



AEGISFLOW



RAPID RESPONSE, MAXIMUM CONTAINMENT



BY GROUP 9



Protecting the Oceans

Oceans are susceptible to oil spills.

Oil spills damage marine ecosystems.

Oil spills are bad.

However, traditional methods are slow and labour-intensive.

We need a new solution!



○ June 14, 2024, 2.18pm

Crash involving two vessels occurs

Netherlands-flagged dredger Vox Maxima suffers a sudden loss of engine and steering controls, and hits Singapore-flagged bunker vessel Marine Honour, which is stationary. About 400 tonnes of fuel leak into the sea.

More than 400 tonnes of oil spill
on June 14.

It involved more than 700 people
and could span months.

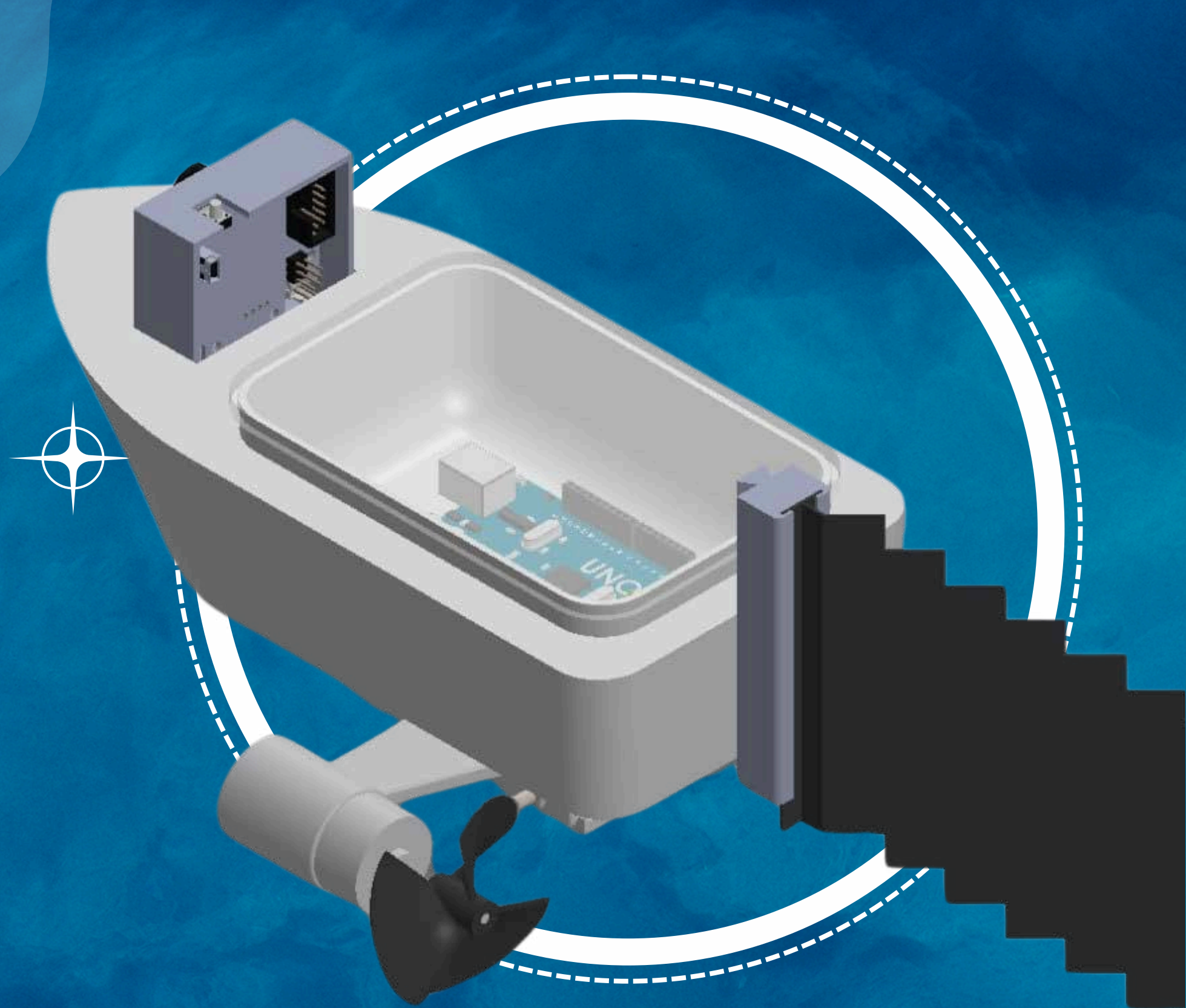


○ June 14, 2024, 9.41pm

Boom contractor arrives at the site and works through the night.

○ June 15, 2024, 5.15am

Deployment of 200m of booms is completed.



