

Gladius Submersible Drone (GSD)

by Peter Rowlands

Ever since I can remember, I have had a fascination with ROVs; magical machines which can go either deeper or for longer than I can, controlled from the surface and sending video images back for viewing or recording.

My fascination stayed just that as the costs of such machines were prohibitive but earlier this year I heard of a crowdfunding project for a Gladius Submersible Drone (GSD). It looked great, promised a lot and, for early investors, cost just over £1100. I was not alone, it seems, for there were hundreds out there like me who flocked to support the project.

Fast forward about nine months when an impressive package arrived and for the first time I was seriously tempted to do one of those sad 'unboxing' videos for YouTube. To be honest I forgot all about once I lifted the lid on the aluminium case and saw my GSD. I was genuinely delighted with what I saw.

The quality of design and workmanship was very high and I spent some time just looking at the sports car-like lines and curves. There wasn't a bad angle to view it from and the proportions were just right.

There's an old saying that I have

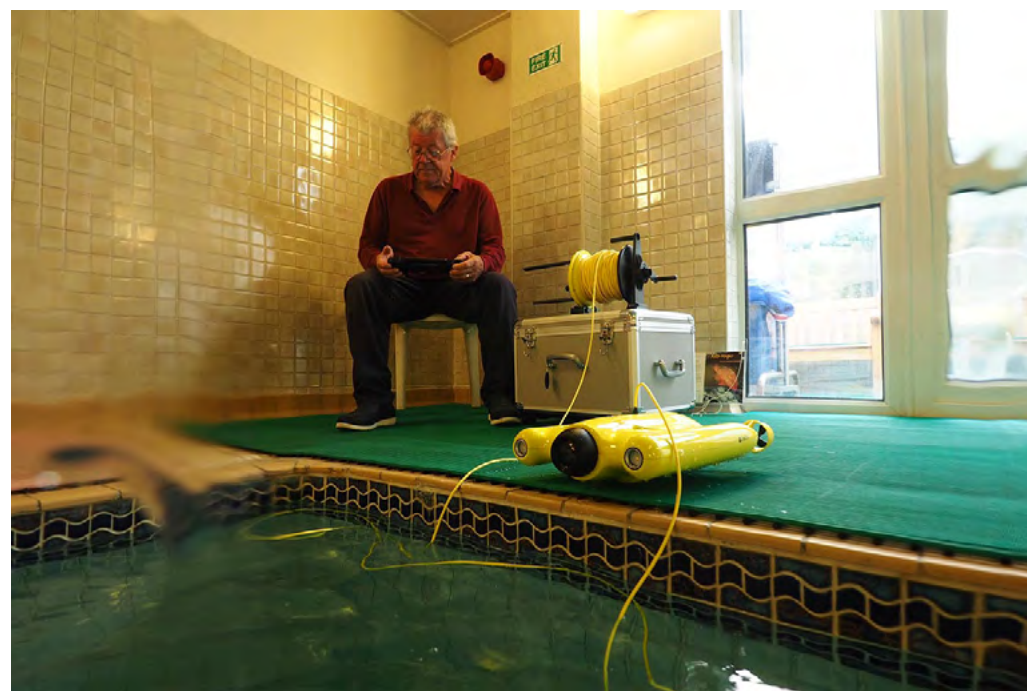
always agreed with and that is "If it looks right, it will perform right" and the GSD for me had certainly got off to a flying start. All I had to do now was hire a pool to put the old saying to the test.

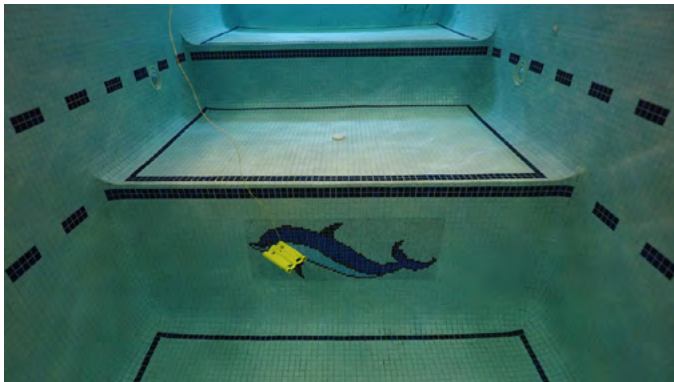
The Gladius Submersible Drone comes in two parts, the Drone and the WiFi buoy reel, joined by a lightweight communication umbilical. Initially this makes handling a bit awkward and the centrally positioned exiting cable from the GSD itself looks prone to damage but, in reality it is more than strong enough to lift it up though, as I will describe later, there are simple ways to avoid this and make launching and recovery a trouble free operation.

It was an exciting day in the Rowlands workshop when the GSD was delivered. I had paid extra for the aluminium case which provides excellent handling protection.

