

LET'S TALK ABOUT LIGHTER THAN UNMANNED AIR VEHICLES UNMANNED AIRSHIPS

➤ **PURPOSE: Surveillance & Reconnaissance**

Please take a look for our animation video (43 seconds) firstly before continue to reading our pitch deck. If you like you can continue, if not please delete all.

<https://youtu.be/2e8y98t-PfU>

LET'S ANIMATE THE FLIGHT TIMES OF AN
UNMANNED AIRSHIP, A FIXED WING &
A ROTARY WING AIRVEHICLE





LATEST NEWS

➤ NDA Between KUZGUN & H3R

Non-Disclosure Agreement

This Non-Disclosure Agreement (hereinafter referred to as this "Agreement") is entered into by and between H3R (referred to as "Party A") and KUZGUN (referred to as "Party B") in relation to the information provided in performing AIRSHIP PROJECT.

The Parties agree as follows :

Article 1 (Objective)

Through this Agreement, the Parties intend to set out the terms and conditions governing the protection of Confidential Information disclosed to the Receiving Party.

Article 2 (Definition)

① The term "Confidential Information" in this Agreement shall mean all and any information including but not limited technical and managerial information provided between two parties in a tangible form of printed material, and computer file, orally or in a way of allowing to read or view.
② Where "Secret," "Restricted," "Confidential," "Proprietary" or terms indicating secret using similar expressions in media or documents containing the information provided between two parties, the information shall be deemed confidential information.

Article 3 (Confidentiality)

① Both parties shall use confidential information only for the purpose of performing the Licensing Agreement.
② Both parties shall pay attention at the level equivalent to its own confidential information in handling and managing confidential information.
③ Both parties shall take necessary measures to prevent others except its officers and employees who need to handle confidential information for their duties from accessing confidential information for the purpose of this Agreement.
④ Both parties shall cause its officers and employees who handle confidential information to comply with the confidentiality.

Article 4 (Certification of Compliance of Confidentiality)

Both parties shall certify in writing at the request of between two parties has complied with confidentiality.

Article 5 (Exceptions)

① Where Both parties submit confidential information by the laws, or the orders of the courts or the government bodies, Both parties shall give each other immediate notice on the fact.
② Both parties shall submit the minimum amount of confidential information in accordance with the previous paragraph hereof.

Article 6 (Obligation for Returning Documents)

Both parties shall return to each other all documents containing confidential information within ten (10) days from the termination of this Agreement or the request of between two parties.

Article 7 (Reservation of Rights)

Providing confidential information in accordance with this Agreement shall not be considered allowing to license the intellectual property rights.

Article 8 (Scope of Guaranty)

Both parties shall not guarantee appropriateness, completeness, and commercial values of confidential information.

Article 9 (Non-assignment of Rights and Obligations)

The rights and obligations subject to this Agreement shall not be assigned to a third person.

Article 10 (Non-waiver)

Even if Party A delays the exercise of the rights as set forth in this Agreement, it shall not be deemed to waive its rights.

Article 11 (Compensation)

Where Party A or Party B breach obligations as specified in this Agreement, Party A or Party B may claim compensation arising therefrom (including, but not limited to, the lawyer's fee, other counsel's remuneration, and all other costs and expenses).

Article 12 (Closing and Termination)

① Where the Licensing Agreement entered into by and between both parties is closed, this Agreement shall be closed.
② Where one of the parties breaches any provision of this Agreement, both parties may demand from each other to rectify in writing and if it is not rectified within ten (10) days, both parties may terminate this Agreement in writing.

Article 13 (Survival Clause)

The confidentiality of Party B in accordance with this Agreement shall survive until the confidential information loses secrecy.

Article 16 (Governing Law)

This Contract shall be governed and construed by the laws of Republic of Korea and Republic of Türkiye.

Article 17 (Jurisdiction)

Any lawsuits filed in relation to or arising from this Agreement shall be under jurisdiction of the court where the head office of both parties is located.

This Contract shall be effective once the parties have signed it.

IN WITNESS WHEREOF, both parties have signed and executed this Contract in duplicate, keeping each.

11.11.2024

(CEO) SONG CHAE YOON

(Company Name) H3R

(Address)

H2 - B1, 4A, Eoseon-ro 51beon-gil, Yuseong-gu,
Daejeon, Republic of Korea
R&D CENTER - 431, 36, Gaebeol-ro, Yeosu-si,
Jeonhon, Republic of Korea



(Gn.Man.) YÜCELDİR

(Company Name) KUZGUN

(Address)

Tunahan Mh. Kuvayimilliyce Cad. AGE Bld.
No: 3B / 23 Eryaman Etimesgut Ankara
Türkiye

(Seal)

