

College of Science, Engineering and Technology

Community Engagement Projects



Learn without limits.

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college of
science, engineering
and technology

Introduction

Unisa's Community Engagement and Outreach Policy is firmly set within its vision of being the African university in the service of humanity. In the context of Unisa, community engagement refers to initiatives and processes through which the expertise of the institution in the areas of teaching and research are applied to address issues relevant to its community, to the mutual benefit of the community and the institution.



What is GirlPower

The aim of the project is to develop a generation of girls who are confident, competent, and can realise their potential in the field of science, engineering and technology.

The purpose of GirlPower

1. To engage with high school girl learners and support the girls to excel in maths, science and technology and follow them through to matriculation.
2. To entice learners into maths, science and technology.
3. To develop a pool of young researchers who have creative-thinking and problem-solving skills.
4. To introduce the girl learners to careers in SET.

What is CSET doing?

- Create a mentorship programme between the learners, educators and CSET staff.
- Create a laboratory environment for the learners of SET through Science micro-kits.
- Provide opportunities and support for the learners to conduct small-scale research.
- Celebrates the success of women in Science and showcases their contribution in SET.
- Develops resources inculcating a sense of fun in science activities, challenging topics, and real-life application of science that will motivate, support and empower learners in SET.

How to get involved

Do you have innovative research ideas and a passion to improve the world of Science, Maths and Technology in high schools? If yes, please come and share your skills as the project facilitator or a designer of learner's material.

Slogan

GirlPower: TO BECOME, TO BE HEARD

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I-SET

What is I-SET?

- Inspired towards Science, Engineering and Technology (I-SET) is a Community Engagement Flagship Project of the College of Science, Engineering and Technology (CSET) at Unisa, supported by Research and Innovation (R&I).
- The I-SET goal is to INSPIRE awareness in Science, Engineering and Technology through the FUN activities of robotics.
- I-SET is targeted at learners and their communities.

What is the I-SET purpose?

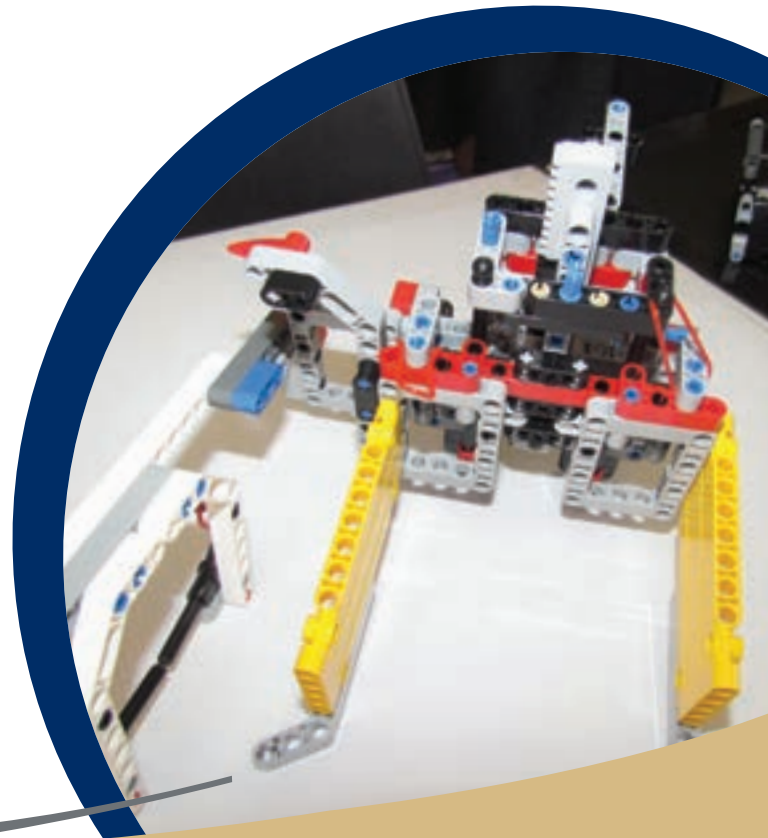
- To market Science, Engineering and Technology through the liaison with media and through the hosting of relevant events.
- To participate in events that will inspire the interest of the learners in Science, Engineering and Technology.
- To identify, investigate and research community engagement research questions within the project that are raised within the wider community engagement, both nationally and internationally.

