



Refugee Virtual Exchange Program

Engineering Diplomacy

Submitted by:

University of
Southern California

Viterbi School of
Engineering

The Refugee Crisis



We're witnessing the largest migrant crisis in human history: more than 65 million people — nearly one percent of the world's population — have been displaced as a result of conflict. While the demands of survival have taken priority, deep beneath the surface is a crisis for higher education. Tens of thousands of university students are fleeing their homelands with their educations interrupted, educations needed for those nations to rebuild if and when the conflicts end. The United Nations estimates that there are at least 200,000 Syrians who have had their post-secondary education cut short since the war began in 2011, roughly the student population of 13 large universities. Barely 1% of college-age refugees are in university courses in their host countries, compared to the global average of 34 percent, the Institute of International Education estimates. Today, only 1.4 percent of worldwide humanitarian aid goes to education of any kind, according to UNESCO. Many university-age refugees want to study in the United States, but only a handful succeed as student visas account for only 6% of all visas issued by the U.S.

The Solution

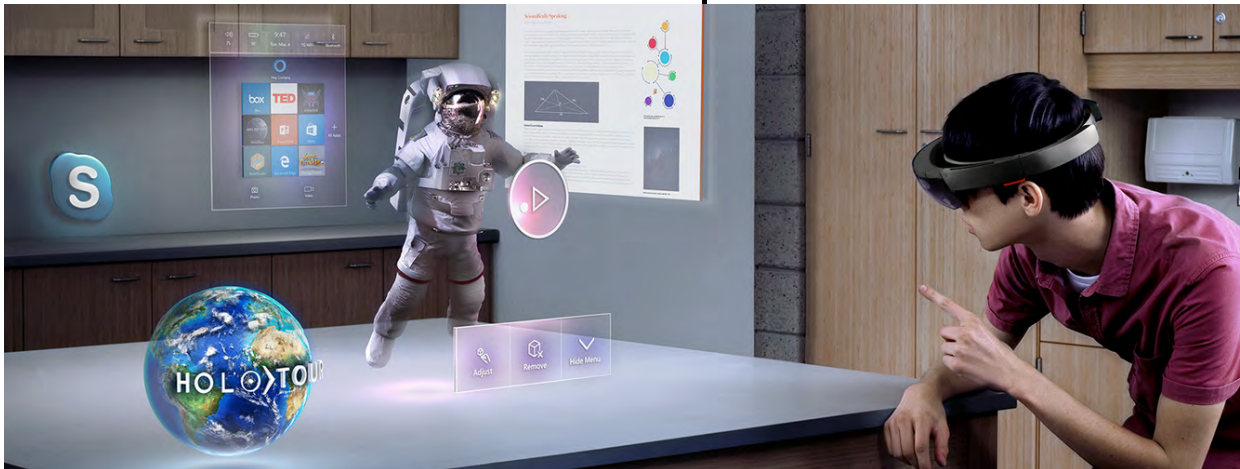


With this problem in mind, the USC Viterbi School of Engineering proposes a virtual exchange program between refugee students in host nations and U.S.-based students in Los Angeles. If refugee students cannot physically come to our campus, we will bring the campus to them. Distance education is the only scalable, viable solution to educating the world's refugee population at this very moment. Enter a borderless Engineering Diplomacy program.

The Solution

Our interactive program will allow 24 undergraduate students (12 in Los Angeles and 12 refugees in a host nation) to collaborate virtually in six groups of four (two USC and two refugee in a chosen country) to solve problems that directly impact refugee life and beyond. Problems such as food and water security, energy, ergonomic living spaces design, VR journalism and 3-D printing artificial limbs. We're calling this program "Engineering Diplomacy: Fusing Engineering with Foreign Policy and International Development."

Each group will share one faculty advisor from USC and one refugee faculty advisor in a cross-disciplinary environment rooted in project-based learning. In addition to our unique virtual iPodia platform (<http://ipodia.usc.edu>), students will meet through interactive real-time holograms using either the Microsoft HoloLens or technology built by our alumni at Vntana (<http://vntana.com>) — creators of the world's only scalable and interactive holograms. At the end of the program, the teams will get to present their projects to a panel of experts from industry and academia.