- It is better to give some info about our selected presentations in **Horizon Europe programmes** as a first step (It seems that our project ideas have been applicable to the calls).
- Our Project idea **“KUZGUN_GEA “Geodesic Airframe”** has been selected for the pitching session in the **Horizon Europe Industry 2024 Brokerage Event Cluster 4 - 2024** calls. Please check the presentation (38:38-44:28)
<https://horizon-europe-industry-2024-brokerage.b2match.io/page-4081>
- Our Project idea **“KUZGUN_5E Unmanned All Electrical & Hydrogen Powered “Aerial Vehicle_XXX”** has been selected for the pitching session in the **GREENET Brokerage Event for HE Cluster 5 - 2023** calls.
Please check the presentation (24:32-28:20):
<https://greenet-brokerage-event-2023.b2match.io/components/25720>
- The following groups have wanted to participate our projects:
Agata Communications (UK & Spain), Sauletech (Poland), ESA (Türkiye), Imieu (Belgium), Asca (France & Germany), TechNovator (UK), Logicdev (Austria), National Composites Centre (UK).
We are looking for a coordinator for Horizon Europe projects.
- In fact all of our project ideas are related and dependent each other.

➤ WHO WE ARE

- We are a group of engineers/entrepreneurs from Turkey.
- We believe that **Lighter Than Air (LTA) vehicles** will be one of the future air vehicles.
- An **LTA vehicle** is a buoyant lighter-than-air aircraft that can be steered and propelled through the air with great saving in fuel consumption.
- We'd like to add thin flexible solar cells and LiPo batteries together with a wing to the structure, to increase lifting capacity for our project. Also, implement advanced control and artificial intelligence techniques to decrease the power consumption and increase flight time.
- So we name it "**AEUAV_XXX**" from now on.

➤ WHAT WE'VE DONE UP TO NOW:

- Our company (KUZGUN Ltd.) was founded in 2007 and closed in 2015 (micro start-up company). We are on the edge to establish a new one (KUZGUN Aerospace Inc).
- We've completed 2 prototypes of **Lighter Than Air vehicle** concepts: **KUZGUN_1 Unmanned Airship & KUZGUN_A1 Tethered Airship**.
- Specifications of KUZGUN_1 Unmanned Airship: All Electrical (LiPo batteries), Rigid type, Composite Structure, Modular.
- Patent application has completed and patent was granted:
"A MODULAR UNMANNED AERIAL VEHICLE _ TR 2011 03453 B"

➤ KUZGUN_1 Unmanned Airship Flight Tests

➤ Please check our flight tests: https://youtu.be/RoETD_yb9Fg.



➤ We've completed 2 prototypes and executed successful flight tests (all electrical). These prototypes have composite structure very similar to fixed wing aircraft structure (bulkheads & stringers).

➤ Let me come to the point. We always need lighter, stronger low cost airframe parts. We believe that the development of light, stronger, low-cost airframe fuselage structures can be achieved by means of new generation composite materials based on GEODESIC / ISOGRID or ORTHOGRID technologies.

➤ **Our advantages:**

- 1) An example of Green Technologies & Sustainable air transport.
- 2) Zero operational emission.
- 3) Low operational costs with respect to conventional unmanned air vehicles. Flying cost per hour of fixed and rotary wing type of air vehicles are around US\$ 10.000, however the LTA (airship) costs per hour is approximately US\$. 1.000.
- 4) Longer flight times. Our platform can easily reach 1 week flight time. The flight time of conventional UAVs (electrical) is max. 2 hour. The flight time of conventional UAVs (fossil fueled) is max. 2 day. One week of flight time (168 hours), is achievable by airships and like.
- 5) We have the all the patent rights of our product in Turkey.

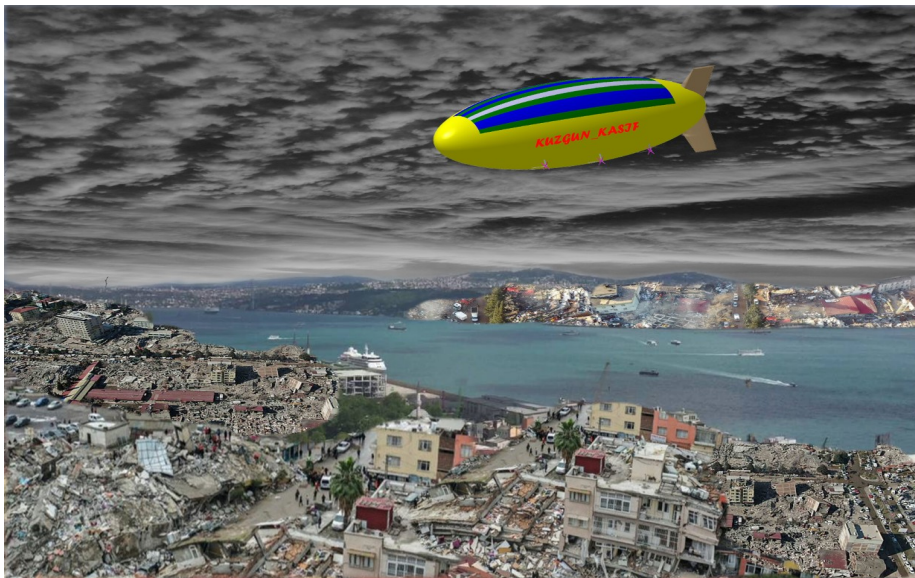
➤ **Our disadvantage:**

The bulky appearance of the airship!