The first pool session went well with the WiFi buoy (on top of the case) and its extended aerials. This module is designed to float and can be operated up to 100 metres away but I haven't got round to using it in that mode yet.

(Photo Dan Bolt)



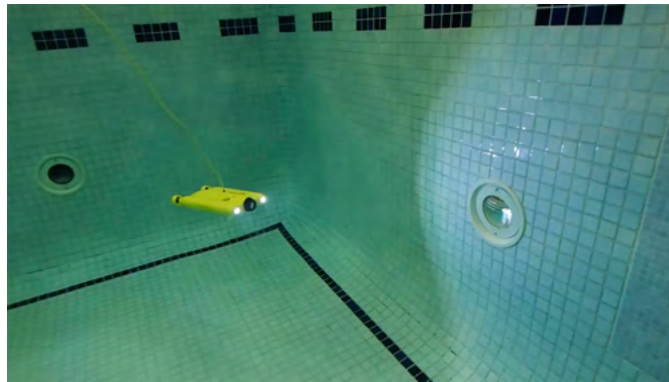


The controlled conditions in a swimming pool allow the luxury of being able to watch the GSD as you control it. This helps the learning curve.

The GSD and the WiFi buoy both have built in rechargeable batteries with separate chargers which fully charge in 90 minutes and this, depending on the heaviness of use will provide up to 3.5 hours of submersible time.

Initially the GSD is available in two versions - Standard with 1080p video and 50 metre umbilical or Advanced with 4k and 100 metres respectively. The choice of video quality is up to you but I would highly recommend you consider the 100 metre umbilical version because in practice nothing ever happens in a straight line.

The GSD comes with a joystick controller which communicates with either iOS or Android phones or tablets via Bluetooth while the GSD itself communicates with the WiFi buoy byyes, WiFi which the buoy generates. These two signals allow the GSD's thruster motors to be operated and the video signal to be viewed on the mobile phone or tablet screen using the free to download IF Dive App. The images or footage can then be recorded onto the memory wired inside the GSD (16gb Standard and 64gb Advanced). So with batteries



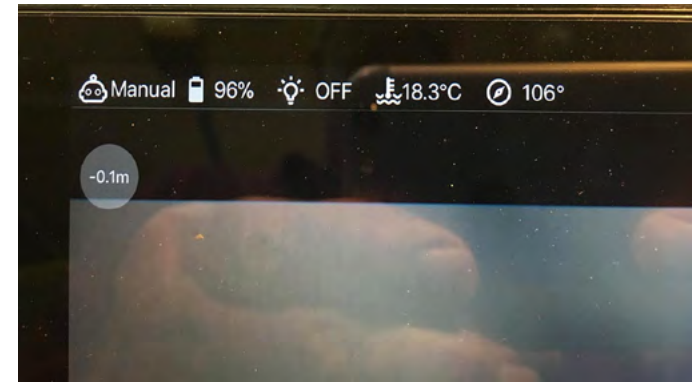
I was surprised how bright and effective the lights are. The output can be finely controlled from 0 - 100%. Photos left & above by Dan Bolt.

fully charged it was off to the pool for the very first session.

Setting up the system is quite simple if you are using a mobile phone with a screen up to about 6" as this can be held by the spring loading controller but any bigger screen than this (which makes viewing much easier, requires several hands or flat calm surfaces because the controller is not designed to hold them and they must be supported and made stable for viewing and operating.

Once set up and talking to each other the GSD can be lowered into the water and this is where you need another pair of hands as there are no handles and the GSD surfaces are smooth and gripless so a hand either side is needed for stability. I am going to leave any suggestions for future design improvements until later in this review.

In a clear freshwater pool situation you, the driver or 'pilot', have the luxury of being able to see the GSD; its directional movements and inclinations and this is fine initially but in the real world you will need to get used to 'flying' just looking at the phone or tablet screen and this is where size really



The top left display on the iPad shows Mode, Battery level, LED light level, water temp, compass heading and the grey circle is water depth.

does matter.

In the IF Dive app there is a top row of indicators showing from left to right - Depth, battery level, LED lights output %, water temperature and digital compass heading. The bigger your screen, the easier these will be able to see.

Coming back to the pool session and visual contact with the GSD this is a great opportunity to get used to its handling properties and also to get something out of your system once and for all and that is seeing how fast it will go! Yes, I did it and it was quite thrilling. At 100% power (the default, quite sensibly, is set at 50%) the GSD literally flies through the water and is excitingly impressive but, at the risk of being a killjoy, the secret of success when flying the GSD is to use just enough power to keep control because, sooner or later, you will hopefully want to put the GSD to positive use producing smooth viewable video footage and sharp still images.