**Introducing...
AegisFlow!**



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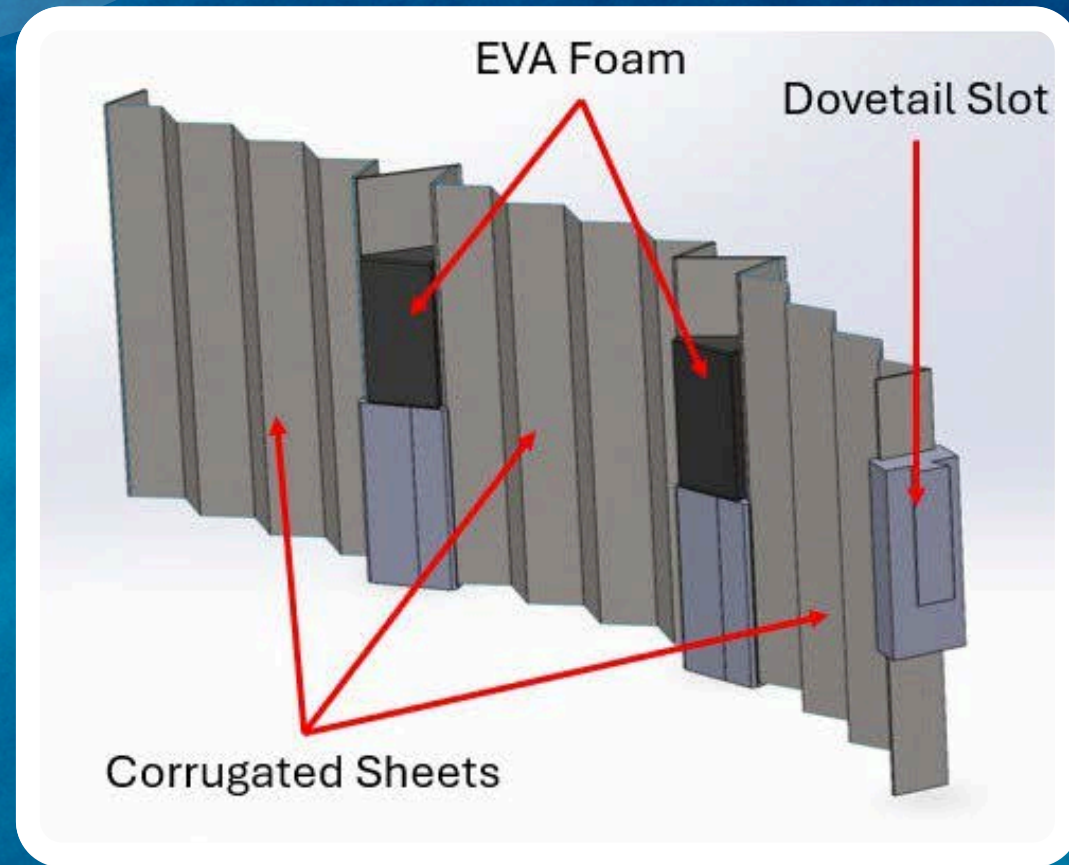
- **Autonomous Deployment**
- **Rapid Containment**
- **Swarm Capabilities**
- **Modular, Collapsible Booms**



Introducing... AegisFlow!