AEUAV_ All Electrical Unmanned Aerial Vehicle_XXX

➤ Usage Areas:

- 1) ISR (border security, environment control, city security, natural disasters, pipelines security ...)
- 2) Swarming Attack Drones & Reusing Them
- 3) Cargo Carriers.
- 4) Entertainment (flying yacht or flying hotel)
- 5) Stratospheric “Aerial Vehicle_XXX” project.
- 6) Doomsday “Aerial Vehicle_XXX”



➤ **PROBLEM DESCRIPTION_The need(s) to be satisfied**

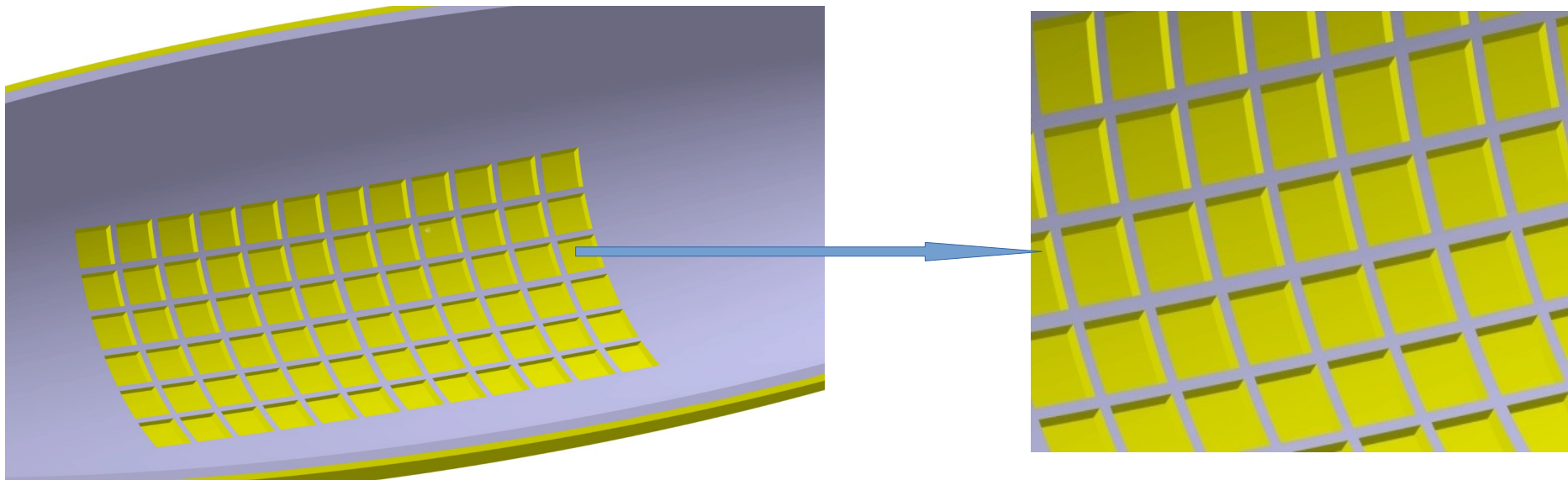
- Today the aviation industry generates 2.8% of global CO2.
- Clean Sky aims to develop cleaner air transport technologies for earliest possible deployment...
- The unmanned airvehicles are generally used for surveillance purposes today. We can easily say that almost all of them are fixed or rotary wing type of air vehicle. The power source is typically electrical or fossil fuel type.
- The flight time of electrical ones is max. 2 hour. The flight time of fossil fueled ones is max. 2 day.
- There are some projects going on in early stages for carrying cargo and transporting people.

➤ **OUR SOLUTION**

- Rigid type Lighter than Air All Electrical Unmanned Aerial Vehicle.
(AEUAV All Electrical Unmanned Aerial Vehicle _XXX)
- Helium will be used for 70% - 80% of buoyant lift. Electrified vectored engines will be used to provide the remaining lift and maneuverability.
- Since we've proved that our concept works with batteries, we'd like to add **Flexible solar cells with Batteries** as a power source together. Our patented modular structure will help us to carry all types of payloads and weights. So almost NO OPERATIONAL CARBON FOOTPRINT.

