The Autonomous Water Rover has the following components in this circuit diagram - Motor controls, Temperature sensor, pH sensor, Turbidity sensor, Conductivity sensor, Waterproof Ultrasound sensors and a Arduino Pro-mini shield for sensors' data collection.

Step 1 - The foremost thing to figure out is the motor control on the right hand side of the diagram. Since we are using bilge pumps, only unidirectional control is required eliminating the need for a H-bridge configuration. The Uln 2803 has Darlington pair transistors which are being used to provide the Gate of the n-channel Mosfets with the corresponding voltages. A point to remember is that the ULN 2803 will complement the output, thus a 0v i/p is to be given for a high output and vice versa. The Gate terminal is to be grounded with a high value resistor (10k ohms) since the Mosfet is a voltage controlled device. The Resistor strip A103 helps to keep the output of the ULN 2803 at a stable output. Thus, by giving complementary i/ps to the ULN 2803, we can control the pump motors.

Step 2 - Arduino Pro-mini shield is made using female bergstrips and the data pins of all the 4 sensors are connected to the corresponding pins. The ultrasound sensors are also connected with their echo and trigger pins. All the sensors and the Pro-mini are powered by the LM 2596 buck converter which gives a 3A/5V output.

The total cost for the board is Rs. 561/8.25$