# AINS WORLD

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The use of Artificial Intelligence (AI) in diving is still relatively new, but it shows promise in several applications.



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Somewhat by chance, on a quasi-grey evening, i single platform to tame complexity. Key to I am sitting at a table with two data specialists. After exchanging the usual pleasantries and niceties, we discover that all three of us have a passion for diving. Well, you can hardly call something like that a coincidence. After we get to know each other's preferences in terms of diving equipment and profiles, an interesting conversation unfolds about the future of diving.

We decide to extrapolate on how we will go underwater in say 10 to 20 years. How will technology change our sport? The following is a summary of our conversation.

### WHAT WILL THE FUTURE BRING?

The future of SCUBA diving looks bright, as there are several trends and developments that we are expecting to shape the industry in the years to come. Here are some of the most significant ones:

- Sustainable Diving: With growing concerns about the impact of human activities on the environment, many divers are seeking ways to make their dives more sustainable. This includes using eco-friendly equipment, supporting responsible dive operators, and being mindful of their underwater behaviour.
- Technical Diving: Technical diving is becoming increasingly popular as more divers seek to push the limits of their equipment and skills, and as technical equipment becomes more user-friendly. What used to be technical (e.g. a rebreather) is increasingly becoming 'quasi-recreational'.
- Underwater Drones: Underwater drones are becoming more advanced and accessible, allowing divers to explore the seas in new ways. These devices can be used for tasks such as underwater mapping, marine biology research, and even recreational exploration.
- Accessibility: Efforts are being made to make diving more accessible to a wider range of people, including those with disabilities or mobility issues. This includes specialised training programmes, adaptive equipment, and dive centres that cater to the needs of diverse communities.

But with progress comes a need to integrate different systems and technologies into a unlocking the potential of this integration are powerful computers. These computers can process substantial amounts of data in real time, and are used to monitor and manage the diving environment. With more powerful computers, it is possible to create an integrated system that can monitor and control various systems, from navigation, propulsion, balancing and communication to oxygen levels and dive profiles.

Besides powerful computers, the development of a very compact energy source is another key factor to realise the potential of integration. This energy source should be able to power the various systems and technologies used in diving without compromising safety or performance. The promising development in this area is the development of fuel cells.

By combining different systems, the complexity of the diving environment can be reduced, and divers can concentrate more on their surroundings. This allows divers to access data from different sensors and cameras, allowing them to monitor their environment in real time. This potentially has several important implications:

- Longer Dive Times: Compact power sources allow divers to stay underwater for longer periods of time as they can power advanced equipment such as underwater drives, communication systems, and lighting for longer.
- Enhanced Safety: Powerful computers are being used to develop sophisticated diving algorithms and monitoring systems that can help divers avoid the risks of decompression sickness and other diving-related health issues. Additionally, computerised rebreathers can automatically adjust the gas mixtures to maintain safe oxygen levels and extend hottom time
- Advanced Imaging: Powerful computers are also enabling advances in underwater imaging, with software algorithms that can correct distortion, improve image quality, and process large volumes of data.

Navigation and Mapping: Compact energy sources are also powering advanced underwater navigation systems and mapping tools, including handheld sonars, and underwater cameras. This technology allows divers to explore new areas and gather more data about the underwater world.

Nanotechnology, the manipulation of matter at the atomic or molecular level, is another area of development that could radically change diving. One of its most promising applications in diving is the development of nanomaterials. These materials are incredibly light and strong and can be used to produce more efficient and durable diving equipment. They can also be used to make sensors and cameras that can detect and measure all kinds of parameters in the underwater environment. Similarly, nanotechnology can be used to develop a new type of propulsion system that is more efficient and powerful than traditional systems.

Although oxygen can be extracted from water using electrolysis, the energy required to do so would be prohibitively high, even with our compact fuel cell. Filtering oxygen from water is a possible application of nanotechnology, but this is not currently feasible. If this nanofiltration becomes possible then, in combination with a rebreather, it would revolutionise diving, as divers could then stay underwater virtually indefinitely.

Communication and navigation are essential for safe and efficient diving. In the past, these systems were bulky and inefficient, but in the future, integrated communication and navigation systems can be developed that are more efficient and powerful. In what ways could underwater navigation be improved?

Underwater GPS: The development of underwater GPS (Global Positioning System) technology is making it easier for divers to navigate underwater, much like they would on land. Using acoustic signals from underwater beacons, GPS can provide divers with precise location information, which can help them to navigate to specific points of interest.