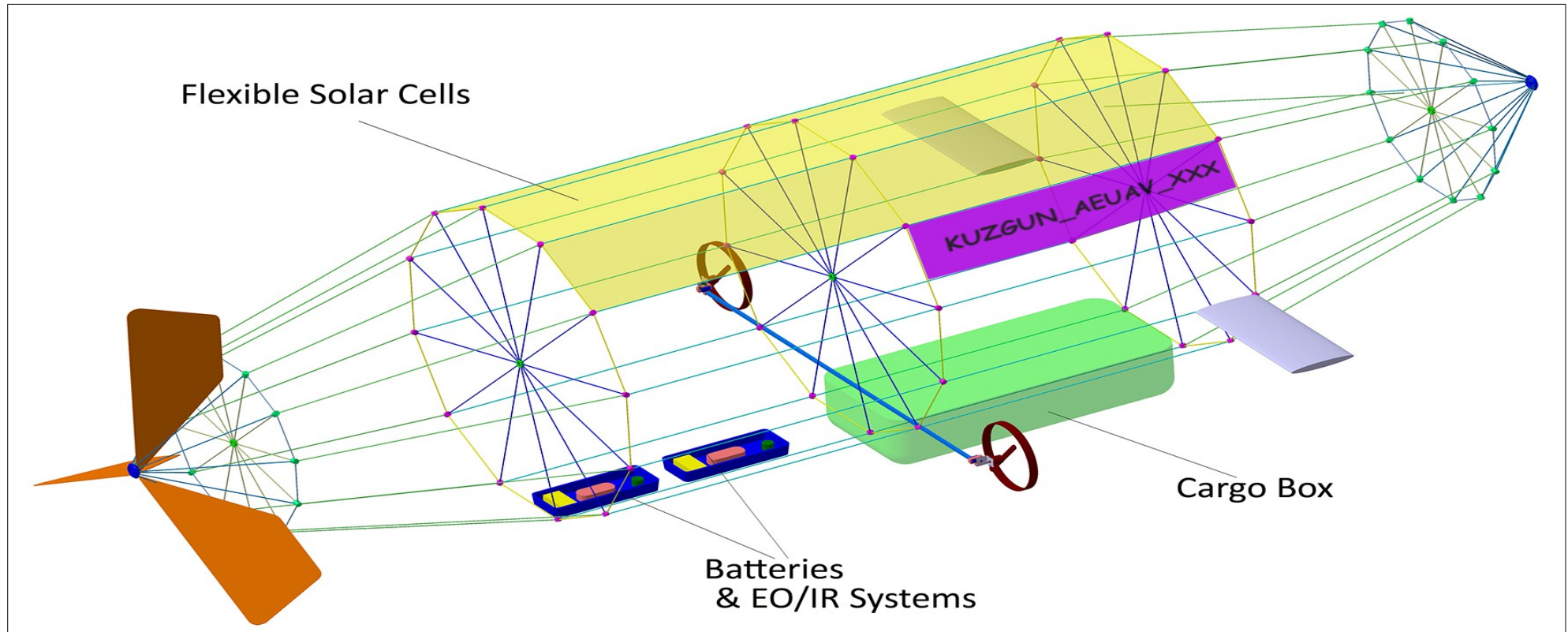
AEUAV_ All Electrical Unmanned Aerial Vehicle_XXX

- We'd like to take part in rescue and cargo transport to start with, and then the next step will be to take part in people transport. Our products can easily be adapted to use in the following areas: environment control, city security, natural disasters, pipelines security ...
- We've mentioned about Geodesic / Isogrid structures for our next generation design principle. We will only design and manufacture 2 or 3 Geodesic-Isogrid panels which will prove the applicability of such kind of shell to the LTA vehicles.