What is I-SET doing?

- It provides training and support to coaches and mentors of I-SET teams within the community through the Robotics in Education – Basics (short-learning programme).
- It is providing coaching, mentoring and branding to the I-SET Teams that represent I-SET at national robotics competitions.
- It trains and supports CSET staff members to mentor and coach the I-SET teams and to judge at robotics competitions.
- It participates in a wide range of Science, Engineering and Technology exhibitions and showcases to actively market I-SET and its activities.

How to get involved?

- CSET/UNISA academics – coach and mentor I-SET teams in preparation for Robotics Competitions.
- CSET/UNISA academics – judge at Robotics competitions (WRO or FLL) – Design, Programming, Teamwork or Research.
- CSET/UNISA academics – guide research for FLL competition.
- UNISA students – train as I-SET Buddies to present workshops at Science Expos.
- Anyone – LIKE our Facebook page ISETLEGO UNISA.
- Educators/Community Leaders – Register for the Robotics in Education – Basics (short-learning programme) and become part of the community.



Waste to Energy for Lenasia's Thembelihle ECDs

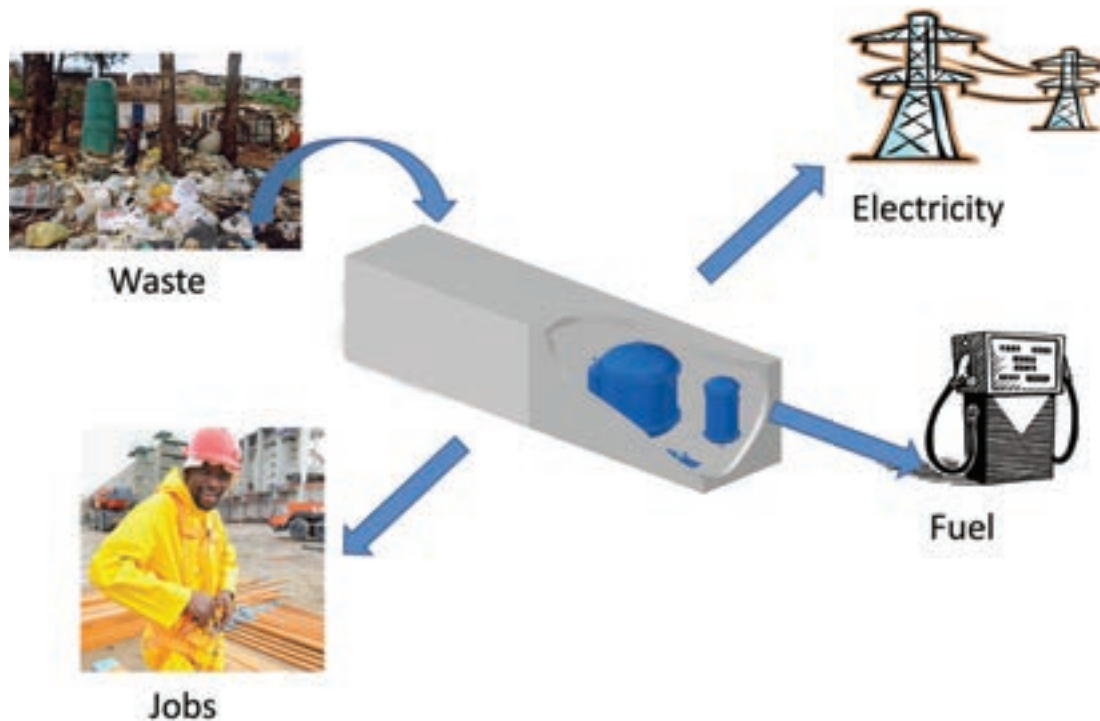
The Material and Process Synthesis (MaPS), a chemical engineering research centre, in collaboration with the Institute for Social and Health Science (ISHS) at the University of South Africa (UNISA), undertake a project to provide a solution to waste disposal in informal settlements, which poses a serious health hazard. In addition access to energy and quality of life are linked and many informal settlements do not have access to electricity and still use candles and paraffin for lighting, and cook with coal, wood or paraffin stoves.

