

Qatar University – Robotic Cloud

Peter Lobner, 18 March 2022

In connection with their 2011 bid for the 2022 FIFA World Cup, Qatar announced plans to build new solar-powered, air-conditioned stadia for the events, which originally were scheduled to occur in June 2022, when local temperatures can reach 50° C (122° F).

Saud Abdul Ghani, head of the Mechanical and Industrial Engineering (MIE) department at Qatar University, described plans to build large, flat airships, known as Robotic Clouds, that were designed to fly above a stadium and provide shade for players and fans. By shielding the stadium from the direct rays of the Sun, the “cloud” was expected to reduce the temperatures in the stands and on the field by as much as 10° C (18° F).



*Relative size of a Robotic Cloud and a World Cup stadium.
Source: Qatar University MEI Department (2011) via Global Voices*

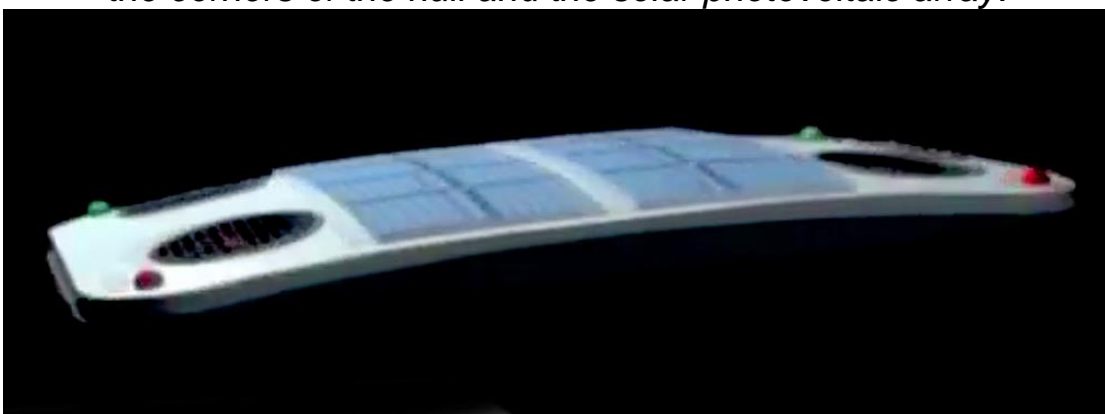
FIFA defines field dimensions in yards. For international matches such as the World Cup, field length must be between 110 - 120 yards (330 - 360 feet), with a width between 70 - 80 yards (210 - 240 feet).

Scaling very roughly from the above graphic, a Robotic Cloud airship would be about 200 feet (61 m) long, with a width of 100 feet (30.5 m) and a maximum thickness of 10 - 15 feet (3 – 4.6 m).

Ghani said the “clouds” would be built with a lightweight carbon fiber structure and covered by an envelope containing helium lifting gas. A thin-film solar array on the top surface would generate the electric power needed for airship systems, including four electric motor-driven vertical fans located at the four corners of the flat airship. These fans would propel and position the “cloud” autonomously or via remote control. Ghani estimated that a “cloud” could be produced at a cost of \$500,000 (about £310,000 in 2011) each when produced in quantity.