In water the GSD is designed to be neutrally buoyant and is supplied with two counter weights - one for fresh and one for saltwater. The latter



In search of Seatrout in the River Tavy. The GSD can operate up to 3.5 hours before a recharge is needed.

especially is an estimate as salinity varies throughout the world and small amounts of weight may need to be added depending on the waters in which you are operating. This buoyancy is both the GSD's secret of success but also its achilles heel because something that weighs effectively nothing is at the mercy of any, even slight, force from water movement. Physics will always be physics, unfortunately.

Having got used to the basics of flying with the luxury of being able to see the GSD it was time to head out into open seawater. Those owners who only intend to use their GSD in freshwater lakes and still waters can skip this next section and

save themselves a lot of learning for as soon as you venture into open seawater many more forces come into play and provide genuine obstacles which are to be overcome if useful footage or images are to be captured.

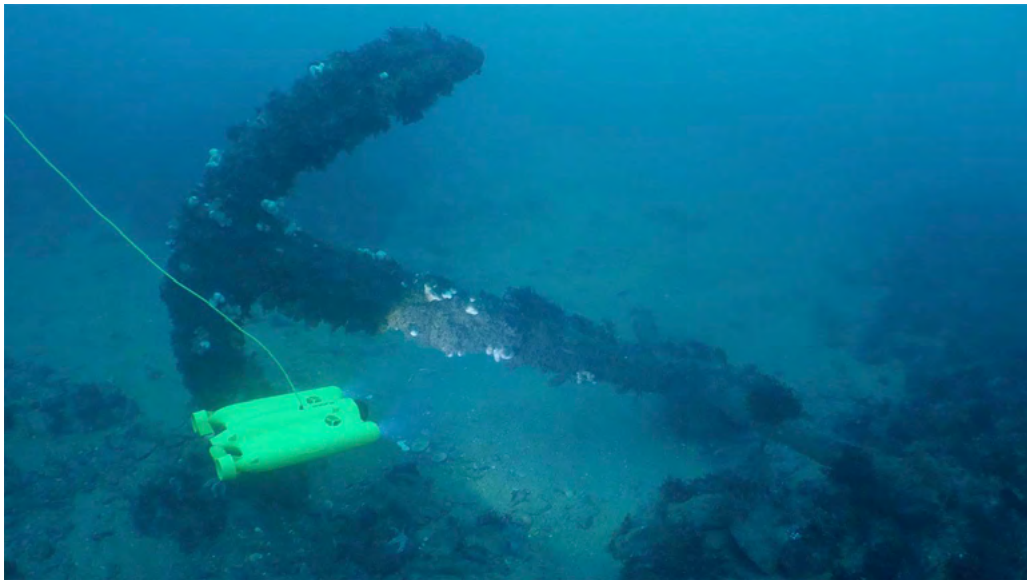
First out of the obstacle blocks is tidal flow or current. This slows the GSD down in one direction or speeds it up in the other but the GSD is more than capable of driving into quite a strong current because it is hydrodynamically very well designed. The problem is that the umbilical, despite its lightness, produces a significant drag which can sap the power of the GSD. Let's say the umbilical is 5mm in diameter and the GSD is at 15 metres heading into a



The controller (bottom right) can expand to take a smartphone with up to a 6" screen size. It would be nice if it could expand further to take an iPad.

Video frame grab of a Seatrout resting in the lee of the current waiting to go upstream to spawn. The ambient light level was very low but the on board lights did a great job.





Operating at slackwater from a boat on a calm day provides the most control to produce steady video and sharp still images.

current; that is quite a lot of surface area. If you have ever drift dived with a surface marker buoy you'll know exactly what I mean and the line on a marker buoy is usually much less than 5mm! So given that umbilical drag is a limitation the best solution is to try and dive at slack water if the area you want to explore is affected by tidal current. That may sound limiting but given that most slack tides are at least 30 minutes and on neap tides are more if not even negated, there is still a lot of exploring that can be done in that time. My point is don't get downhearted after your first seatrial (as I did) when the GSD position was all over the place. As time has gone on I have become more and more capable

in controlling the position and depth but it is a definite learning curve of frustration mixed with elation.

I operate my Gladius from a boat which introduces another set of criteria to take into account as the boat's drift is influenced by both tide and wind. Fortunately the Gladius WiFi buoy is designed to free float which helps to negate this but, in the time available to produce this test, I have not had the time to try this type of deployment so I will leave this capability to be covered in the continuing review in the next issue of UWP.