AEUAV_ All Electrical Unmanned Aerial Vehicle_XXX

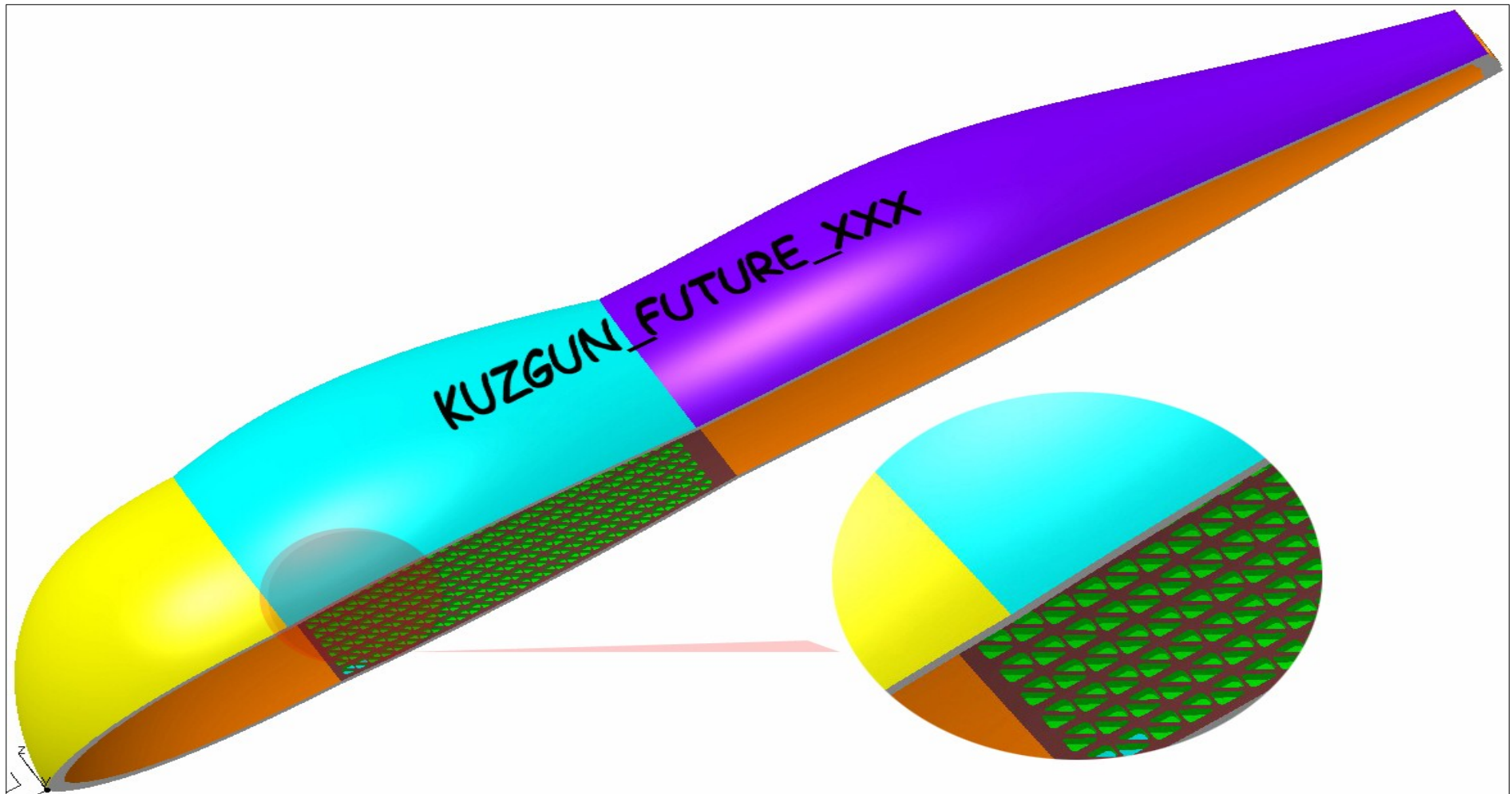
➤ ARTISTIC STRUCTURAL DESIGN CONCEPT



Technical Specifications

Length (m)	Max. Dia. (m)	Payload (kg)	Endurance (days)	Power Source	Operational Ceiling (m)	Max. Speed (km/h)
17 - 22	5.5 – 7.5	50 - 70	7	LiPo Batteries + Flexible Solar Cells	1500	80

➤ FUTURE STRUCTURAL DESIGN CONCEPT (GEODESIC/ISOGRID)



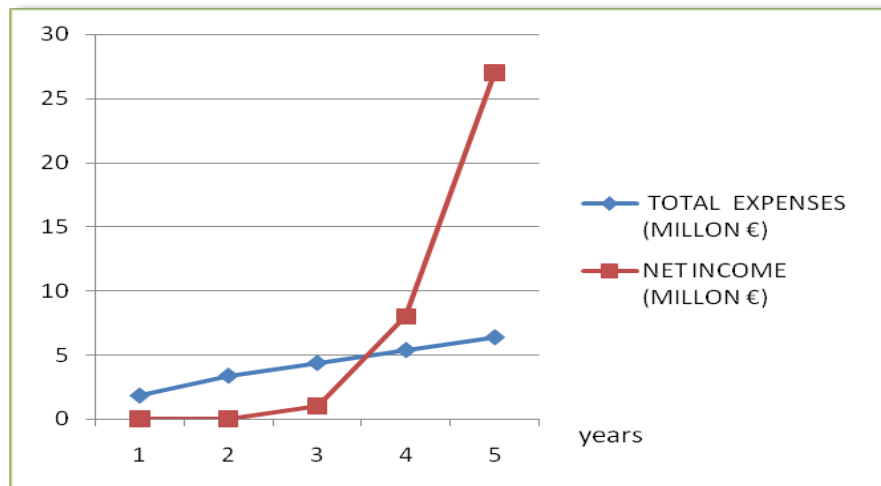
AEUAV_ All Electrical Unmanned Aerial Vehicle_XXX

➤ EXPENSES & BREAK EVEN POINT ESTIMATIONS

	EXPENSES (MILLON €)	TOTAL EXPENSES (MILLON €)	KUZGUN AEUAV - XXX (# of sales)	KUZGUN_AEUAV_XXX SALE INCOME (PER PRICE = 2 MILLON €)	INCOME (MILLON €)	NET INCOME (MILLON €)
1st YEAR	1,83	1,83			1,83	0
2nd YEAR	1,55	3,38			3,38	0
3rd YEAR	1	4,38	1	2	5,38	1
4th YEAR	1	5,38	4	8	13,38	8
5th YEAR	1	6,38	10	20	33,38	27

➤ We'll reach Break Even around T0 + 4 years

➤ Let me make it clear. We need 3,38 Million € for the first 2 year. We believe that we can sell at least one of our products and so on.



