and 3D modelling
- Property building process
- Airborne data capture
- Mobile mapping & services
- Analysis and advice
- Industrial surveying
- Geophysical survey

The experience gained during this presentation was a solid understanding of the survey techniques used during marine based mapping for coastal zone projects. The airborne lidar bathymetry was the method used to achieve bathymetric surveys. It was interesting to see how seabed mapping was not only possible via USV (unmanned surface vehicles) but also from the air. This aspect had a direct correlation to what we study in our undergraduate degree which was invaluable to see our role in Hydrography.

There are advantages to using an airborne bathymetric lidar as it is ideally suited to undertake repeat surveys. A significant advantage of a bathymetry laser system is its ability to work in dual mode, while using red and green lasers as it can penetrate the water to map water



depths with high precision. The next presentation was covered by Paul Bell, from the National Oceanography Centre (NOC). Paul Bell demonstrated the recent development in NOC's transition to its radar hydrography technology from shore based to vessel-based operations and in the process, opened new ways to observe the marine environment using off-the-shelf hardware ubiquitous in the marine sector. Oceanographic measurement systems based on X band radar allow it to scan the ocean's surface in real time with high temporal (1-2s) and spatial (5-10m) resolution.

Session 4 was about innovation in the field presented by Adam Howell. Adam discussed the innovative technology used today in the field to collect data for DTM analysis. Many surveying methods were demonstrated to collect the DTM data in the field such as: RTK GPS (Real Time Kinetic Global Positioning System), Robotic total station & Trimble compared to the modern technology of using UAV.

Adam Howell discussed the advantages and disadvantages

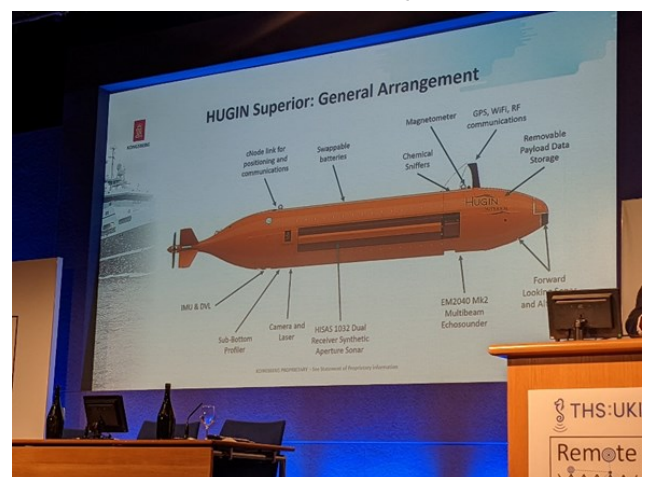
between both survey technical methods, their accuracy achieved of DTM, turnaround during the field measurement and cost. This broadened our understanding of the various equipment available and how each one could play a role in surveying.

## Day 3

Interesting discussions continued into day three. IXblue discussed their newest USV's highlighting their adoption of remote working. Their systems used multispectral sensors to survey and navigate the ocean floor with much of the post-processing being automated - ensuring more efficient workflows. It was interesting to see companies focusing on USV safety, particularly collision avoidance. IXblue have developed a system that automatically avoids obstacles, returning to its scan path when safe to do so.

Kongsberg discussed their role in the Seabed 2030 initiative, presenting their impressive new Hugin Superior vessel. We were interested in their utilization of side scan bathymetry and HISAS which allows the vehicle to capture large, accurate data sets like never before. Kongsberg also highlighted their adoption of remote, cloud-based frameworks using Blue Insight.

Unmanned Survey Solutions (USS)



▲ Figure 1 Kongsberg Hugin Superior



showed us their modular approach to USV design. It means payloads can be tailored to client needs easily. This is an approach we had never seen before and found quite interesting and intuitive. USS discussed how modern, smaller USVs can be used to record highly accurate data in adverse, hard to access survey areas. USS's Inception, and more recent Accession, were fine examples of modern USVs in today's industry. John Dillon-Leetch of The London Port Authority stressed the many benefits of adopting such bespoke survey methods, with safety, efficiency and positive environmental impacts being at the core of their ethos. All of which are important to us.

To end the day, Thomas Furey of the Marine Institute discussed INFOMAR and the future of seabed mapping for Ireland. While they currently do not use remote sensing techniques, the Institute showed their keen interest in them. Ireland's continental shelf is rich in biodiversity. Furey believes the key to cultivating and benefiting from

this is to better understand the topography below the surface using modern bathymetric techniques, and we agree with him.

