Solar Boat Competition

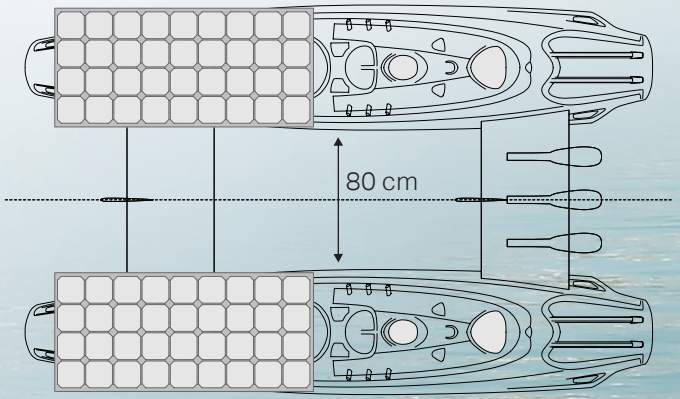
by the Lebanese Ministry of Energy and Water

BrightFuture

brightening the future together

Sponsored by: Dar Al-Handasah (Shair and Partners)

Boat Design



Important Notes

- Our team's combination of Dar professionals, aspiring students, and watersport experts was key to the success of the project.
- Our system is set to fully charge batteries within 5 hours.
- Our boat was tested on full power for a total of 3 hours and a half of continuous full run.
- Tilting angle for solar panels is adjustable for maximum sun exposure any day and anywhere.
- A sun analysis for Chabrouh Dam was performed, and the optimum tilting angles are listed on page 4.
- Our system is made with maximum compatibility concerning current-voltage ratings. The voltage delivered from the solar panels to the batteries is very efficient and does not lose any power.
- For optimum maneuvering, our kayaks are only 0.8 meters away from one another as per our expert kayak driver's request.
- Three engines are connected with one handle so that one driver will have control and engines will shift together.
- The boat was assembled fully with the support of professionals at Top Marine, an assembly and repair boat company.

Technical Information

Intex Engine Table	
Voltage Rating	12 V
Current Rating	35 A (initial) 25 A (continuous)

Selection of PV Array Configuration	
No. of Series Panels per String	1
No. of Parallel Strings	2
PV Panel Peak Power	160 Wp
PV Panel Open Circuit Voltage	22.65 V
PV Panel Rated S.C. Current	9.0 A
PV Array Peak Power	0.3 KWp

