Non-ROV Device Document

- Design - We at XTR have chosen to develop our float using a buoyancy engine. Our version of this is an acrylic cylinder of diameter 80mm containing a mounted syringe. This is suspended close to the bottom of the cylindrical float using a 3D printed component that also houses a servo with a pinion mounted to it and a rack to retract and extend the syringe. On initial retraction of the syringe, the intake of water will be of a sufficient amount to cause the syringe to become negatively buoyant, and to sink to the bottom of the pool. The float will then gradually sink to the bottom of the pool and make contact with the bottom of the pool. On contact with the pool floor, the servo will be manually activated and the servo will rotate, extending the rack and hence the syringe, expelling all the water in the syringe and causing the float to become positively buoyant. This will then cause the float to start to rise to the surface, where it can then communicate the required information (current time and company number) to the mission station. The float device must do this process three times for maximum points.

- Electronics – Our float uses four main pieces of electronic equipment: an Arduino Mega, an Arduino Bluetooth module, an Arduino real-time clock, and a servo motor. The Bluetooth module is controlled from a phone.

Weight	1.06 kg
Height	260 mm
Diameter	94 mm
Voltage Rating	9 V
Servo Strength	25 kg

- Method – To be able to gain maximum points from this task, we approached the manufacture of our float with making a buoyancy engine in mind. This is what led us to adapt a syringe approach, meaning a servo was required. As a result of this, we were forced to develop a 3D printed housing unit, that would stay in place using friction, house the servo and keep the pinion aligned so it could extend and retract the syringe at the right angle. The next step, after housing all the wiring and a power source required for working the servo, was waterproofing the cylindrical unit. After integrating multiple O-rings to seal the cylinder at the top and bottom, waterproofing at the opening containing the syringe had to take place. This was done in the form of epoxy resin, which was applied round the edge of the syringe while it was mounted in the float unit. This resulted in a float unit that contained all the required wiring and electronics, functioned as required, and was fully waterproofed.