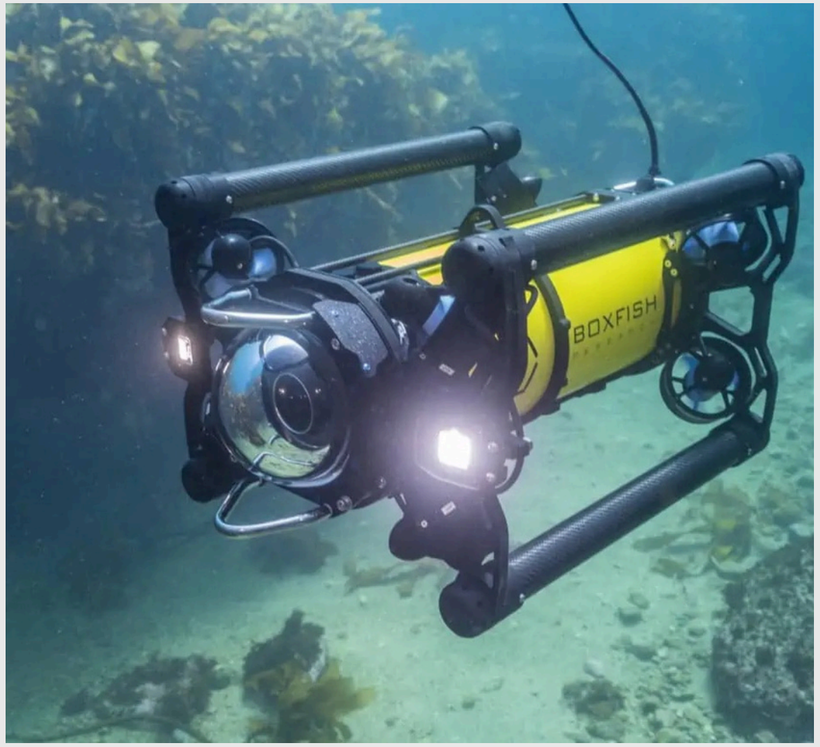
SEAHAWK

waterbed surveyor submarine with water quality & dept monitoring



Presented by GROUP-04

Project Significance

•Environmental Monitoring – Enables early detection of water pollution by assessing key quality parameters.

•Safety & Navigation – Identifies foreign objects or obstacles on the riverbed to prevent hazards.

•Search & Recovery Support – Assists in locating underwater lost objects, evidence, or even submerged bodies in rescue/recovery operations.

•Resource Management – Provides data to aid in sustainable water resource planning and conservation

Working Principles

Power Supply & Regulation

>The submarine is provided stable DC voltage from batteries to power motors, sensors, and control circuits.

>The power circuit supplies calculated voltage sources and there are protection devices/mechanisms to prevent damage from fluctuations or faults

•Motor Control

•Employs software based Arduino commands to control motor direction for maneuvering underwater.

•Uses PWM signals to vary motor speed efficiently, conserving power.

•Sensor Signal Conditioning

•The submarine takes inputs sent by the depth sensor, DO sensor, Camera Sensor to be sent to the Arduino and later processed by the computer to show the desired output graphics and statistics.

•Converts sensor outputs to compatible levels for microcontroller input, ensuring accurate readings.

Working Principles

•Microcontroller Integration

•The Arduino processes sensor data and executes control commands for motors and alerts.

The Arduino manages communication and power distribution within the DC circuit framework.