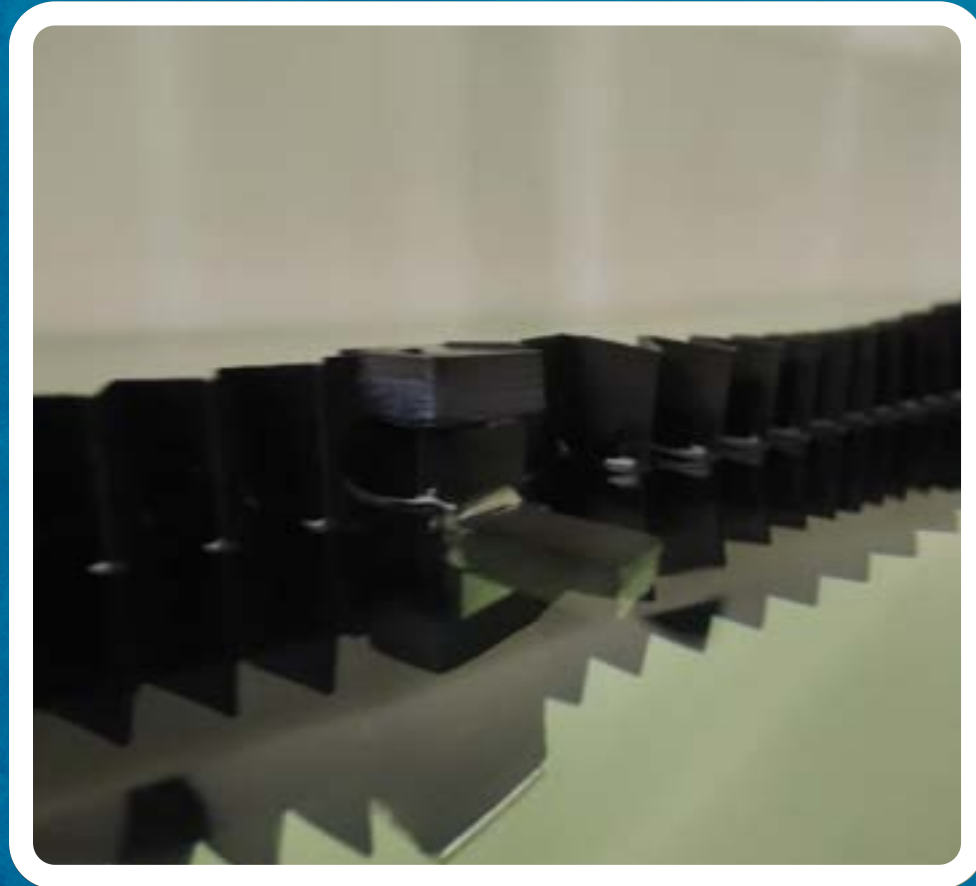
- **Fuelled by Partnerships**

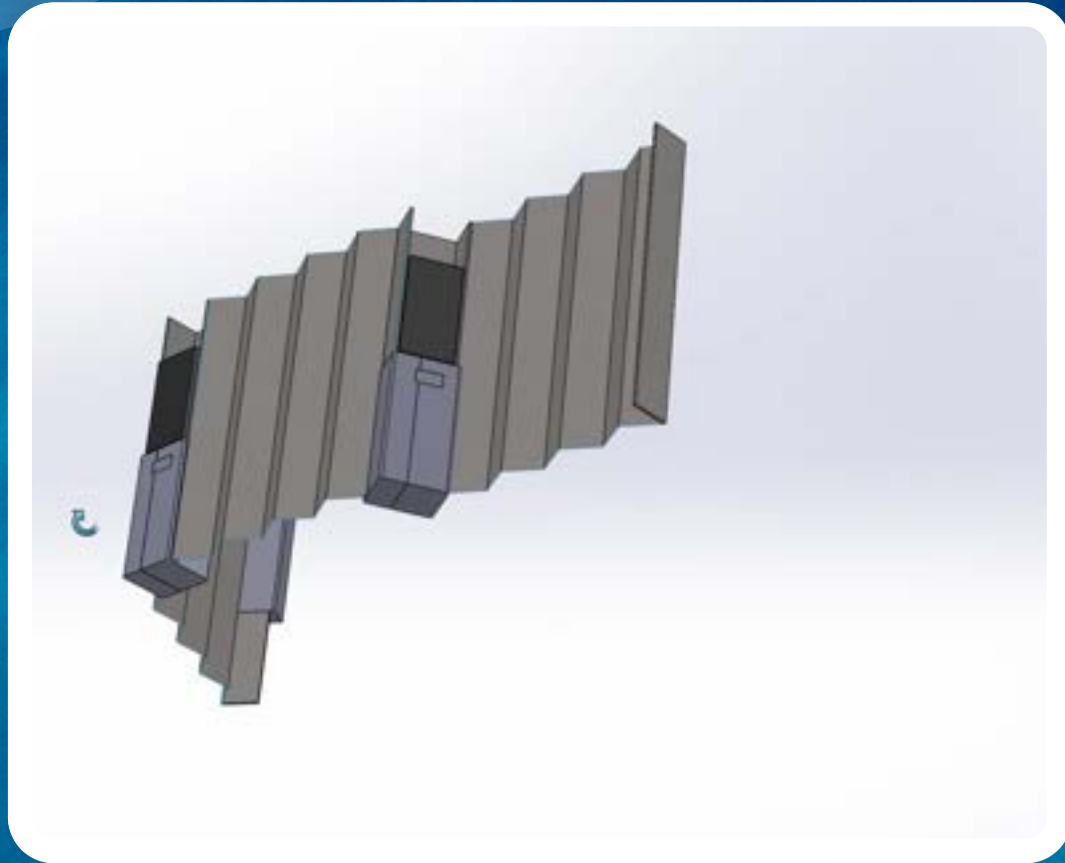




The Boom

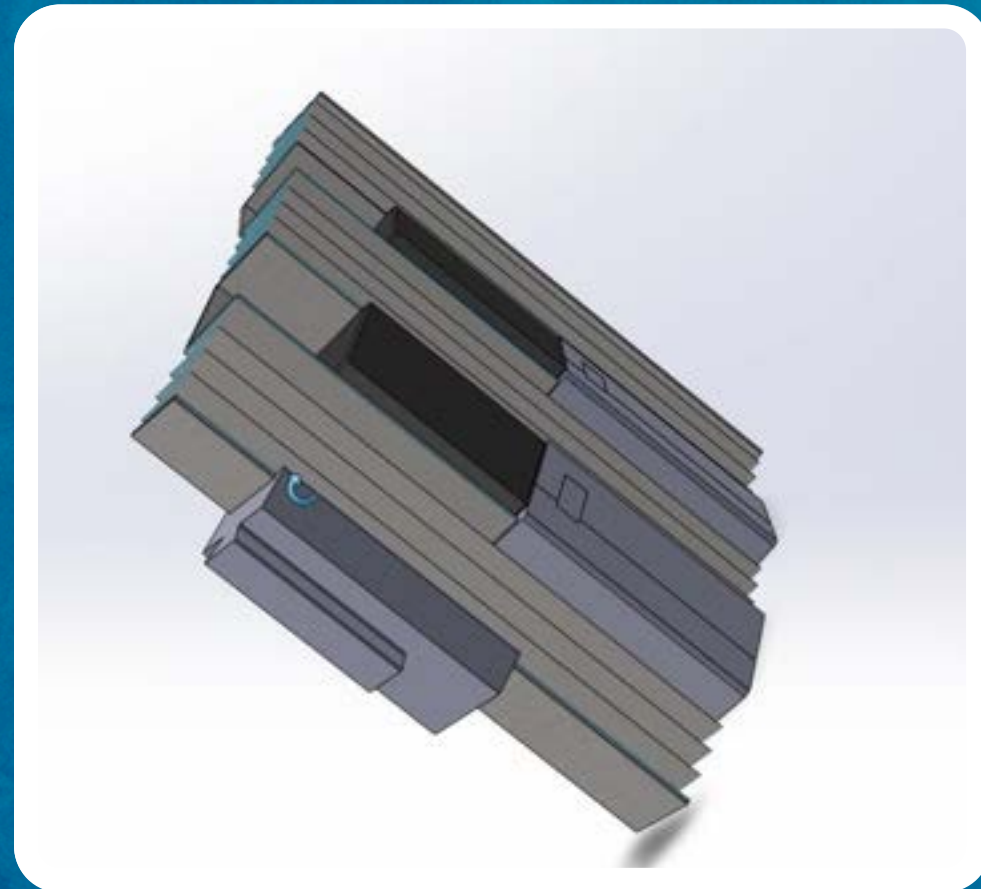
- **Retractable** Corrugated Design
 - **Compact** Storage!
- **Modular System**
 - Interconnected w/ ballasted foam
- Dovetail connection to hull

