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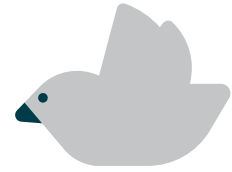
# Green careers guide

**Sarah Qureshi**  
Pakistan



# Dr. Sarah Qureshi

## Aero Engine Craft Private Limited



### UK Study

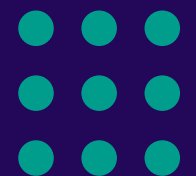
I have a PhD degree in Aerospace Engineering from Cranfield University, UK. My area of specialization is Aerospace Propulsion whereby I researched on the design of an environmentally safe contrail-free aero-engine that has been derived from a novel patented technology. During my initial PhD research, I assisted the inventor with patenting the contrail-free aero-engine. The invention was granted two international patents and has a tremendous potential in bringing about an environmental revolution in the context of aviation. The research project won the Clean Technology Competition for the 2016 Clean Equity Conference, Monaco and was shortlisted for a few other environmental technology innovation competitions.

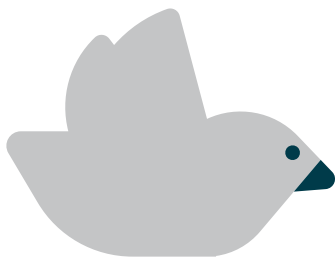
Prior to this, I completed my MRes degree in the field of Aerospace Dynamics from Cranfield University, UK. My research involved the design of a trajectory following controller inclusive of stability augmentation, attitude control system and outer loop autopilot for unmanned aircraft (UAVs) flying in close formation for the purpose of air to air refuelling. I also learnt acrobatic flying and several flight manoeuvres while at Cranfield. I currently holds a visiting academic position at Propulsion Center, SATM Cranfield University; I am involved with the ongoing research related to the future directions of my PhD work. The Center is seeking a grant to promote the domain of my PhD research to the next level of technology. I also try to highlight Cranfield University's contribution towards my current work on various forums.



### Acrobatic Flying at Cranfield University UK

Current Role I have setup and co-founded Pakistan's first commercial aerospace and engine R&D Company Aero Engine Craft Private Limited in Pakistan to develop the world's first green contrail-free aero engine for the global aviation industry. The core technology is based on the research outcome of my PhD study at Cranfield University UK in collaboration with the inventor of the technology Mr. Masood Latif Qureshi. Aero Engine Craft is set up to convert this patented technology into a full scale commercial application ready to be used by modern civil transport aircraft for the purpose of reducing aviation induced global warming due to contrails. The business is modelled as a circular economy creating value for global engine manufacturers, aircraft manufacturers and airlines by providing compliance to environmental standards and revenue through emission trading and artificial rainfall.





Arab News: [https://youtu.be/IJeSl86MH\\_w](https://youtu.be/IJeSl86MH_w)

Karandaaz Pakistan: <https://youtu.be/kDsUhySNbD4>



Figure 2: The concept behind a green contrail-free aero-engine

## Reducing the negative impact of Aerospace on environment

As the CEO and co-founder of Aero Engine Craft, I am developing contrail-free aero-engines for the reduction of global warming and to induce artificial rain during aircraft flight through on-board water recovery from fuel emissions; creating a vision of the future for the aviation industry whereby it can not only reduce aviation induced global warming but also adopt an approach to treat the fuel emissions as a resource. Water vapour exists in the exhaust emissions as a combustion by-product. A revolutionary technology is employed that eliminates contrails at source and recovers water from fuel exhaust emissions as a net positive product. This is a true definition of a disruptive technology; a global first attempt to create water within the aero-engine from the exhaust plume during flight, carry it aboard and release it as rainfall prior to landing. The product is a low cost

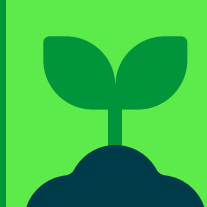
alternative to aero engine redesign, and offers revenue potential to the aviation industry while solving a crucial environmental challenge. Aero Engine Craft aims to mark the beginning of the first generation contrail-free aircraft flight in the world! Tedx: <https://youtu.be/Aw6xjTAYgIE>