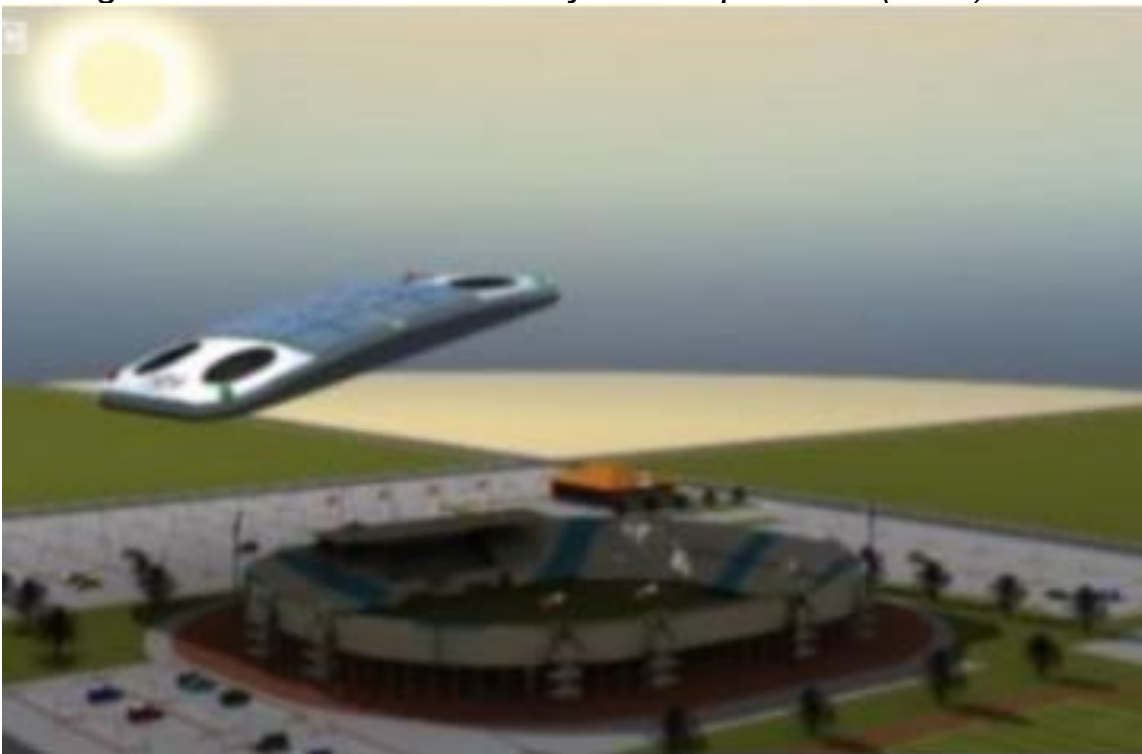
General layout of a Robotic Cloud, showing the four fan propulsors at the corners of the hull and the solar photovoltaic array.



*Side view of a Robotic Cloud, highlighting the thinness of the hull.
Source, both graphics: Screenshots from Qatar University MEI
Department video (2011)*



A Robotic Cloud deployed above a stadium to shield it from direct sunlight. Source: Qatar University MEI Department (2011) via CNN



Robotic Cloud tracks the Sun and moves during the day to shade the stadium. Source: Qatar University MEI Department (2011) via BBC

Ghani said that the “cloud” also could be used during an event for additional value-adding services, such as: a camera / video platform for the event, a wireless communications platform to increase local network capacity for the event, and security force operations support.

Qatar won the competition for the 2022 FIFA World Cup, which was rescheduled for a cooler time of the year, from 21 November to 18 December 2022. There has been no further news on development and testing of a Robotic Cloud.

For more information

- Brian Walker, “Qatar could create robot clouds to cool World Cup watchers,” CNN, 21 March 2011: <http://edition.cnn.com/2011/SPORT/03/25/qatar.flying.saucers/index.html>
- “Artificial clouds could help cool 2022 Qatar World Cup,” BBC, 24 March 2011: <http://news.bbc.co.uk/sport2/hi/football/9435035.stm>
- Istiaq Madmud, “Modern Airship Design Using CAD and Historical Case Studies,” p. 27, San Jose State University, May 2015: <https://www.sjsu.edu/ae/docs/project-thesis/Istiaq.Mahmud-S15.pdf>

Video

- “Qatar could create robot clouds to cool World Cup watchers,” (0:46 minutes), Qatar University, MIE Department via CNN, 6 April 2011: <https://www.youtube.com/watch?v=K7rOsrObyKU>

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