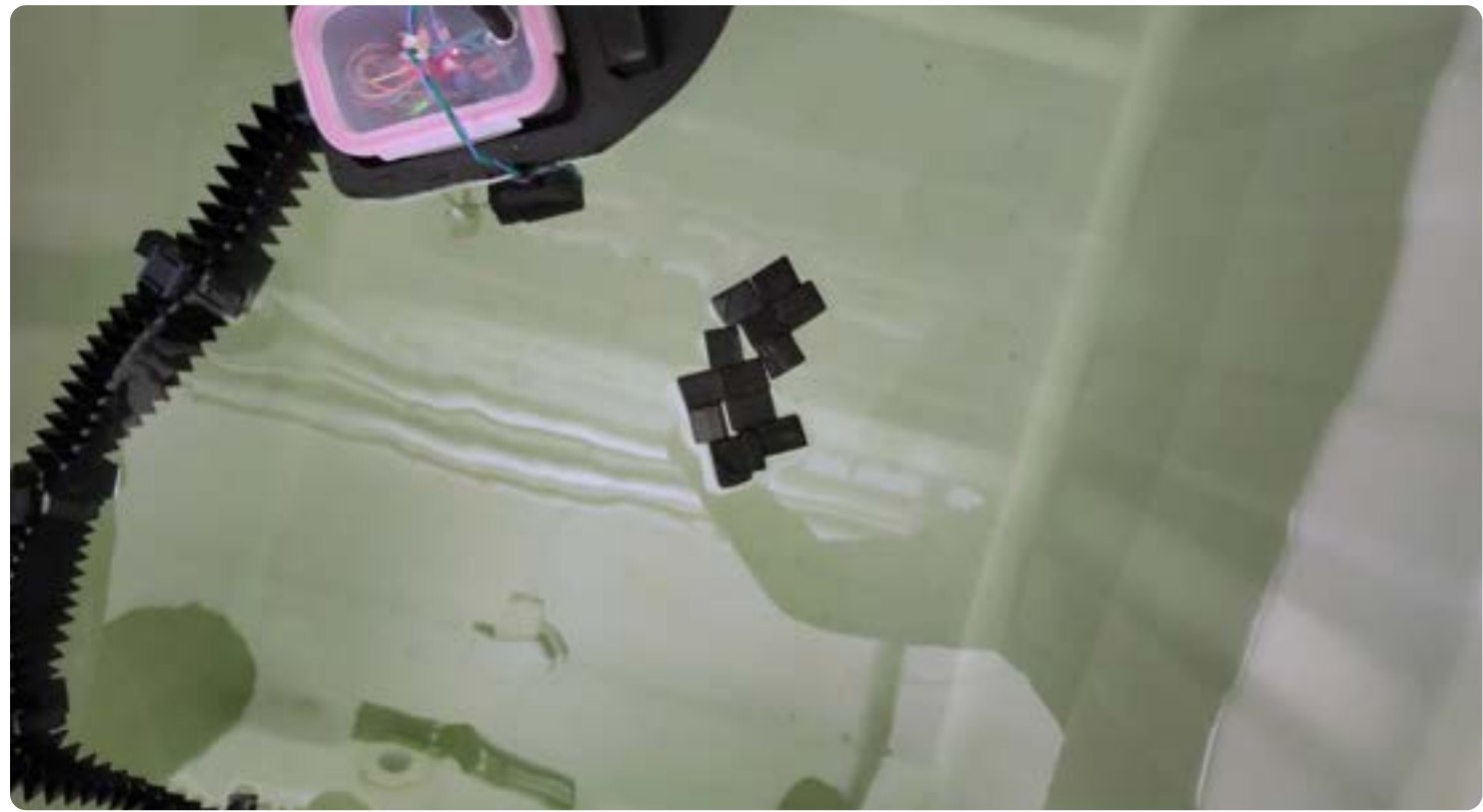




The Boom

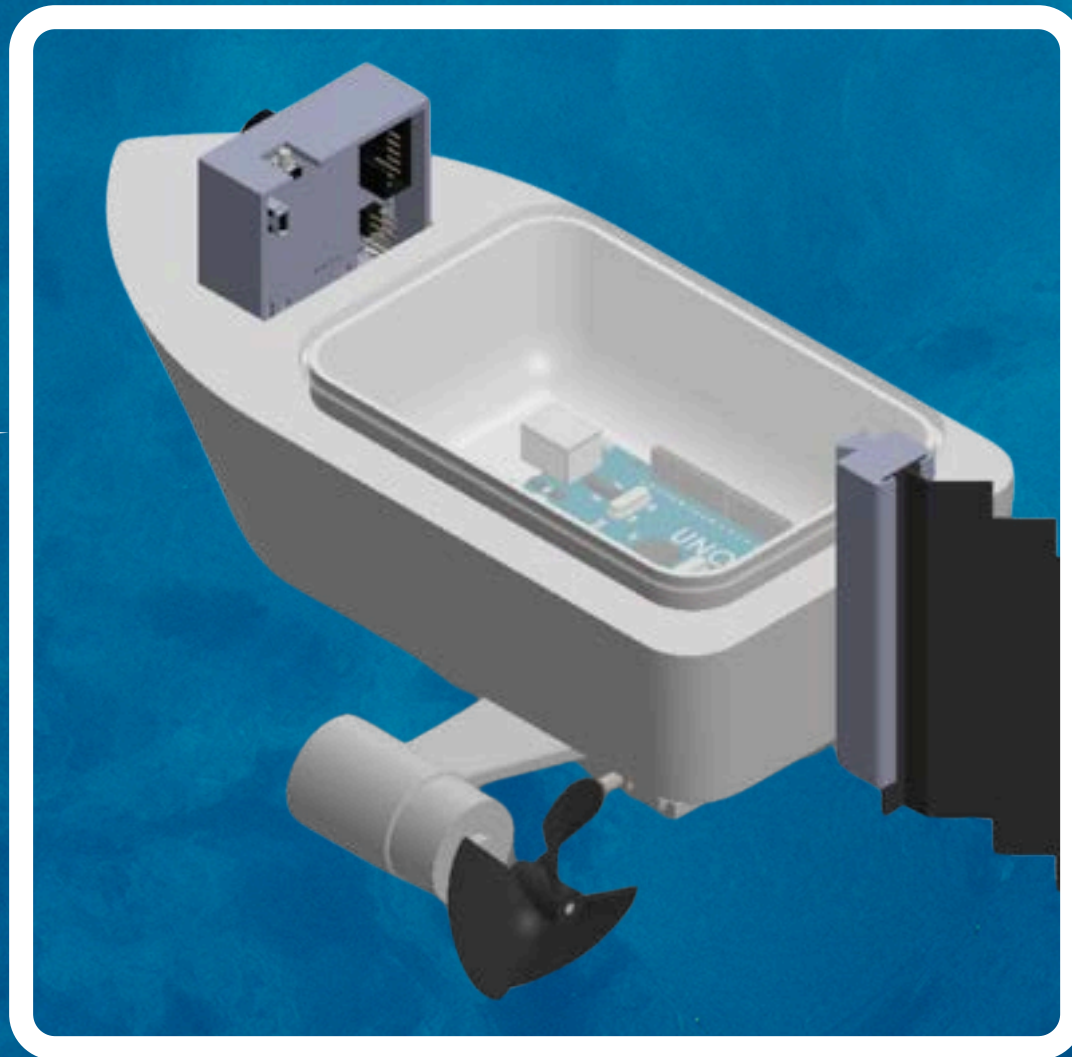
- **Retractable** Corrugated Design
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The Boat