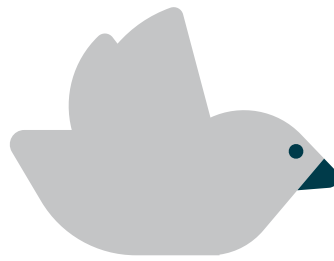
## Innovation and creativity

I have also invented and filed a patent on “A supersonic Turbofan Engine”. The invention is a novel supersonic jet engine that is applicable to the new generation of environment friendly aircraft-engine configurations that aim to reduce aviation induced noise pollution and optimize fast travel. This patent would be offered for sale to fund our green aviation ventures. Arab News: <https://youtu.be/NZafcfkZVok>

## My UK Alumni Story

My relationship with Cranfield University is thirteen years long. I went to Cranfield as a young girl in 2007 and ever since then Cranfield has made me grow. My first introduction to Cranfield was through Prof. James Whidborne, my MRes supervisor who welcomed me very warmly and launched me on a successful academic route at Cranfield University. During my MRes, I contributed to the Cranfield Community as the General Secretary of the Cranfield Student Association. Meanwhile I was also fortunate to start learning acrobatic flying from Capt. Richard Rogers in the Bull Dog aircraft at the Cranfield Airport Circuit. Since I was already a licensed pilot, Capt. Rogers taught me all the aerobatic flying manoeuvres, including the “inverted spin”, which, very few pilot in the world have attempted. He taught me with a lot of interest and it was the most fascinating Cranfield experience. I found it very amusing when, after every g-force intense upside down





manoeuvre, he would use the protocol “Are you OK?” and I would always reply: “of course”

Soon after, I started my PhD with Prof. Pilidis at the Propulsion Centre working under the research group on contrail-suppression. Numerous respects are due to Professor Riti Singh, who was the pioneer of this group that conducts research on aviation’s contrail induced global warming in the atmosphere. He was the first one to work on the idea of extracting water from engine exhaust emissions. His work with his students and his dedication towards the cause, laid the foundation of my research. So far two PhD theses and nine Master’s thesis have been published in this domain under the supervision of Prof. Singh and Prof. Pilidis. Out of these, I co-supervised five MSc theses during my PhD research.

Owing to some challenging personal circumstances, and the birth of my baby daughter, I carried out a part of my research in my home country, where I was helped by my father, who is a very experienced scientist. The research resulted in two inventions that were granted as patents to him. I furthered research on these inventions towards the grant of a PhD degree. My supervisor highlighted that this work holds commercial promise and can have global impact; it won a student prize for the Monaco Clean equity conference and I represented Cranfield alongside my colleagues from the Research Innovation Office at the Conference. The exposure led me to the decision to take my research beyond the academic environment towards commercialization.

After graduating from my PhD, I returned to Pakistan, and along with my father, Masood Latif Qureshi, I co-founded Pakistan’s first aerospace and engine R&D Company in order to convert this research into an environment friendly commercial product for the global



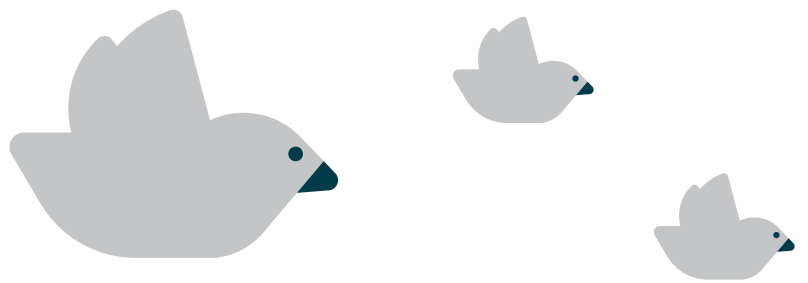
aviation industry. I was able to secure seed money from the Department of International Development UK through Karandaaz Pakistan to launch the company where we are now building the prototype of the technology. Meanwhile, I am also involved with my research group at Cranfield in the capacity of a Visiting Academic.

The product is a contrail-free aero-engine, designed to reduce Aviation Induced Global Warming due to non-carbon emissions. Aviation emissions are divided into two categories carbon emission and non-carbon emissions.