More than this, we want to provide a support system to our refugee peers who are either seeking to integrate themselves in their host countries and continue their education, or to come to USC and become part of the Trojan family through our many scholarship opportunities. The National Academy of Engineering has agreed to provide guidance to participants and help in the implementation of their projects. Our own USC Viterbi Information Sciences Institute, a world renowned R&D center for computer and Internet technology, along with our School of Cinema and our Institute for Creative Technologies, have also agreed to provide technical and scholarly support. At the end of the program, students and faculty will meet in person at a week-long summit either in the U.S. or in the host nation. We want to give refugee students the opportunity to take part in a virtual exchange program at a top American university while utilizing the newest interactive hologram technology in project-based learning. Our hope is that this pilot program will be replicated across partner universities in the U.S.

Our Virtual Exchange Program **Addresses** Three Primary Needs:

1 *Connects refugee students with students at an American university to work on projects with immediate, real-world impact. A pathway for refugees to continue their education*

2 *Provides training in high-need STEM areas to refugee students*

3 *Builds a foundation for lasting dialogue through Engineering Diplomacy*

Students are considered diplomatic teams of experts. This thinking process is highly desired for addressing global issues, such as climate change or the global refugee crises, where we need specialists with international experience, interdisciplinary knowledge, and intercultural sensitivities. We designed this program for globally minded students who aspire to make meaningful change in the world. Diverse, entrepreneurial students, especially women, who want to work on immediate-impact projects are especially sought out.

What's new?

While other organizations have prioritized education for refugees, USC's Engineering Diplomacy program is the first of its kind.

Education is a core component of UNHCR's (United Nations High Commissioner for Refugees) mandate to protect uprooted people worldwide, and a key element supporting sustainable development. While UNHCR and its partners have long worked to integrate refugees into local education systems, it has not always been feasible due to host country restrictions. Even if a country is willing to integrate refugees, a lack of resources can limit its ability to absorb students into existing systems. There also is a dearth of qualified teachers in refugee contexts, which limits the community's ability to graduate through the educational continuum.

A U.N. program known as DAFI has helped more than 2,200 students across 42 host countries to attend university in 2014. Many more applied. Unfortunately, the high per-student cost of traditional scholarship programs like DAFI limits their scalability. At the same time, relocation is not feasible for all refugees, especially those with families or responsibilities in the camps in which they live.

There are some international aid organizations working to address this problem, but very few educational institutions. Several universities in the host countries, some of them in the U.S., have offered scholarships, but these universities are few and far between. Again, this is not a scalable solution, not accounting for the complexity of trying to obtain a visa for these students.

Another major obstacle with programs that offer scholarship or tertiary education is that it requires physical presence. Hard-to-reach refugees who live in temporary camps may not even get the opportunity to set foot in a makeshift class. Moreover, the certificates earned are often not recognized or seen as relevant in either the refugee's host country or country of origin.

Given the large number of refugee students seeking tertiary education, their lack of resources, insufficient in-country opportunities, the geographic isolation of camp-based refugees and their sometimes restricted mobility, UNHCR and its government partners are eager to ramp up distance and virtual learning. Unfortunately, they lack a consortium of academic and humanitarian actors featuring strong academic partners who can both share the burden of cost and provide the adequate technology.



Why USC?

We at the USC Viterbi have the disruptive technologies, the platforms and the expertise that big, heavy-burdened aid organizations don't have to make this a reality. Through the use of information communication technology, virtual learning enables learning that is not bound by the same time and geographical limitations that exist within traditional tertiary programs. Traditional virtual learning programs tend to use a mix of face-to-face and digital interactions with instructors or tutors, as well as a variety of technologies such as the internet, video, CDs and DVDs, mobile phones and printed materials.

However, our research indicates that none of the programs currently in existence offer the newest telepresence technologies that integrate virtual/augmented reality and hologram technology. Educational solutions have simply not kept up with the disruptions in technology, and we don't have to look very far for real life examples.

We want to expand access to connected learning opportunities using this new technology that students can take with them no matter where they go. If a student moves from Jordan to Berlin, for example, they don't need to abandon a project they're working on because collaboration continues in the virtual world.

This brings us to another unique dimension of our project: the peer-to-peer learning feature. By connecting U.S.-based students with their refugee counterparts, we are building a bridge, a multifaceted approach to solving problems that, in the end, affect us all. A team-learning experience that will last a lifetime.