- **Twin Propeller** configuration
- **Hydrodynamic** hull design
- **Autonomously** guided by **Computer Vision**



Cost and Sales



Cost (S\$ per unit)	
Base Cost + Marketing	4,395
Annual Maintenance	650
Total (<u>after gov grants</u>)	<u>1,750</u>
Final Selling Price Strategy (S\$)	
Subscription Model	549–849/mth
MPA Pilot Package (10 USV units)	60,000 incl. support



Thank You!



Estimated USV Component Costs (Electronics & Propulsion)



Component Category	Description	Cost (USD)
Hull & Frame (Structure)		\$1,500
Electronics	Microcontroller (e.g. Arduino/RPi), GPS, communication module (e.g. LoRa/WiFi), basic ESC	~\$300
Propulsion	<u>Motor, ESC, rudder, propeller</u>	<u>~\$400</u>
Sensors	Optical + Ultrasonic sensors (detailed below)	~\$300
Battery & Power	Li-ion battery pack + BMS	~\$150
Total Add-ons (Electronics + Propulsion + Sensors)		\$1,150
MPA Pilot Package (10 USV units)	Including Support	\$60,000

Final Total Manufacturing Cost Per USV



Component	Cost (USD)
Structure + Boom	\$1,500
Electronics + Sensors + Power	\$1,150
Subtotal (Per USV)	<u>\$2,650</u>
Mould Cost (Amortized)	e.g. \$245 (for 10 USVs)

Final Cost per Unit (with amortized mould): ~\$2,895 (for 10 units)

Final Swarm Manufacturing Costs (Including All Components)



Swarm Size	Cost (Each)	Mould/Unit	Total
5 USVs	\$2,650	\$490	\$15,700
10 USVs	\$2,650	\$245	\$28,950
20 USVs	<u>\$2,650</u>	<u>\$122.50</u>	<u>\$55,450</u>

Spill Size Cost Scenarios



Spill Category	Volume	Estimated Total Cost (SGD)
Small Spill (Tier 1)	<1 tonne	SGD 50,000 – 150,000
Medium Spill (Tier 2)	1–10 tonnes	SGD 500,000 – 1.5 million
Large Spill (Tier 3)	<u>>10 tonnes</u>	<u>SGD 2 million – 10+ million</u>
Severe Incident	e.g., Bunga Kelana 3	SGD 20 million+ (across all categories)

Oil Spill Settlement Amounts



Cost Type	Who Pays	Time Role	Estimated Cost (SGD)	Notes
Containment & Cleanup	Initially: MPA/NEA or contractors Final: Shipowner via insurer (P&I Club)	Immediate response required; billed later	SGD 500,000 – 2 million	Includes vessel rental (SGD 370–850/hr), booms, skimmers, dispersants, manpower
Environmental Damage	Shipowner via insurer or IOPC Fund	Filed as 3rd-party claims within 3 years	SGD 100,000 – 500,000	Reimbursement for marine and coastal habitat rehabilitation
Third-Party Economic Loss	<u>Shipowner via insurer</u>	<u>3-year filing limit for affected parties</u>	<u>SGD 50,000 – 200,000+</u>	<u>Claims from seafood firms, tourism ops, or coastal businesses</u>
Regulatory Fines	Shipowner or vessel operator	Triggered by late reporting, negligence	SGD 10,000 – 100,000+	NEA/MPA imposed fines; MARPOL violations
Insurance Deductibles	Shipowner or operator	Paid before P&I coverage kicks in	SGD 100,000 – 500,000	May vary depending on ship type and insurer agreement
Legal & Administrative	Shipowner / Shared with insurer	Ongoing throughout claim resolution	SGD 50,000 – 150,000	Legal counsel, documentation, expert assessments, PR management
Excess Over Insurance Cap	IOPC Fund (if above limit)	Only after P&I cap is reached	SGD 2M – 50M (rare, Tier 3 spills)	For spills beyond ~USD 90 million P&I limits; applies only if Singapore is fund signatory
Public Perception / PR Losses	Indirectly borne by operator	Long-term reputational impact	Difficult to quantify	Could lead to contract loss, public inquiry, ESG scoring drop

USV Pricing and Profitability Model



1. Base Manufacturing & Setup Cost
2. Marketing & Sales Costs
3. Maintenance Costs
4. Subscription Pricing Model
5. Government Grants & Subsidies
6. Final Selling Price Strategy