The purpose of the project

The idea is to build a waste to energy plant that will enable communities in informal settlements to use their own waste material, and turn it either into a valuable product that can benefit the community directly in meeting their energy needs or a marketable product as a source of income. This not only enables the community to have a cleaner, healthier environment, but provides a potential for job and wealth creation and access to some improved form of energy that can improve their living standard.

The Technology

The technology consists of a small-scale plant (container size) that takes in carbonaceous waste material such as garden waste, kitchen waste, plastics, cardboard, chipboard, papers etc. These materials are turned into Syngas at elevated temperatures; the Syngas is then used in a gas engine to produce electricity or converted into synthetic fuels and Wax using a Fischer Tropsch Process. The Synthetic fuels can be separated into a range of different products comparable to conventional diesel, gasoline and paraffin. These products can be used directly in the community and for cooking. The Wax can be used to make candles.



Project Benefits

- Job Creation
- Cleaner Environment
- Access to energy for the community
- Catalyst for community development (social entrepreneurship) through downstream business development
- Skills Development (business and technical)
- Catalyse interest in Science and Engineering for local scholars

What we are doing now

- We are engaging with the community in Thembelihle township in Lenasia, to understand what they perceive their energy needs are
- This will allow the design to match the product with the community needs
- Community campaign to ensure broader community engagement
- Design of the first plant, to be used as a demonstration and testing plant. The plant will first produce electricity only to be supplied to an early childhood development centre (ECD)
- Development of training methods for unskilled people to use the plant safely

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Computer Literacy in Communities (CLIC)

What is CLIC?

As a community outreach project, the Computer Literacy in Communities (CLIC) project aims to increase the level of basic computer literacy under elder community members who never had the opportunity/funds to become computer literate. By increasing their capacity for computer use, the project contributes to community development.

What is the CLIC objective?

The main objective is to increase the level of computer literacy through the presentation of training workshops that provide participants with the necessary skills to further complete self-driven courses in Word, Excel, Internet and email use.

What is CLIC doing?

CLIC trainers conclude partnerships with their immediate community schools that make their computer laboratories available as training venues. Three-hour workshops are advertised through the school and in community newspapers.

A partnership with a computer training centre situated in the Zandspruit informal settlement is currently being concluded. Here the focus will be on training basic computer literacy trainers.

As a dynamic project, CLIC is in the process of reinventing itself. A new initiative is visiting old age homes and training residents in the use of smartphones (typically handed down to parents by their children). CLIC is also in the process of developing an inexpensive short course in computer literacy for the elderly, to be presented through the Centre for Software Engineering (CENSE). Each CLIC member will present a discrete course unit for a period of two weeks, thereby ensuring a manageable balance between formal tuition duties and community engagement activities.

How to get involved?

CLIC invites staff to join the project and to experience the fulfilment gained when an elderly person is empowered with computer skills! Staff members are also invited to approach CLIC with innovative ideas. The current CLIC team consists of Prof Mac van der Merwe (project leader), with team members Proff Jan Kroeze, Hugo Lotriet and Andre van der Poll, Dr Bobby Tait and Mr Tobie van Dyk.

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What is CSACEP?

- Cyber Security Awareness Community Engagement Project (CSACEP) is registered as one of the Pro Bono CE projects in the School of Computing.
- The goal of CSACEP is to educate children about the risks involved in using information and communication technology (ICT) and also to educate different role players (for example teachers, parents and caregivers) about their role and responsibility with regard to protecting and monitoring children's activities on the internet.
- The project is targeted at 4 Government Schools, and Community-based NGOs.

What is the purpose of CSACEP?

- To design and develop material that can be used in cyber-awareness initiatives for children to cultivate a cyber-awareness culture in South Africa.
 - To investigate the different role players (children, teachers and parents) and their duties in ensuring that children are cyber safe.
 - To enhance research within cyber-awareness and education field.

What is CSACEP doing?