### **Social Experience**

The social aspect of the Hydrographic Society conference and exhibition has been truly eye-opening from a student's perspective. The opportunity to connect with such a broad spectrum of professionals within the industry was prominent from start to finish. Although the first day was a bit challenging to approach delegates due to our lack of understanding within the industry, the refreshment and lunch breaks, sponsored by Norbit, Marico Marine and Teledyne, allowed us to connect with many professionals and initiate conversations. By the second day, having listened to many prestigious speakers, we all felt much more equipped to get involved in discussions between each session. The community was so welcoming, which encouraged us to ask many questions and learn so much more about how applicable our skills as land

surveyors could transfer to the marine environment.

In addition to the time available at lunch breaks to socialize, there was also a Guinness Tour and dinner organized for the second night, which emphasized the importance of socializing within the industry. The dinner was an exceptional experience, where everyone had the opportunity to let loose and chat in a more casual manner, which added to our already amazing experience. Although the seminars emphasized the drive for moving towards an unmanned or autonomous bathymetry, through socializing at the dinner conference it became apparent of all the opportunities available in the industry for younger graduates. Having heard this reassurance of opportunities, getting connected with so many professionals has been a fantastic start to getting our foot in the door to a possible thriving career within Remote Hydrography and other Hydrographic environments.



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## Biographies

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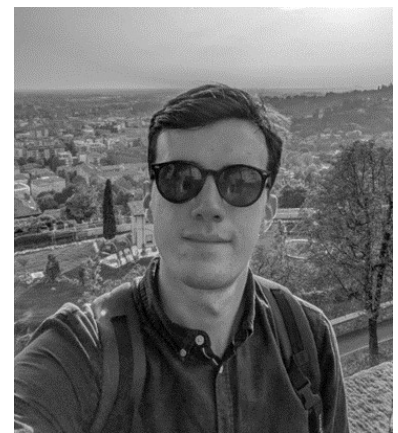
### Finbarr Perry



My name is Finbarr, and I am a fourth-year student in TU Dublin, studying a BSc in Geographic Science. I came to the course after learning about the archaeological and spatial applications of Hydrographic and Land surveying. I have an interest in Topographic, LiDAR, and Hydrographic surveying, especially when applied to the discovery and preservation of historical and environmental locations. I was fascinated with the advances in automation and remotely controlled surveys during the conference. I was also amazed by the number of methods used to create hydrographic surveys, and the level of fidelity achievable with modern scanners. Watching how different industries may interact in the process of a survey has been a wonderful experience for me and has presented me with a range of avenues through which I could pursue my career in surveying in the future.

### Mark Kelly

My name is Mark Kelly. I am a final year BSc Geographic Science student at Technological University Dublin. While our background focuses on land surveying and GIS (Geographic Information System) mapping, it was evident that crossover exists between both industries. We are seeing surveyors from all disciplines adopt similar data management and analysis skills. I was fascinated by the discussions held over the three-day conference by industry leaders and am excited to see how the hydrography space continues to develop into the near future.



### Layan Sulaimani



My name is Layan, and I am currently in my final year of BSc Geographic Science. Over the course of my education experience, I have become a brand ambassador for BSc Geographic Science in Technological University Dublin and was awarded two student excellence awards. I continue to work on achieving excellence in my career and feel passionate about raising awareness to younger generations of the possibilities available in the surveying profession. I have background knowledge in Land surveying, and GIS (Geographic Information System) data analysis, which both require an analytical mind, which I thoroughly enjoy. I recently broadened my knowledge and understanding of Hydrography by attending the Hydrographic Society conference. I have a keen interest in swimming and outdoor activities such as hiking which enhance the enjoyment of my course.

### Fabrice Mukuna

My name is Fabrice Mukuna, a diligent, engaging, and confident fourth-year student in Geospatial surveying at the technological University of Dublin. I possess a strong work ethic with experience in the practical working methods of surveying. I have held several junior surveyor positions in the industry, during my placement I was involved in the Geo surveying department with Jones Engineering. I was also involved in the digital construction department of Intel Kildare Leixlip and the Special project department with Murphy Geospatial. I have a background knowledge of land surveying, GIS, setting out, traversing control networks, Laser Scanning, topographic survey, hydrographic surveying and data processing.