Sonar Technology: Sonar technology, which uses sound waves to detect underwater objects, is becoming increasingly advanced. Doppler sonar, for example, can detect changes in water currents and provide

divers with real-time data about their surroundings.

- Imaging Technology: Advanced imaging technology, such as side-scan sonar and 3D imaging, can provide divers with detailed maps of the underwater environment. This technology can be used to identify underwater features, such as caves, wrecks, and reefs, and can help divers to navigate more accurately
- Heads-up Displays: HUDs are becoming more common in diving masks providing divers with real-time information on depth, heading and other important features. This technology combined with Augmented Reality (AR) can help divers orientate themselves even in poor visibility. An open architecture HUD can combine information from multiple sensors and systems, creating a more streamlined and efficient system.

The use of Artificial Intelligence (AI) in diving is still relatively new, but it already shows promise in several applications. Here are some examples:

- Diving Safety: Al can be used to analyse data from dive computers and other sensors to identify potential safety risks. such as changes in breathing patterns or oxygen levels. This can help divers to avoid dangerous situations and prevent accidents.
- Marine Life Identification: Al can be used to identify different species of marine life from underwater images and video footage. This technology can help divers to better understand the ecosystems they are exploring and contribute to conservation efforts
- Underwater Mapping: Al can be used to create more detailed maps of the underwater environment, which can help divers to navigate more accurately and identify areas of interest. This technology can also be used to monitor changes in the marine environment over time.
- Diving Gear Optimisation: Al can be used to optimise diving gear (in real time) for individual divers, considering factors such as body type, diving experience, and environmental conditions. This technology can help to enhance comfort and safety while diving

Al has the potential to revolutionise the ; a human trait. Al simply builds, a euphemism, industry by improving safety, enhancing the diving experience, and contributing to conservation efforts. As technology develops, we will likely see more applications of Al in diving in the future.

We conclude by consensus that sport diving will continue to be an exciting and rewarding activity. With advancing technology, diving is likely to become easier, safer and more accessible than ever before. However, it is important to remember that diving will never be completely risk-free and it is crucial to prioritise safety and education at all times. By staying well informed, taking the necessary precautions and respecting the underwater environment, divers can enjoy this incredible activity while minimising risks.

It is already close to midnight when I say goodbye to my two table partners. This conversation has given us a good idea of what to expect. Looking at the list, it strikes me that there are no real surprises. Rather, they are extrapolations of current trends into the next decade. Still, the future of sport diving looks bright.

## EPILOGUE

To attentive and news-loving readers, it is obvious that my two interlocutors are Al robots. During an editorial meeting, the idea grew to test the latest hype and see if these Al writers could replace us as writers. The photos accompanying this article were also created using Al.

The first, OpenAl's ChatGPT, is the betterknown of the two and a 'chatbot' that likes to engage in conversation. Unfortunately, this Al has not been fed since September 2021, so its 'knowledge' is not increasing, and it cannot provide answers about facts after this date. The second, WriteSonic's Al Article Writer 4.0, focuses on article writing. This article came about by giving both robots similar input based on an old article with the title 'A History of Scuba Diving – Past, Present and Future' (see the March 2014 edition).

This brief experience taught me that writing an article with AI still takes a lot of time. After all, these robots are not creative. This is still

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on what already exists, on what the learning software was/is fed with. An Al article based purely on what all the Al robots in the world have written would just be a boring mess. Not worthy of your cranial activity unless before going to bed. I was the creative glue by feeding the two systems a title and a list of keywords, and finally mixing the two artificially created stories in a setting of a table conversation to make the whole thing a bit lively. The original text looked more like a Wikipedia entry.

Another problem is that it's hard to figure out where the AI got its wisdom. Is what you read the truth? No problem if you fantasise about the future, but if you want to keep in touch with reality, you're walking on thin ice. Al can blather, and wrap it up nicely too.

But technology does not stand still, because Microsoft, for instance, is busy integrating artificial intelligence into its search engine, Bing. To do so, the software company will use technology from OpenAl, the company behind the much-discussed ChatGPT bot. Moreover, the language model will be more advanced than ChatGPT's and will allow for the inclusion of references where the info was found.

So, are such Chatbots a waste of human potential? No, they can be fun. For instance, one of our sons had his life story sketched by ChatGPT. Hilarious! They are also excellent tools for starting a story. After all, they never have a writer's block. As a writer, they can also help you improve your text. QuillBot, for example, is an excellent tool that uses AI to rephrase your text but does not add anything new. However, they are just machines, tools, based on what other (hopefully) people have written and thrown on the internet. They do not yet replace journalists or editors.

The future of writer-divers looks bright. At least in 2023 anyway.