While the flexibility of studying at school or at home is irreplaceable — and, in the case of technological challenges, cultural considerations and environment-caused delays, crucial — we also recognize the importance of having learning hubs inside refugee camps that allow for students to come together as a community of learners.

Keeping Our Promise

In April 2016, the University of Southern California (USC) announced that it would fund up to five graduate degrees and one undergraduate degree each year for Syrian refugees. A number of USC schools had pledged to provide full-tuition scholarships for master's degrees. The students, who must meet USC's admissions standards, will have the opportunity to pursue master's offered by 3 of USC's top schools. The university also made available one full-tuition undergraduate scholarship in any undergraduate major to a deserving student, and the USC Dornsife College of Letters, Arts and Sciences made available additional funding for PhD students. Students awarded these scholarships were slated to begin arriving on campus in spring 2017. But travel restrictions to the U.S. have hampered this initiative. Nevertheless, USC is a place where we create the future. From the early years of the DARPA-Net, the precursor to the Internet, developed at our Information Sciences Institute, to the creation of the Oculus Rift VR headset at our Institute for Creative Technologies, to the record-setting rockets built by our students at the Rocket Propulsion Lab, along with countless other innovations, we have never allowed obstacles to dictate the limits of what's possible.



Replication

Our model will be open to anyone who wants to replicate it. We will share our methodology with peer institutions, disseminating information at seminars and openly online through our many university communication channels. The call to the global higher education community has never been clearer. The numbers on displaced persons and refugees in the next year will probably be higher than ever, as will the urgency to find and act on higher education solutions that are scalable, high quality, flexible, and pragmatic.

Timeline

We want our pilot to grow into a fully developed program in three years. What will start out as a stand-alone certificate course can morph into a degree-earning program, and a center for Engineering Diplomacy whose work will be replicated by other universities. This program seamlessly integrates with our Grand Challenges Scholars Program (GCSP) that helps students organize their time spent focused on exploring results that benefit society. Each year, the top 25 students who successfully complete the USC Viterbi GCSP areas are named National Academy of Engineering Grand Challenge Scholars, recognized by the National Academy of Engineering.

Phase	Date
Identify refugee students +faculty	January - April, 2018
Set-up location in host-nation and assess refugee student needs	May - June, 2018
Introduce students to their counterparts	June, 2018
Assign projects and advisors	July, 2018
Students work on projects while 2019 cohort is assembled	August - November, 2018
USC students and refugee students meet in person for the first time to pitch projects	December 2018
New cohort begins	January, 2019

Measuring Success



We will measure results based on successful integration of refugee students into full-time degree earning programs in their host countries or at USC, as well as industry exposure of their ideas/projects. Additionally, the replication of the program at peer institutions is a major objective. We will develop context specific outcome measures with the assistance of professor Gisele Ragusa, an expert in program evaluation who chairs USC's STEM Education and Research Consortium. Ragusa has extensive experience evaluating many educational programs throughout the U.S.

We want to be the link between USC students, refugees, universities, and the industry with the goal of giving students the skills needed to thrive in a technologically driven world. We also hope to give refugee students a real pathway to continue their studies wherever they choose. Three years into the program, USC should count at least 24 alumni, if not more — and a lot more incoming students — as a part of this program. For U.S. students, it will become a hallmark of a USC experience.