➤ GROWTH FORECAST

- We've submitted one of the LTA R&D projects (tethered airship_aerostat) to our Presidency of Republic of Türkiye Defense Industry Agency together with Turkish Aerospace Ind. They informed us that the project was approved verbally. We've been waiting for the signing the contract.
- AFAD (Disaster & Emergency Management Presidency) has shown interest to our product for using during disasters.
- TÜBİTAK (The Scientific and Technological Research Council of Türkiye) is the leading agency for management, funding and conduct of research in Türkiye. It was established in 1963 with a mission to advance science and technology, conduct research and support Turkish researchers.
 - Our first Project KUZGUN_1 Unmanned Airship Project was supported by TÜBİTAK.
 - As a first priority we'd like to find a few investors for our next projects. Then make the applications for TÜBİTAK support again.
- As mentioned our project ideas always attracted the people in EU Horizon Europe Brokerage Events ("KUZGUN_GEA "Geodesic Airframe" , "KUZGUN_5E Unmanned All Electrical & Hydrogen Powered "Aerial Vehicle_XXX") ... We'll try to get funding from the EU programs.
- One of the alternatives will be Crowd Funding.

➤ NOW IT IS CORRECT TIME TO MENTION LATEST NEWS ABOUT LIGHTER THAN AIRVEHICLES

➤ December 2024: Kelluu Selected for NATO's DIANA Programme from Over 2,600 Applicants.

Purpose: The Finnish company Kelluu Oy, specializing in environmental data collection with **AIRSHIPS**, is one of 75 companies chosen for NATO DIANA Programme for 2025. Out of more than 2,600 applications:

<https://www.linkedin.com/company/kelluuairships/posts/?feedView=all>



AEUAV_ All Electrical Unmanned Aerial Vehicle_XXX

➤ September 2023: BAE Systems & Hybrid Air Vehicles Sign MoU to Develop Defence Applications for Airlander.

Purpose: provide an alternative sustainable and cost effective solution to air logistics and Intelligence Surveillance and Reconnaissance (ISR) capabilities, complementing today's networks of air, space and surface systems:



<https://www.uasvision.com/2023/09/18/bae-systems-hybrid-air-vehicles-sign-mou-to-develop-airlander/>

➤ December 2023: US DoD Operational Energy Office Signs Contract with Hybrid Air Vehicles.

Purpose: enhancing logistics and maritime efficiency for the US Navy and Marine Corps. with less fuel and fewer emissions:

https://www.linkedin.com/posts/hybrid-air-vehicles-ltd_airlander-usdod-operationalenergy-activity-7141074261141512193-cilE/?utm_source=share&utm_medium=member_android

➤ We've stated that this reality 16 years ago: "Lighter than Air vehicles will be one of the future air vehicles".

➤ Time show us that we are in the correct way.

➤ THE MARKET

➤ Commercial Drones Market to Grow by USD 45 BN to 2027

The commercial drone market size is estimated to grow by USD 44.85 billion from 2022 to 2027, growing at a CAGR of 38.97%. In the North American region, a substantial 44% contribution is anticipated towards the global market's growth over the forecast period, according to a report just published by [technavio](https://www.technavio.com).

(ref : <https://www.uasvision.com/2024/03/13/commercial-drones-market-to-grow-by-usd-45-bn-to-2027/>)

➤ Global Drone Services Market Size to Grow to USD190 BN by 2033

The Global Drone Services Market Size to Grow from USD 19.7 Billion in 2023 to USD 191.4 Billion by 2033, at a Compound Annual Growth Rate (CAGR) of 25.53% during the forecast period, according to a new study by [Spherical Insights](https://www.sphericalinsights.com) : (ref : <https://www.uasvision.com/2024/03/06/global-drone-services-market-size-to-grow-to-usd-190-bn-by-2033/>)

➤ Hybrid Air Vehicles predicts \$50 billion

Hybrid Air Vehicles is the manufacturer of the Airlander which combines the flight characteristics of lighter-than-air and fixed-wing aircraft. This innovation brings new and much-needed capabilities to the skies, such as ultra-endurance and the ability to land anywhere. Aim to commercialise the Airlander and assemble up to 12 per annum, in order to address a \$50 billion estimated market. (ref: <https://www.hybridairvehicles.com/>)

AEUAV_ All Electrical Unmanned Aerial Vehicle_XXX

UNMANNED AIRVEHICLE REQUIREMENT of TURKEY For Rescue, Surveillance & Cargo

	TETHERED LTA VEHICLE	MEDIUM ALTITUDE LTA VEHICLE	HIGH ALTITUDE LTA VEHICLE	FIXED & ROTARY TYPE AIRVEHICLE
2024	6	1		More than 100
2025	24	6		More than 100
2026	48	12	1	More than 100
2027	100	24	2	More than 100