Carbon emissions mostly comprise of carbon dioxide and carbon dioxide is a phenomenon which is common to both the ground and the air and it has a very wide spectrum of industrial contributors so there is a fairly good understanding of carbon dioxide and its contributions as well as methods to mitigate it and to reduce carbon emissions both on ground as well as in the air. A lot of solutions have been developed for ground based industries





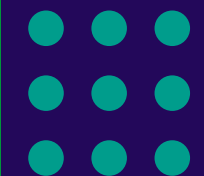


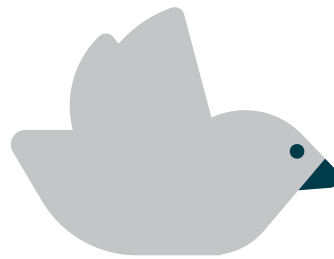
## International visibility

My work has been featured on several international platforms such as Gulf News, Arab News, BBC Urdu, VoA Urdu, TEDx, Cranfield University, and Open University MK

1. Gulf News: <https://gulfnews.com/world/asia/pakistan/pakistani-aerospace-engineer-aims-to-make-air-travel-sustainable-1.71886095>
2. Arab News: <https://www.arabnews.pk/node/1626696/pakistan>
3. BBC: [https://www.bbc.com/urdu/pakistan-51422519?fbclid=IwAR07q7o4Tng9e8\\_V\\_hadJCA5Yf2-u1I6VPONMPMTXmDDnRPFrwBN406thI](https://www.bbc.com/urdu/pakistan-51422519?fbclid=IwAR07q7o4Tng9e8_V_hadJCA5Yf2-u1I6VPONMPMTXmDDnRPFrwBN406thI)
4. Indus News: <https://youtu.be/SVwrARafmEc>
5. Indus News Interview: <https://youtu.be/btHczg97phw>
6. <https://www.techjuice.pk/pakistani-aerospace-engineer-aims-to-revolutionise-eco-friendly-air-travel/>
7. <https://propakistani.pk/2019/11/21/this-aero-engine-built-by-a-pakistani-engineer-can-produce-rain/>
8. <https://www.propergaanda.com/meet-the-pakistani-entrepreneur-taking-over-the-aerospace-universe/>

to reduce carbon dioxide and are now being in some way transposed into the air to reduce carbon emissions. The combustion by products of any hydrocarbon fuel burn are water vapor and carbon dioxide and water vapor is therefore one of the abundant non-carbon emission. Since water vapor has a variable residence time and lower residence time as compared to the carbon dioxide, on the ground it is recycled quickly and does not contribute to global warming. However at higher altitudes this water vapor acts as a greenhouse gas and also forms contrails, and therefore has a major role in contribution to global warming. In that context we can say that the global warming contribution of water vapor is a phenomenon which is specific to the aviation industry and therefore the level of understanding on it is limited. Hence it is crucial to talk about it, which is one of the roles that I have undertaken along with the development of the technology itself





## Technology & engineering leadership

My company is born global and is also involved in the development of other environment friendly innovations such as automotive engines, drone engines, executive aircraft and green airlines in order to address sustainable development goals by developing sustainable technologies based on new inventions

Cranfield University “Leadership on the Go” podcast: <https://youtu.be/PfiKhUBCr9M>

Open University MK entrepreneurship interview: [https://youtu.be/L9gd\\_8vFx3s](https://youtu.be/L9gd_8vFx3s)

## Significant impact on the industry as follows:

1. Solution Evaluation Expert at World Alliance for Efficient Solutions and Solar Impulse Foundation 2019 onwards
2. Aviation Instructor for STEM. teaching aviation to underprivileged children at a village community school 2018 onwards [https://youtu.be/sRsGIKvb\\_3M](https://youtu.be/sRsGIKvb_3M)
3. Lobbying for regulations on aviation induced global warming with the UN and others UN Secretary General: <https://youtu.be/QxV9LiRbWpY> Gulf News: <https://youtu.be/Osw4evDfdTg>
4. Creating awareness on Environmental Aviation Technologies on various local platforms (radio shows, TV shows etc.)
5. HUM News native language <https://youtu.be/qCGiFlccdNY>
6. Jet Engine Technology interview: <https://youtu.be/7tx0X6XrQEI>