- It promotes cyber awareness at national and international conferences and workshops.
- It enhances national and international collaboration with experts (academia as well as industry) within the field.
- It develops and distributes relevant cyber-awareness material.
- It presents open day(s) and workshop(s) to enhance a cyber-awareness culture.

How to get involved?

- Academics can make themselves available in order to help in creating project awareness to the target group and to produce research outputs on the project.
- www.cyberawareness.org.za
- <http://eagle.unisa.ac.za/elmarie>



What is MathsEdge?

MathsEdge is an academically inspired initiative of CSET, which recognises the fact that mathematics is important to all of the disciplines in the college; but it is often seen as out of reach of the everyday world by many potential learners. MathsEdge offers information about Higher Education study as well as maths-related careers and how mathematics can be applied in real-life situations.

The purpose of MathsEdge is:

- To show how maths is all around us and forms an integral part of our everyday activities – examples will be drawn from research in image processing and cryptography.
- To provide opportunities for school children and other people to see mathematics that lies beyond the classroom.
- To provide information on career opportunities in mathematics and other related fields.
- To bring what some people call the “big nasties” of mathematics (e.g. infinity, division by zero and rational numbers) to a digestible level.

What is CSET doing?

- Present a showcase of people who appreciate and use mathematics in their careers – engineers, computer programmers, financial experts, etc. What maths do they use in their careers and why did they choose the career they are in.
- Present popular and interesting articles on breakthroughs in mathematics.
- Provide information on what level of maths is required to study a specific degree.

How do I get involved?

- Advising learners and educators during MathsEdge functions.
- Mentoring learners and educators in research.
- Science writing and interviewing.
- Reviewing learner research journals.
- Making presentations to learners in schools on the importance of mathematics and the grades of mathematics needed to study disciplines in Science, Engineering and Technology at University.
- Photo and/or video graphing in the project.

Slogan

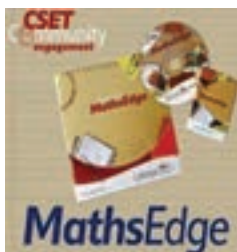
Maths gives you the Edge...!!!

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Twitter: <https://twitter.com/mathsEdge>



What is Socially Relevant Computing?

This is a community engagement and outreach initiative of the School of Computing (SOC) registered in the Computing Pro Bono project. The project focuses on empowering students, young people, and the unemployed with the relevant software development skills that could assist them in addressing social challenges using technology in our local communities.

The project mainly exploits the *computing* and *research* expertise of the SOC staff and external stakeholders to empower our students and unemployed graduates to conceptualise and develop open, socially relevant computing solutions that could address social and humanitarian challenges affecting our local communities.

The purpose of Socially Relevant Computing is:

- To upskill young people, especially students with limited industry exposure and unemployed graduates with practical software development skills.
- To expose our students, young people, and unemployed graduates, to social challenges that could be addressed using Information and Communication Technologies.
- To expose unemployed graduates to business start-up opportunities that could address social challenges in our communities.
- To increase the number of female students participating in software development.
- To contribute towards solving real problems for real people using available technologies in our communities (e.g. mobile devices).

What is CSET doing?

- Engages with external stakeholders to empower students, young people, and unemployed graduates with software development skills.
- Engages with local communities to investigate social challenges that could be addressed using ICTs.
- Provides training and support to our students, young people, and unemployed graduates (e.g. mobile development).
- Mentors unemployed graduates on various business start-up possibilities.
- Conducts research and development related to the project (e.g. impact assessments).
- Hosts hackathons where participants (students, young people, and unemployed graduates) gain practical experience by developing ICTs that addresses social challenges.

How to get involved?

- Staff members could make themselves available to train and support students with regard to practical software development skills.
- Staff members could assist in conducting research on various aspects of the project.
- External stakeholders could provide opportunities and an environment for students to learn and gain exposure.

Slogan

“Hacking for Humanity...”

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EWB-Unisa

Who are we?

EWB-Unisa is a volunteer organisation where students and professionals use their skills and expertise to benefit communities and community-based organisations. EWB-Unisa operates under the umbrella of EWB-SA and is aligned with the Unisa Millennium Development Goals. Projects range from water and sanitation to civil structures, energy, waste and agriculture. With few avenues for students and engineers to be involved in social upliftment projects, EWB-Unisa provides an extra-curricular platform for students to apply what they have learned in their studies to real-world situations, and opportunities for staff to indulge their sense of social responsibility.