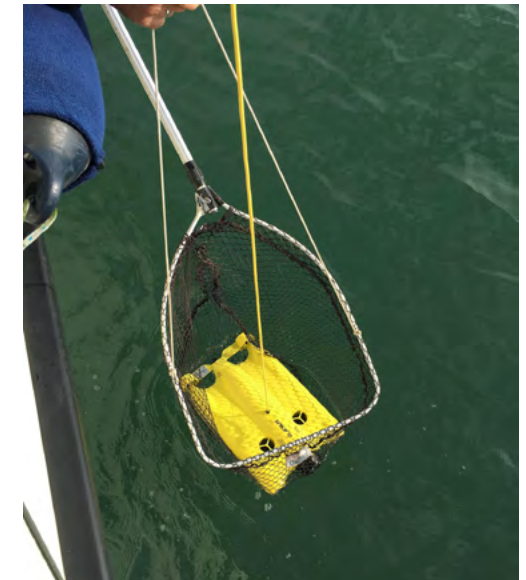
Recording video footage or stills is as simple as pressing the appropriate Stop/Start button on the



The saltwater weight module can be adjusted with lead shot

controller. This records to the wired-in memory inside the Gladius. After the dive these files can be downloaded via the WiFi buoy and then transferred into (in my case) the Photos app on my iPad. The speed of this transfer was a bit slow especially for 4k video footage but it's a small price to pay for the overall quite simple workflow.

The Gladius is still an evolving project and full production is a little way off. At the time of writing not all of the initial backers have received their units and I would suggest that full production could be about two months from now. The advantage of waiting is that, for example, my Gladius could be described as a pre-production prototype with some small

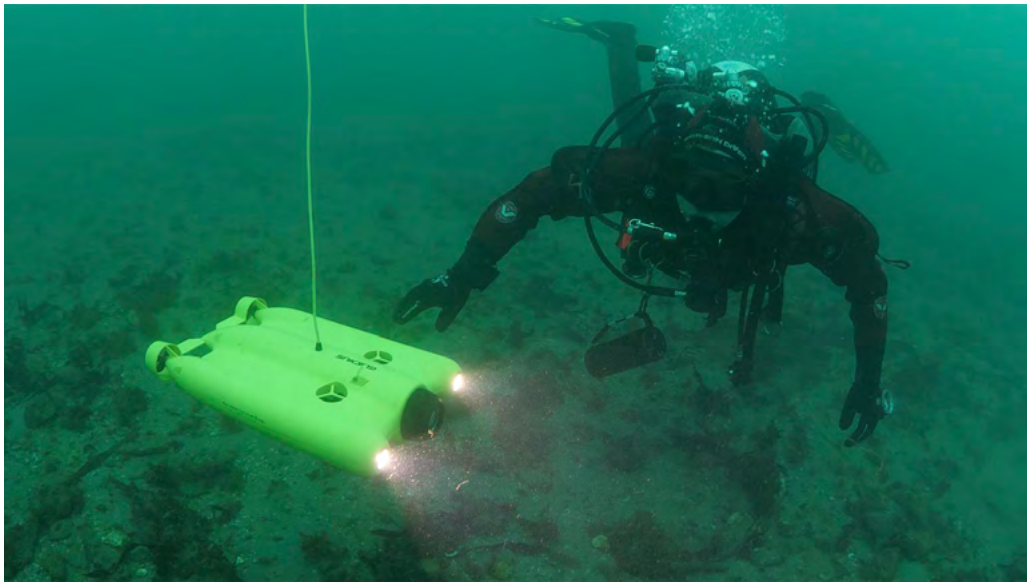


Even though the umbilical is strong, a keep net is ideal for lifting to a boat.

physical design changes still to be made prior to production. Most of these improvements are quite minor, it has to be said.

The manufacturing company Chasing Innovation have been very impressive firstly in the time they took to produce the first working models but more importantly in the way they have communicated about all of the developments and the plans they have. These plans have been finalised by being totally open with customers and being especially open to suggestions from early users. It has been a very refreshing experience and I look forward to a continued collaboration with them.

So I guess the burning question



must be “Does the Gladius replace an underwater photographer?” and the obvious answer is “No!” but it will have uses above and beyond the pure excitement of flying it underwater. With a depth rating of 100 metres it can obviously go deeper and for longer than we sensibly could and it is a very capable machine which could be fitted out to stay on the seabed and provide monitoring feedback with recording capability of over 3 hours which would normally be beyond the comfort or safety zone of a normal diver.

As someone who has always had a fascination with ROVs I feel like the GSD is a dream come true and whilst it could be argued that it is ‘lightweight’ by comparison to other ‘working’ ROVs (at many multiples

of the price) I can foresee it will have an increasing number of uses for me in the years to come and I will, of course, keep you updated.

The Gladius Submersible Drone is currently available for \$1620 which is usually \$1799 for the Advanced version. It is available in a slightly less expensive Standard version which is fine if you only want to use your GSD in a swimming pool but I would strongly recommend you consider the Advanced unit purely for its 100 metre umbilical which should give most users a very useful range.

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