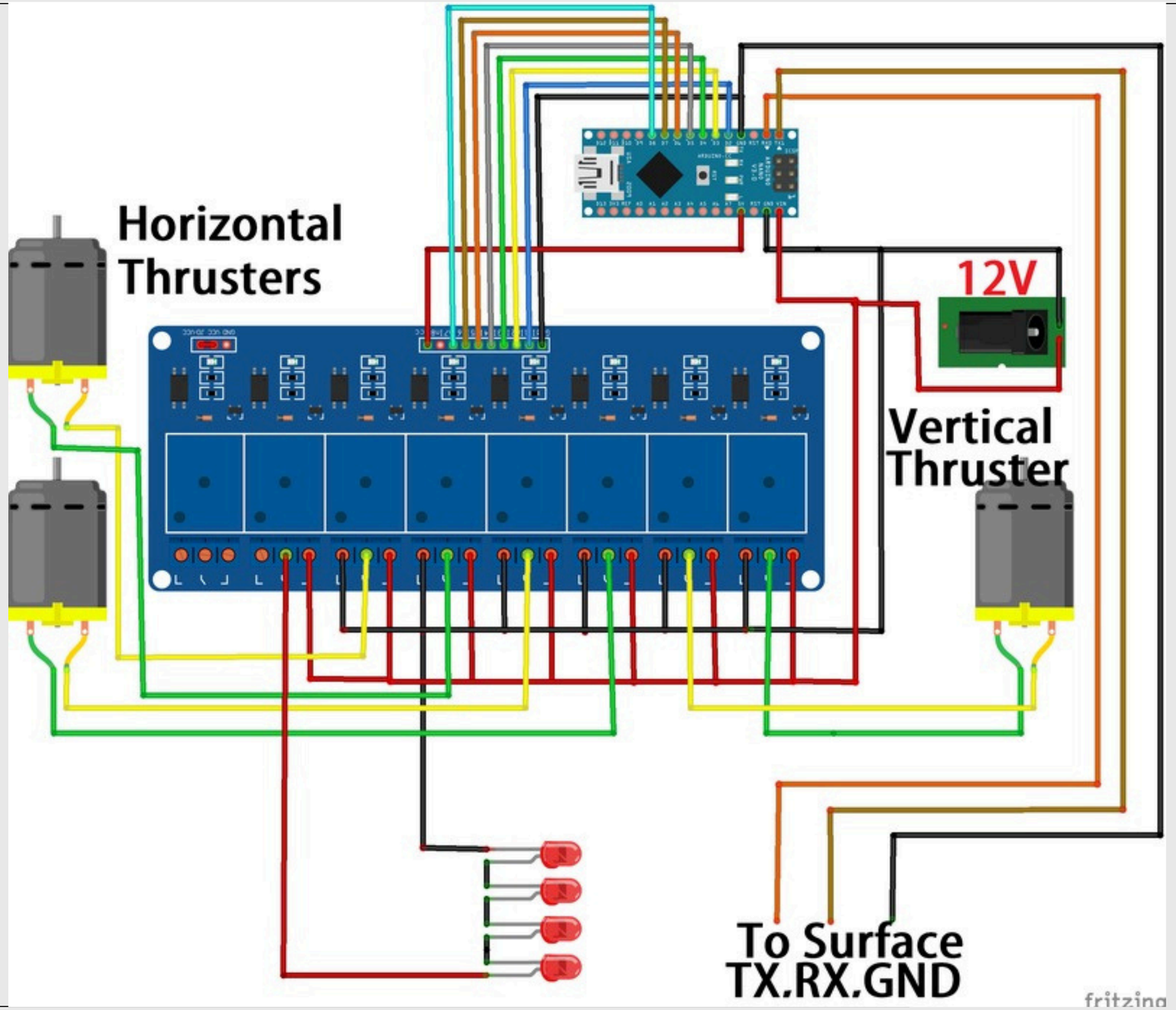
•Protection Circuits

•Waterproofing Measures

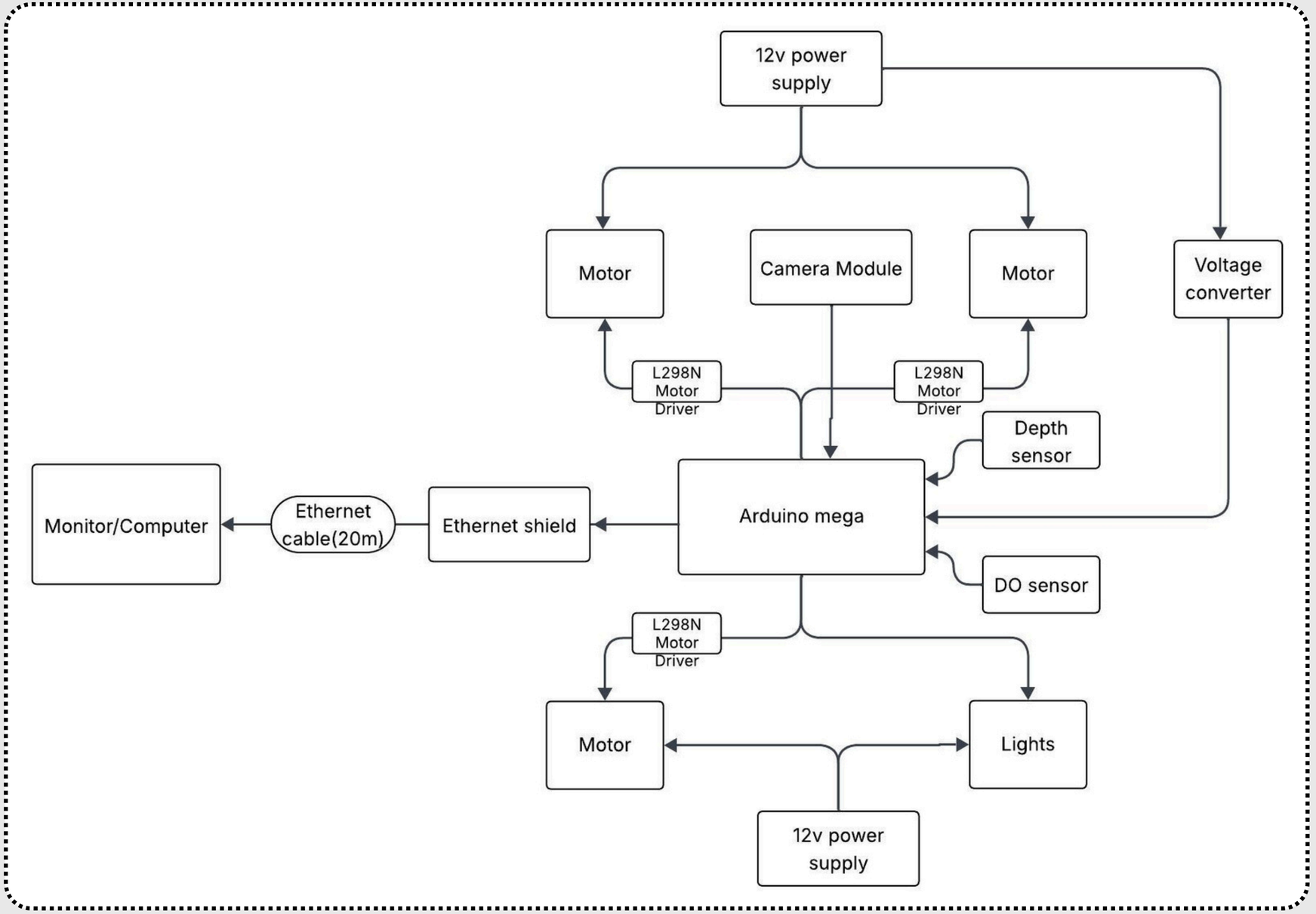
>All electronic components and circuits of the submarine is in waterproof housings to prevent water ingress and corrosion.