Base Manufacturing & Setup Cost



Component Category	Cost (SGD)
Manufacturing Cost (structure + sensors + electronics)	\$2,895
Assembly & QA	\$250
Packaging & Transport	\$150
Warranty Buffer (1 year)	\$200
Total Base Cost per Unit	\$3,495

Marketing & Sales Costs



Component Category	Unit Cost (SGD)
Website, brochures, trade shows	\$300
Sales, demos, pilots	\$400
Channel Partner Commissions	\$200
Total Marketing	\$900

Maintenance Costs



Component Category	Unit Cost/Year (SGD)
Spare parts & servicing	\$300
Remote diagnostics & firmware	\$150
On-site labor	\$200
Total Maintenance	\$650

Subscription Pricing Model



Component Category	Unit Cost (SGD)
Rental Revenue	\$850/month
Annual Revenue	\$10,200
Annual Cost (Manufacturing + Maintenance)	\$4,145
Net Profit Year 1	\$6,055
Net Profit Year 2	\$9,550

Government Grants & Subsidies



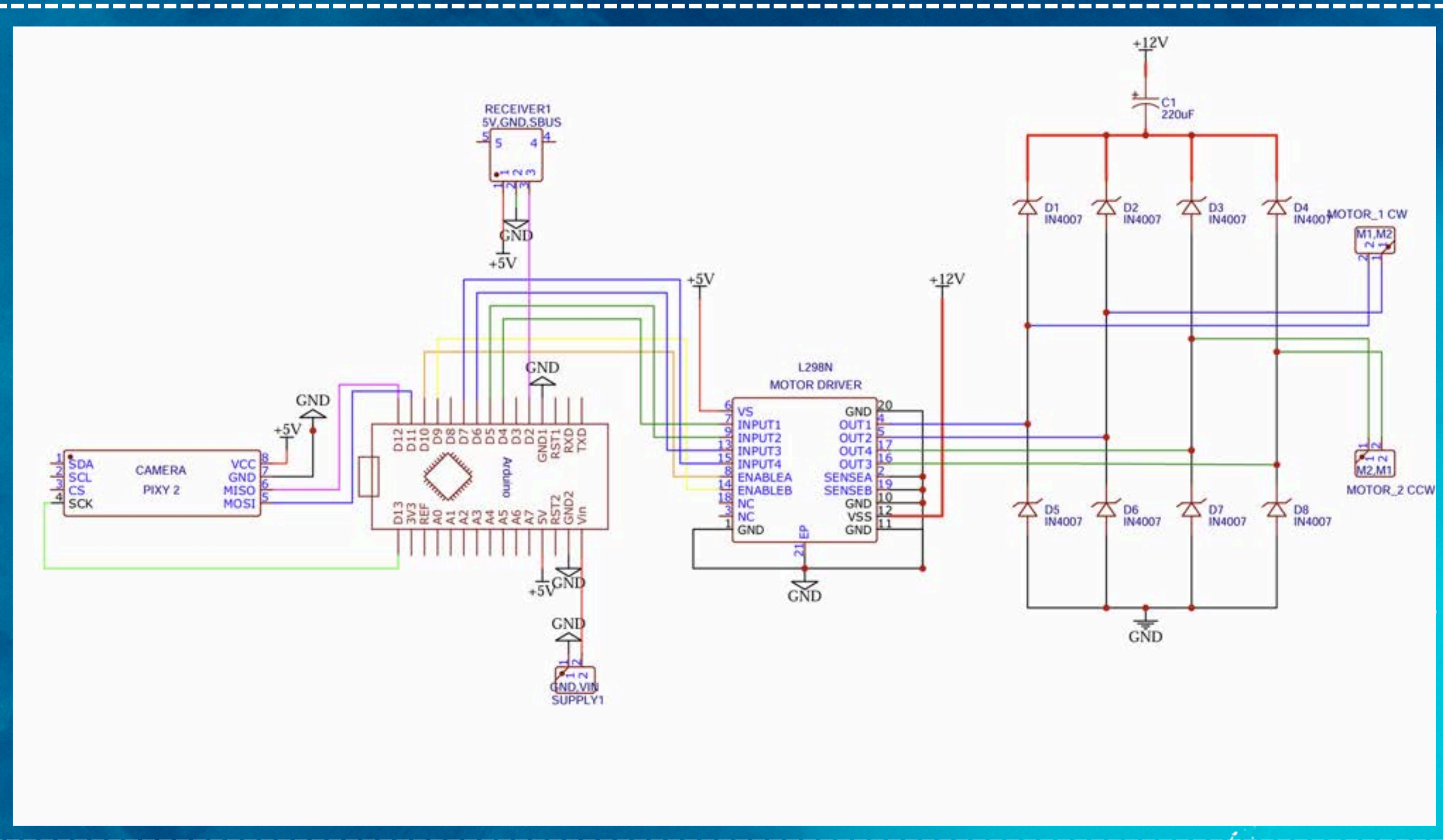
Component Category	Unit Cost (SGD)
Enterprise Development Grant (EDG)	Up to 70%
Maritime Innovation & Technology Fund	Up to 50%
Sustainability Tech Credits	Up to 30–50%
Average Offset on Base Cost	~50%
Effective Cost for Early Adopters (MPA, ESG)	~SGD \$1,750/unit