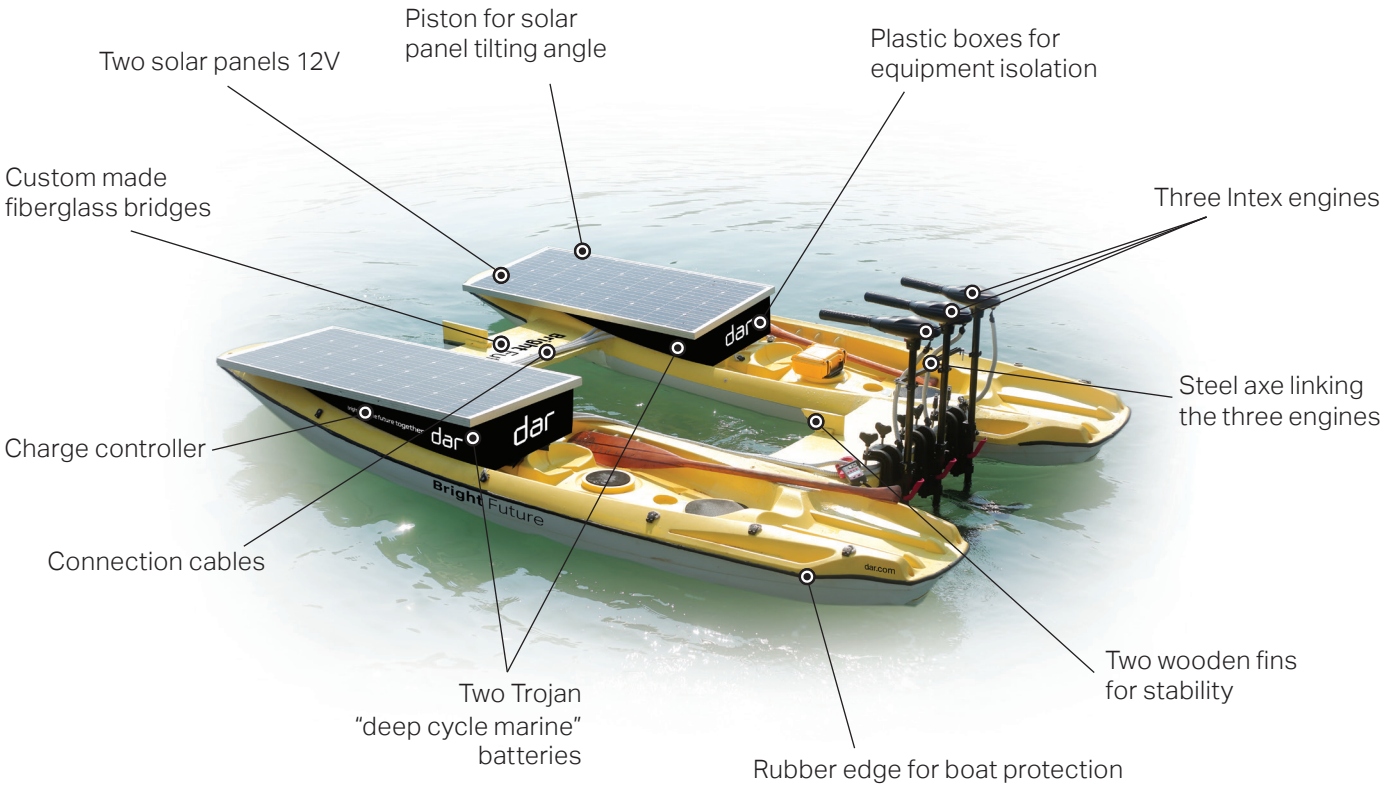
Tracer 3210AN Charge Controller Used	
Selected In. Voltage Rating of Charge Controller	24 V
Minimum Array Short Circuit Rating @ STC	30 A
Minimum Output Power	390 W

Battery System Requirements	
Total Installed Capacity	3.1 KWh
System Operating DC Voltage	12 V
Used Battery Rated Voltage	12 V
Used Battery Rating	130 AH
Batteries Charging Loss Factor	0.9
Batteries Deep Discharge Factor	0.60
Total Required Batteries Ampacity	194.4 AH
No. of Series Batteries	1.0
No. of Parallel Strings of Batteries	1.5
Exact no. of Parallel Strings of Batteries	2.0
Total Installed Batteries Ampacity	260.0 AH

According to Sun Study for Chabrouh Dam	
Optimal Tilting Angle (All Year Long)	33.31
Optimal Tilting Angle in August	20.35

Boat Specifications

- Dimensions per kayak: 359 cm x 84 cm x 32 cm
- Total dimensions: 359 cm x 248 cm x 42 cm
- Weight per kayak: 28.5 kg
- Maximum weight capacity: 420 kg
- Total weight: 230 kg
- Built-in feet: this allows a distribution of the effort
- Carrying handles
- Self-drilling holes x4



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Team members:

DAR professionals:

- Raymond Boustani
  Architectural Engineer / Coordinator
- Rami Ghazali
  Electrical Engineer
- Nicolas Madani
  Electrical Engineer
- Elie Skaf
  Graphic Designer
- Daniel Zoghby
  Façade Engineer / Naval Engineer Advisor
- Yara Bissani
  Architectural Engineer

Aspiring students:

- Antoine Mehanna
  Civil Engineer Student
- Roy Abi Nakhoul
  Civil Engineer Student
- Richard Malha
  Ecole Polytechnique Paris

Watersport expert:

- Bachir Borkhoch
  Expert Kayak Driver from Kayak Lebanon

Volunteer:

- Yara Bsaibes
  Pamphlet Photos

Only 150 copies were printed for this event. Kindly scan the below QR code and navigate to find the online version.