Case Study

iPodia

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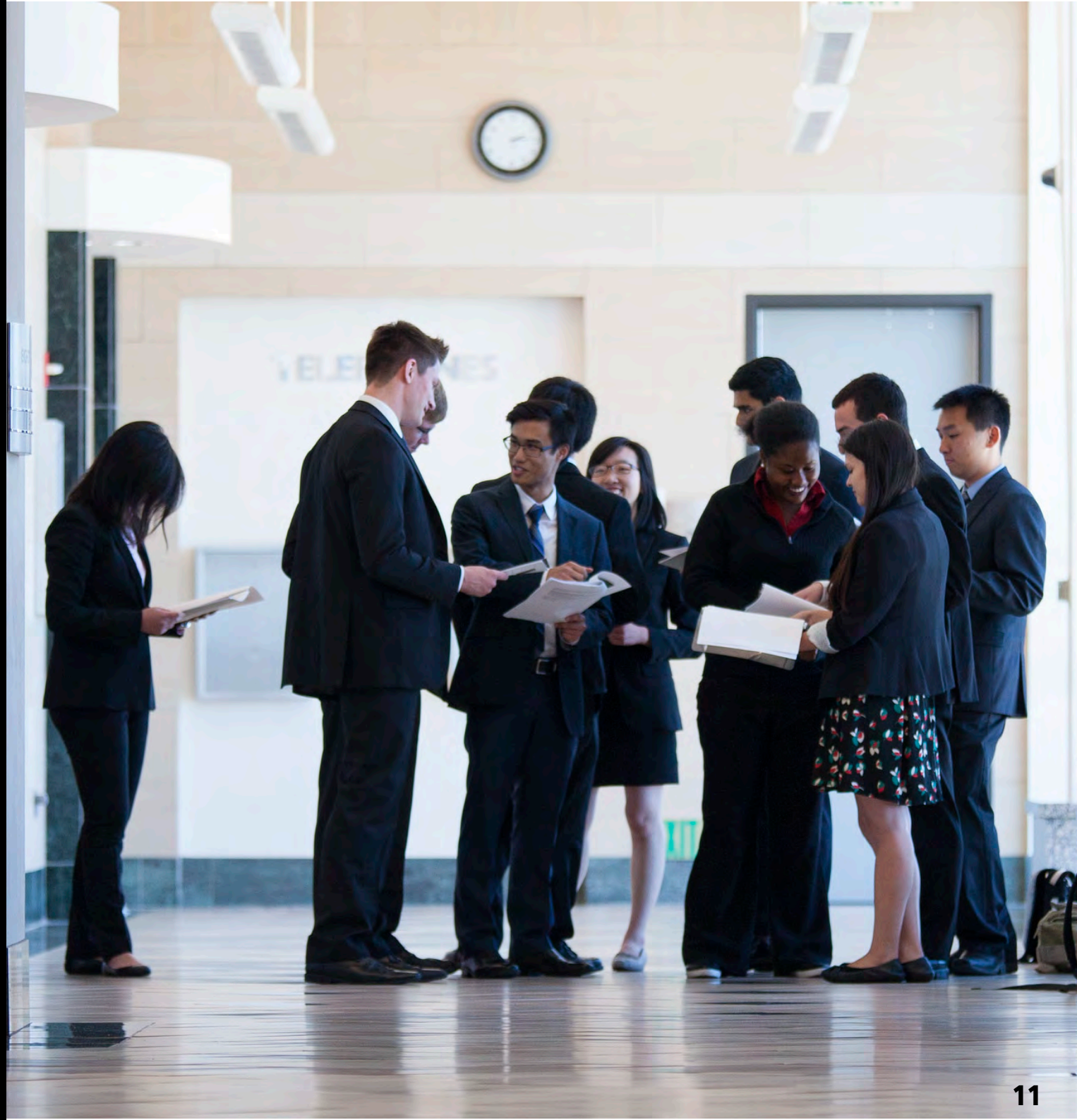
UNIVERSITIES

9

COUNTRIES

1

CLASSROOM



How Did We Do It?

What is iPodia?

iPodia is a new pedagogy which promotes peer-to-peer interactions among participating learners across disciplinary, institutional, physical and cultural boundaries. The "i" in iPodia stands for "inverted," "interactive," "international," and any combinations of the above.

How It Works

Students across the globe regularly gather to attend lectures to learn from professors with their colleagues. Though this event occurs regularly, students in the iPodia classroom come together in a remarkable way as students from all over the globe gather in a "single" classroom. The physical classrooms are linked together virtually; students see their global classmates on screens projected in each of their classrooms. Audio and video are linked live, so students access the same lecture, professor, and discussion at the same time.

Additionally, students are assigned discussion groups for each week to connect with local and international classmates for processing and absorbing material provided for the course. Discussions in the iPodia classroom have increased insight and influenced several cultural perspectives on a topic. This is particularly important in our increasingly global world.

iPodia in Action

Creating an iPodia is complex. A student at USC may walk into their classroom at 7:30 AM on a Thursday morning. Their classmates in Israel attend class at 5:30 PM Thursday night. The remainder of the class joins from Hyderabad and Goa, India at 8 PM, Thursday night. 8,500 miles and a 12.5-hour time difference separate these students, yet they all attend the same class to learn from the same professor based on the same syllabus. In this borderless classroom, students are able to study side-by-side synchronously, discourse back-and-forth interactively, and work on team projects collaboratively. iPodia students must be dedicated to learning and put in effort to work with their classmates to complete projects, coordinating across time zones.