Final Selling Price Strategy

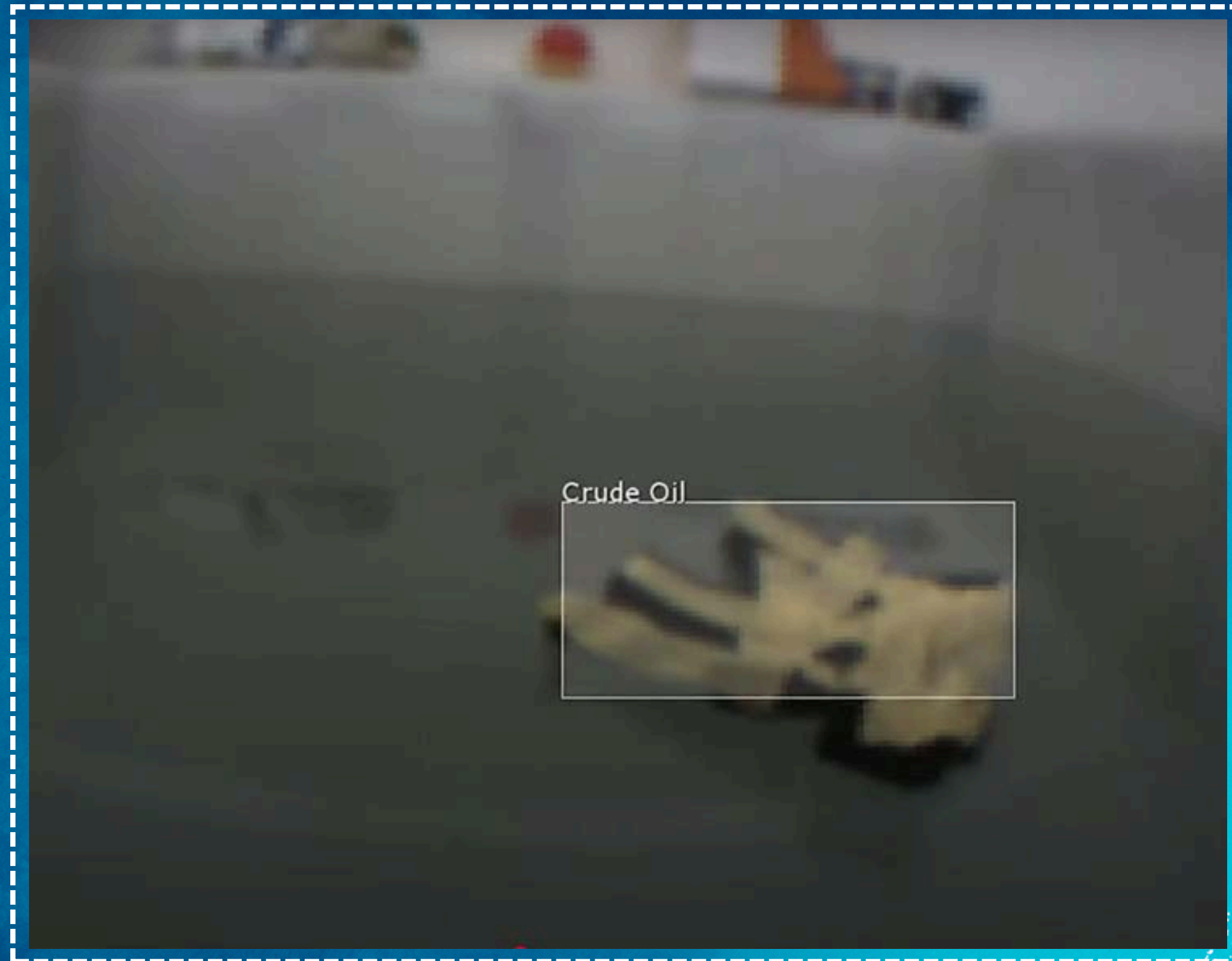


Component Category	Unit Cost/Year (SGD)
Direct Sale Price	\$6,900
Subsidized Price (after grants)	\$3,450-\$4,500
Subscription Model	\$550-\$850/month
MPA Pilot Package	SGD \$60,000 for 10 USVs incl. support

Schematic of Circuit



Pixycam View



Pixycam View