Purpose and Mission

The aim of EWB-Unisa is to engage and support voluntary community projects as well as to use members' knowledge and experience to benefit local communities. EWB-Unisa is committed to developing long-term engineering solutions that address the needs of local communities by means of applying a 'social innovation' approach to problem solving. It aims to use sustainable engineering solutions to address the needs of local communities.

What is CSET doing?

- EWB-Unisa's very own chapter was launched in 2013 and CSET has provided tremendous support and guidance.
- Facilitated workshops to learn about research and community engagement.
- Provision of financial support to gain enthusiasm and kick-start projects.

How to get involved?

SUCCESS counts most when you get to give back to your community. The most valuable resource is your brain; your ideas – let us use our knowledge to create a footprint in our societies. While the organisation is typically for engineers, EWB-Unisa recognises that successful projects need expertise from all fields and is open to engineers and non-engineers alike.

Slogan

Empowering Communities

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Twitter: **Follow @EWBUnisa**

Facebook: <https://www.facebook.com/ewbunisa>





Solar Vehicle Project

What is it about?

- The Solar Vehicle project is a Community Engagement undertaking initiated by the Department of Mechanical and Industrial (DMIE) to showcase their engineering expertise to the benefit of communities, and is fully sustained by the Research and Innovation (R&D) portfolio and integrates sustainable environmental practices into community engagement initiatives.
- This project entails the planning, design and construction of a FIA Compliant Olympia Class solar vehicle (4 wheels), to participate in an international competition with the participation and involvement of engineering lecturers and high school students from neighbouring high schools.

What is the purpose of solar vehicle project?

- To illustrate what Engineering, Science and Technological expertise can bring for the common good of our society.
 - To stimulate school learners' creativity and innovativeness and interest in engineering and science studies through partnership with engineering academics and students.
 - The best solar vehicle typically exhibits the following:
 - Sound, reliable mechanical design
 - High mechanical efficiency
 - Efficient and reliable electrical systems
 - Highly efficient motors
 - High power to weight battery systems
 - Efficient solar cells (good response to angle of incidence is vital)



How is this achievable?

- Dedicated engineering staff members are grouped according to their fields of expertise to expose school learners and Unisa students to various processes of developing this solar vehicle.
- These staff members will continue to mentor these learners until the end of the project to ensure that appropriate engineering skills are acquired.
- The design is to be kept as simple as possible, so that students can take full responsibility of the vehicle.
- Special effort will be made to make the solar vehicle easy to maintain and repair.
- The vehicle will have a full telemetry system, where the data of the car will be made available to scholars and searches who would like to use this in different projects.

Who can get involved?

- Though this project is managed by the Department of Mechanical and Industrial Engineering, it represents the entire Unisa community.
- Therefore any Unisa staff member and students across various disciplines are more than welcome to participate.
- Innovation culture encourages teamwork in order to realise the organisational common goal.
- Typically students that make a solar team a success would be the type of people that accede to the following careers:
 - Mechanical Engineers
 - Industrial Design
 - Aerodynamicists
 - Electrical Engineers
 - Computer Science
 - Geophysics and Climatology
 - Maths and Physics (STEM)
 - Marketing, Sponsorship and PR personnel
 - Business and Project management
 - Logistics, Catering, Travel/Transport planning, Medical
 - Teaching and Education
- The best solar teams typically exhibit the following characteristics:
 - Effective and well-practised team
 - Ability to solve problems on the fly and good teamwork
 - Good understanding of all the elements of their car, and what would typically have to be repaired
 - Strong understanding of the maths that drives solar vehicle strategy
 - Knowledge of the race environment, geographical, logistics, race rules

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What is the Astronomy Outreach Programme?