➤ OPERATING COST COMPARISON OF AIRVEHICLES

PLATFORM	TYPE	PILOTING	COST/FLIGHT (per hour) US\$	ENDURANCE (unrefueled)	YEARLY OPERATING COST FOR ONE AIRCRAFT AT 7/24 COVERAGE (Million US\$)
GLOBAL HAWK (RQ-4)	UAV Aircraft	Unmanned	24.123	35,0 hour	211,3
AWACs	Boeing 707 Aircraft	Manned	20.000	11,0 hour	175,0
JSTARS	Boeing 707 Aircraft	Manned	20.000	11,0 hour	175,0
E-2C HAWKEYE	Naval Aircraft	Manned	18.700	4,7 hour	163,0
PREDATOR	UAV Aircraft	Unmanned	5.000	40,0 hour	44,0
MQ-9 Reaper	UAV Aircraft	Unmanned	2.617	27,0 hour	22,9
AIRSHIP	Low Altitude	Manned	1.800	2-3 days	15,8
420K TARS	Tethered Airship	Unmanned	300-500	15-30 days	3,5

ref: Sunswire Unmanned Airship Solutions for Integrated ISR Systems, Cost Based Analysis of Unmanned Aerial Vehicles by Thomas J. Denevan 2014 (Naval Postgrade School)

➤ NATIONAL COMPETITION

- There are 3 companies which deals with fixed wing type UAVs: TAI, Baykar and Vestel.
- We are the only group which deals with the design of Lighter Than Airvehicles (Airships).
- So there is not any competitor in the specific area in Turkey.

➤ INTERNATIONAL COMPETITION

Low altitude:

- Hybrid Airvehicles develops lighter than air vehicles for zero carbon aviation for people and cargo transport in the UK.
- Atlas group offer a wide variety of customized LTA solutions for surveillance, communications, entertainment, tourism and cargo transportation in Israel.
- H3Dynamics aims to bring new long range, sustainable and quiet unmanned airships to a range of commercial applications. (France, USA).

High altitude:

- Lockheed-Martin (USA) is developing a High Altitude Long Endurance Demonstrator (HALE-D), which seeks to hover, completely untethered, at 21km. We know that first flight tests were not successful.
- Thales Alenia Space's Stratobus is an autonomous stratospheric airship in the HAPS. It seems that it is still in conceptual phase.

TECHNOLOGY LEVEL COMPARISON

Technology Level

100

Lockheed Martin_High Altitude Airship



RosAerosystems Low Altitude Airship



Goodyear Airship



KUZGUN_1 Unmanned Airship

0

Increasing Level

TECHNOLOGY ROAD MAP of AIRVEHICLES



Zeppelins



Fossil Fueled



Hybrid / All
Electrical



Geodesic /
Isogrid
Structures

LIGHTER THAN AIRVEHICLES



Aircraft

New Engine
Concepts

Hybrid Electric
Aircraft

Fully Electric
Aircraft

Morphing
Airframes & Wing



AIRCRAFTS

1930

2020

2050

KUZGUN JOURNEY by TIME



➤ CORE TEAM

- **Mr. Yücel Demir:** Mech. Eng. (MSc), more than 30 years of experience in air vehicle design and production. Project idea, design and production of KUZGUN_1 Unmanned Airship & KUZGUN_A1 Tethered Airship.
- **Prof. Dr. Suat F. Kadioğlu:** Mech. Eng. Dept. METU, more than 30 years of experience. Project advisor.
- **Mrs. Vildan Kalan:** Mech. Eng. (BSc), 20 years of experience in Aerospace Ind.
- **Mr. Hüseyin Kalan:** Aeronautical Eng. (BSc), more than 30 years of experience in Aerospace Ind. & structural design.
- **Mr. Emre Kızılırmak:** Electric–Electronic Eng. (MSc), 15 years of experience in Aerospace and wireless communication.
- **Mr. Anıl Bektaş:** Mech. Eng. (MSc), our youngest & brilliant engineer (MSc: McMaster University, BSc: University of Manitoba). 3 years of experience in Machine Learning & AI.

➤ **Please check our pitch deck video "KUZGUN AEUAV XXX_All Electrical Unmanned Aerial Vehicle":**

<https://youtu.be/ZgnKzb-eT6Y?si=szL4c6G7R2nPosfs>

History of Geodesic Design

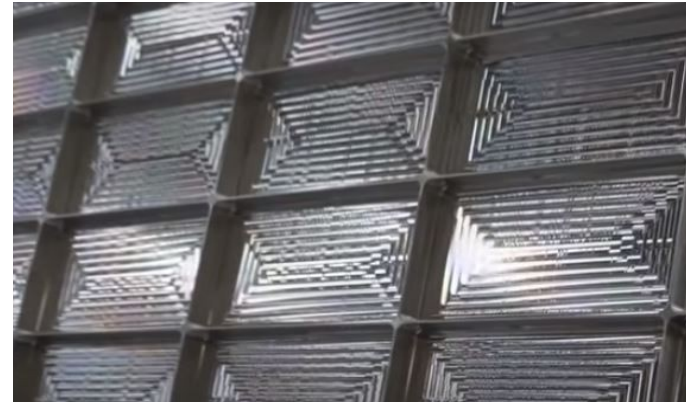
The Wellington Bomber & Wellesly Bomber were designed according to the Geodesic Design concept.