7. Creating Awareness on Aviation Induced Global Warming in Native Language <https://youtu.be/HpxHf4oFlwU> <https://youtu.be/9YF-QcKe34c>

8. Participating in local panel discussions related to Pakistani Aviation Industry, women empowerment and women leadership

9. <https://youtu.be/AOBZO8bBCpY> [https://youtu.be/WsZi3azZ\\_ng](https://youtu.be/WsZi3azZ_ng) [https://youtu.be/mLncXeoA\\_Y4](https://youtu.be/mLncXeoA_Y4)

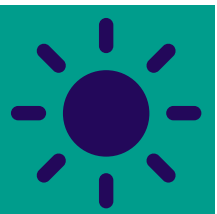
10. Fellow of Royal Aeronautical Society Pakistan Chapter <https://www.facebook.com/events/715178529300421/>

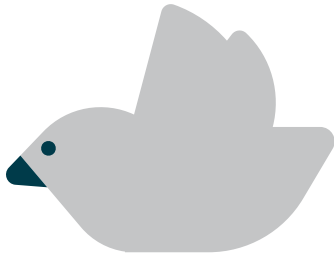
11. Senior Girl Student: National University of Science and Technology (1997-2000, Pakistan)

## Awards and Recognition

1. Winner, Distinguished Aerospace Alumni Award 2020, Cranfield University
2. Finalist, British Alumni Award Pakistan 2019
3. British Alumni Award: <https://youtu.be/JSyXRrStZ3Q>
4. Secured equity funding from Karandaz Pakistan through a Women Entrepreneurship Challenge 2017 to set up clean technology aviation R&D Company in her home country in July 2018.
5. Winner of the Clean Tech Conference Monaco Student Competition (Mar 2016). Represented Cranfield University at the Monaco Clean Tech Conference.

[https://alumni.cranfield.ac.uk/Public/News\\_Item.aspx?id=1807&fbclid=IwAR3sdh1\\_FHQ76d-85k5mKXxZpaaSf2pA7jkBL6BcWVV7EVCw1Qv9zJFiueY](https://alumni.cranfield.ac.uk/Public/News_Item.aspx?id=1807&fbclid=IwAR3sdh1_FHQ76d-85k5mKXxZpaaSf2pA7jkBL6BcWVV7EVCw1Qv9zJFiueY)





## My academic contribution and other achievements at Cranfield as a student:

1. I won the Clean Tech Conference Monaco Student Competition (Mar 2016) and represented Cranfield University at the Monaco Clean Tech Conference along with other colleagues.

2. I contested for elections and was elected as the General Secretary: Cranfield Students Association (2007-2008)

3. I was directly involved with the inventor for the invention, filing and grant of two patents that were the outcome of her PhD research.

4. As a PhD student, I co-supervised of a total of 5 students on the MSc. Aerospace Propulsion course during 2 academic years for their Research Projects on green engines working towards the MSc. Thesis. (Oct 2015-Feb 2017).

5. A total of 9 MSc. Students in various cohorts at the Propulsion Center, SATM have furthered research on the basis of my PhD thesis from 2015 to 2019 as their MSc. Thesis.

6. My thesis has been kept confidential by the University for 5 years because of the commercial promise and the global societal impact it holds.

7. I was short-listed for the Aerospace Coachmakers Award 2016.

8. I was short-listed for the Schmidt-McArthur Fellowship for Circular Economy 2017.

9. I trained for Acrobatic Flying as a private licensed pilot with flying Instructor Richard Rogers. Acrobatic manoeuvres mastered: spin, spin recovery, loop, barrel roll, and hammerhead. Aircraft flown at Cranfield: Bulldog, Slingsby and Pitts biplane

10. [https://www.linkedin.com/pulse/critical-recovery-aviation-industry-from-global-pandemic-gureshi/?fbclid=IwAR2lWlu1YyrLyAb7qO5a5\\_2yqhm94oFpZe3ClwOgdLooK\\_ahwbWdzOGdvA0](https://www.linkedin.com/pulse/critical-recovery-aviation-industry-from-global-pandemic-gureshi/?fbclid=IwAR2lWlu1YyrLyAb7qO5a5_2yqhm94oFpZe3ClwOgdLooK_ahwbWdzOGdvA0)

## Technical Work at Current Role