How Did We Do It?

(cont.)

The iPodia classroom uses a state-of-the-art internet infrastructure to transcend the geographical, temporal, institutional, and cultural boundaries between the iPodia Alliance members' physical classrooms. The coalition is called the Viterbi iPodia (ViP) Alliance and was created by USC among world-class universities. The goal of the coalition is to tear down the centuries-old ivory towers of higher learning to create a classrooms-without-borders paradigm in the 21st century. The size of the iPodia coalition continues to grow as new universities partner with the program.

World-renowned institutions partner with the Viterbi School of Engineering as members of the ViP Alliance. For the first time in the history of our program, a university in Israel and a university in Qatar are taking a course together under the iPodia umbrella.

Next Steps

With Engineering Diplomacy, we want to take iPodia to the next level and introduce emerging hologram and AR/VR technology that allows for a Star Trek-level interaction between students (as near to in-person as possible) through augmented reality.

Team

Why Us?

Who better to help refugees develop an education than people that have previously been in their shoes and those who have dedicated their lives to empowering people to bring solutions to some of our world's greatest challenges.



Najmedin Meshkati, Ph.D, CPE

DIRECTOR

PROFESSOR OF CIVIL & ENVIRONMENTAL ENGINEERING

PROFESSOR OF INDUSTRIAL & SYSTEMS ENGINEERING

Professor Meshkati's work is wide-ranging, from Bhopal and Chernobyl to Fukushima and Deep Water Horizon. For the past 25 years, he has been teaching and conducting research on risk reduction and reliability enhancement of complex technological systems, including nuclear power, aviation, petrochemical and transportation industries. He has inspected many nuclear power and petrochemical plants around the world and has been either the Principal Investigator or co-investigator for several funded research projects, including two by the U.S. Nuclear Regulatory Commission. An outspoken supporter of increased cooperation in the Persian Gulf, Meshkati regularly appears on news outlets advocating for his vision of engineering diplomacy.



Kayla Soren

COORDINATOR

Kayla is the Founder and Executive Director of the International Student Environmental Coalition, a non-profit in 30 countries that provides resources and organizational power to help students anywhere in the world engage in the grassroots movement of environmentalism. She was named a Local Pathways Fellow by the United Nations Sustainable Development Solutions Network and works to make 50 major cities "smart, fair, and sustainable." She was named a Global Champion for Women's Economic Empowerment by UN Women and made North American Association for Environmental Education's "30 under 30" list. She is a Mork Scholar at the University of Southern California studying International Relations and Environmental Studies.

Team



Daniel Druhora

COORDINATOR

Daniel is a senior media producer for USC Viterbi School of Engineering where he produces content covering topics from urban centers to remote corners of Earth, the depths of the oceans to space and the modern heroes tackling 21st century grand challenges. He is also the creator and host of *Escape Velocity*, a science and engineering podcast funded by the United Engineering Foundation. An award-winning screenwriter, Druhora was recently optioned by Forecast Pictures in Paris for his screenplay "Climbers," about Rwanda's first cycling team. His most recent screenplay "Marjan," about a girl living through the Syrian civil war, was shortlisted for the 2017 Academy Nicholl Fellowship. He holds a B.A. in International Relations from the University of Washington and an M.F.A. in Film & TV Production from the USC School of Cinematic Arts.



Stefani Mikov

COORDINATOR

Stefani is a Business Technology Analyst for Deloitte, the world's number one technology/management consulting firm. She was one of the two business architects on the Medicinal Cannabis Licensing System Implementation of manufactured products for the State of California. Her project on the "Redesign of the Syrian Refugee Camps" became a finalist in the U.S State Department Wonk Tank Competition — the biggest crowd-sourcing competition in U.S. foreign relations. She followed that up with a TEDx talk at her alma mater, the University of Southern California. Mikov holds a B.S. in Industrial and System Engineering and a minor in Piano from USC. A true linguaphile, Mikov speaks no fewer than seven languages, including French, Turkish, Spanish, Greek, English and Latin.

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<https://tfm.usc.edu/usc-viterbi-engineer-developed-worlds-fastest-wheelchairs/>

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