The Astronomy Outreach Programme at Unisa consists of several astronomy-related activities with the aim to inspire learners to get interested in science and ultimately to pursue careers in science and technology. Astronomy is a branch of physical science that can be appreciated without any scientific or mathematical background. Because it is so accessible and exciting, astronomy is of continuous interest to the general public and an excellent tool to inspire a general interest in science. Our government has identified astronomy as a key science objective and has shown their support for astronomy by investing in projects such as the SKA, SALT, MeerKAT and HESS.

The purpose of the Astronomy Outreach Programme is?

- To increase science awareness in communities
- To stimulate the scientific curiosity of learners from a young age
- To encourage learners to study science at a tertiary level
- To educate learners and the general public about South African science projects
- To build relationships with non-professional societies to share knowledge and experience
- To educate learners and the general public on aspects of astronomy

What is CSET doing?

Astronomy presentations

- We do astronomy presentations on a broad range of topics. These can be adapted to suit a particular target audience from primary school learners to adults. For example, we can do presentations on specialised topics in astronomy for societies and general interest groups.
- We do hands-on demonstrations of astronomy-related concepts to help participants get a better understanding and appreciation of astronomy. The demonstrations include a planet walk and building a comet. These can be done for a daytime visit or if the weather is not suitable for a viewing evening.

Viewing Evenings

- The Muckleneuk campus hosts the only observatory in Pretoria run by professional astronomers. There is a 35cm (14") telescope mounted on a fixed pier in the observatory with computer-controlled pointing. We host small viewing evenings where participants get a tour of the night sky and a chance to look at some astronomical objects through the telescope.



- We also host viewing evenings at remote sites by taking portable telescopes to the venues. Typical sites for off-site viewing evenings include schools and community centres. Hosting a viewing evening outside allows us to accommodate more people and we can set up more telescopes. This allows us to go to communities instead of them having to come to us at night.

Educational Resources

- We develop educational resources such as posters or newspaper inserts on astronomical topics or current astronomical events. These resources are targeted at the general public.

How to get involved?

We usually need help with the groups to show them where to go, and tell them what to do – training is quick and easy. As an added bonus, you get to look through the telescope on viewing evenings! You can contact us if you are interested in getting involved in the programme.

Slogan

Inspiring our community to reach for the stars

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ICT in the Classroom

What is ICT in the Classroom?

- Information and Communication Technology (ICT) in the Classroom is a community engagement initiative of the School of Computing (SOC) that is designed to inspire, teach and train educators to utilise up-to-date IT tools and techniques that facilitate the classroom teaching experience.
- The project comprises four distinct sub-programmes, namely:
 - Group A – Teaching the computer-aided training (CAT) and Information Technology educators to efficiently use CAT in the classroom;
 - Group B – Training educators on the use of ICT in the classroom with focus on the Google Chromebook project in the development of an Open Education Resources (OER) course (this training session allows educators to maximise the usage of the Google Chromebook);
 - Group C – Science Fair is an engagement with a local secondary school to assist the teachers and learners with their Science projects.
 - Group D – Science Engineering and Technology talks for the community that the SOC serves.

The purpose of ICT in the Classroom

- This project is aligned with the National Development plan 2030 on improving education, training and innovation as well as social protection.
- Group A – This is an ongoing project and the goal is the collaboration with the IT and CAT teachers to identify gaps in the training.
- Group B – This is an ongoing project and the goal is the interaction with the DOE JHB West in hosting workshops for teachers and administrators in the use of ICT in the classroom and school environment with specific focus on using the Google Platform as part of the Google initiative. The goal is the development of an OER course as the main platform of delivery with onsite workshops with the teachers.
- Group C – This is an ongoing project and the goal is to assist learners who are developing their Science Fair projects; as well as the hosting and evaluation of secondary schools' Science Fair projects.
- Group D – This is an ongoing project and the goal is the hosting of Science, Engineering and Technology (SET) talks to the community on everyday, IT-related topics.

What is the ICT in the Classroom project doing?

- Workshops are hosted to address the needs of the above-mentioned groups.
- Technical training is provided to all the groups by highly skilled lecturers.
- Training is provided to the participants in the various groups to use and apply ICT in the classroom for the current school syllabus.

How to get involved

<https://canvas.instructure.com/enroll/DLLWGP>

<https://sites.google.com/site/catteachershtmlresources/home>

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