•The submarine uses sealed connectors, gaskets, and conformal coatings on circuit boards and tether to ensure reliable operation underwater

CIRCUIT DIAGRAM



BLOCK DIAGRAM



COMPONENT LIST & BUDGET (TOTAL 7480 BDT)

Category	Item	Model	Qty	Price (BDT)	Source
Control	Arduino Mega	Clone 2560	1	1345	Techshop BD
	Ethernet Shield	W5100	1	1090	Startech BD
Power	LiPo Battery	3S 2200mAh 30C	1	600	Drone Bangladesh
	Balance Charger	Imax B3AC	1	400	Daraz BD

COMPONENT LIST & BUDGET

Category	Item	Model	Qty	Price (BDT)	Source
	Buck Converter	LM2596 12V→5V	1	80	Dhaka Electronics Market
Motors					Daraz BD
	Gear Motors (Horizontal) **(+vertical)**	12V 300RPM	**3**	700	RoboticsBD

COMPONENT LIST & BUDGET

Category	Item	Model	Qty	Price (BDT)	Source
	L298N Motor Driver		1	180	Daraz BD
Sensors	Depth Sensor DO sensor	MS5803-14BA	1	600	RoboticsBD
	Camera	OV2640 2MP	1	500	Daraz BD
Mechanical	PVC Pipe	4"×50cm	1	150	Local Hardware

COMPONENT LIST & BUDGET

Category	Item	Model	Qty	Price (BDT)	Source
	Propellers	40mm Plastic	3	450	Daraz BD
	Waterproof Sealant	Silicone + Epoxy	-	300	Hardware Store
Cables	Ethernet Cable	CAT5e 30m	1	450	Computer Store
Safety					
	XT60 Connectors	Pair	1	60	Daraz BD

PROJECT TIMELINE

WEEK-1

Key Activities:

- Finalize component list and budget sheet
- Create 3D model design (Tinkercad/Fusion 360)
- Develop circuit diagram

WEEK-2

Key Activities:

- 3D print main hull components (or PVC alternative)
- Assemble motor mounts and camera housing
- Waterproofing tests on sub-assemblies
- Buoyancy calibration in water tank

WEEK-3

Key Activities:

- Solder main control board (Arduino + shield)
- Wire power distribution system
- Install sensors (depth, voltage monitor)
- Bench test all subsystems

PROJECT TIMELINE

WEEK-4

Key Activities:

- Program core functions (movement/depth control)
- Implement Ethernet communication protocol
- Develop camera streaming solution
- Create basic phone control interface

WEEK-5

Key Activities:

- Final assembly of all subsystems
- Shallow water tests (bathtub)
- Depth control tuning
- Maneuverability optimization
- Failure mode testing

WEEK-6

Key Activities:

- Create demo sequence script
- Practice judges Q&A session
- Prepare backup components kit
- Final optimization tweaks

Application of Course Knowledge

- **Application of Course Knowledge (DC Circuits)**
- **Power Source & Distribution** – Applied knowledge of voltage, current, and resistance to design a stable DC power supply system that distributes power from the main battery to motors, sensors, and control circuits without overloading components.
- **Motor Operation & Control** – Implemented DC motor principles, including current direction control and speed regulation, by replacing relays with an Arduino-controlled motor driver using H-bridge and PWM concepts learned in class.
- **Sensor Integration** – Used circuit analysis skills to interface sensors for depth, water quality, and obstacle detection, ensuring proper biasing, signal conditioning, and voltage matching.
- **Circuit Protection** – Applied protection circuit concepts such as fuses, waterproof enclosures, and polarity protection to safeguard electronics against short circuits, overcurrent, and water ingress.
- **Wiring & Load Management** – Designed wiring layouts based on series/parallel connections, load calculations, and minimizing voltage drops over the 100-foot tether cable.

Meet Our Team

Group 04

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Thank you!