RCAF Wellington bomber, having flown back to England despite a direct anti-aircraft hit, with exposed geodetic airframe construction (ref: Wikipedia).

AEUAV_ All Electrical Unmanned Aerial Vehicle_XXX

TODAY : Atlas & Vulcan Rockets (United Launch Alliance).



AEUAV_ All Electrical Unmanned Aerial Vehicle_XXX

The following are some of the aspects to be addressed:

- Identification of airframe parts most suitable for the utilization of Geodesic concepts and application of structural optimization techniques to evaluate potential cost and weight benefits.
- Manufacturing of representative test articles to obtain a practical appraisal of the cost effectiveness of the manufacturing processes as well as to perform structural tests for the validation of the geodesic technologies.

The production of isogrid-orthogrid structures of composite materials still is difficult to perform and to develop the isogrid-orthogrid structure it is important that the production sequence is performed properly. Up to date the following problems are identified:

- Warping of the isogrid-orthogrid panel as a consequence of curing irregularities and other process variables.
- The strength of the interface between the isogrid-orthogrid ribs and the composite plate.
- The thickness of the nodes at intersecting ribs.

Our best regards

Mr. Yucel Demir

Ankara TÜRKİYE

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yucelkuzgun@gmail.com

<https://www.linkedin.com/in/yuceldemirkuzgun>

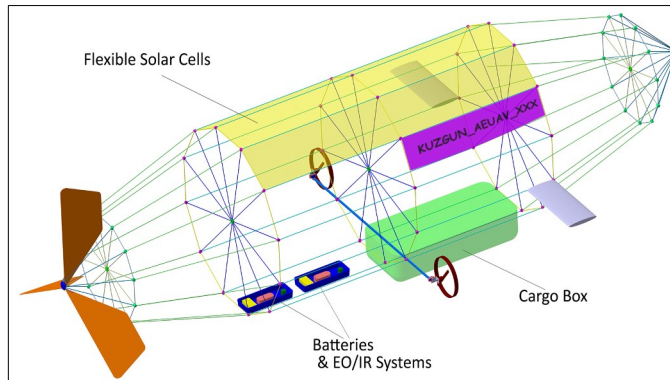
<https://kuzgun-airships.my.canva.site/>

ROADMAP of KUZGUN AIRVEHICLES

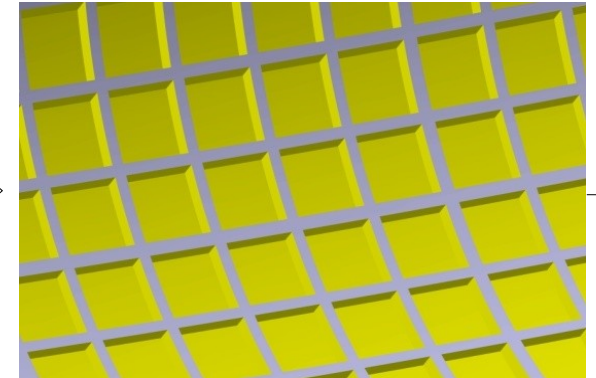
**KUZGUN_1 All Electrical Unmanned Airship
(completed)**



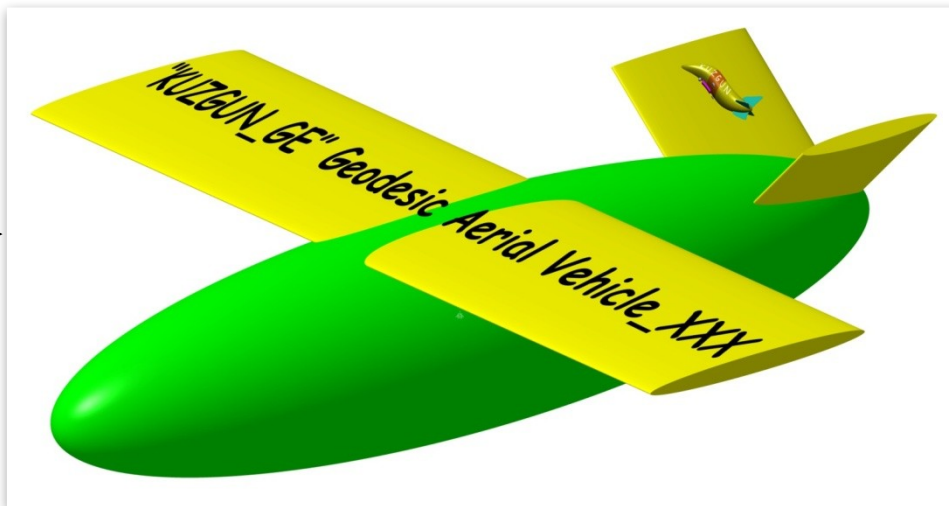
**KUZGUN_5E Unmanned All Electrical & He Powered
Aerial Vehicle (extenden version of KUZGUN_1)**



KUZGUN_GEA Geodesic Airframe



KUZGUN_GE Geodesic Aerial Vehicle_XXX



KUZGUN_GA Geodesic Airships (Lighter Than Airvecicles)

