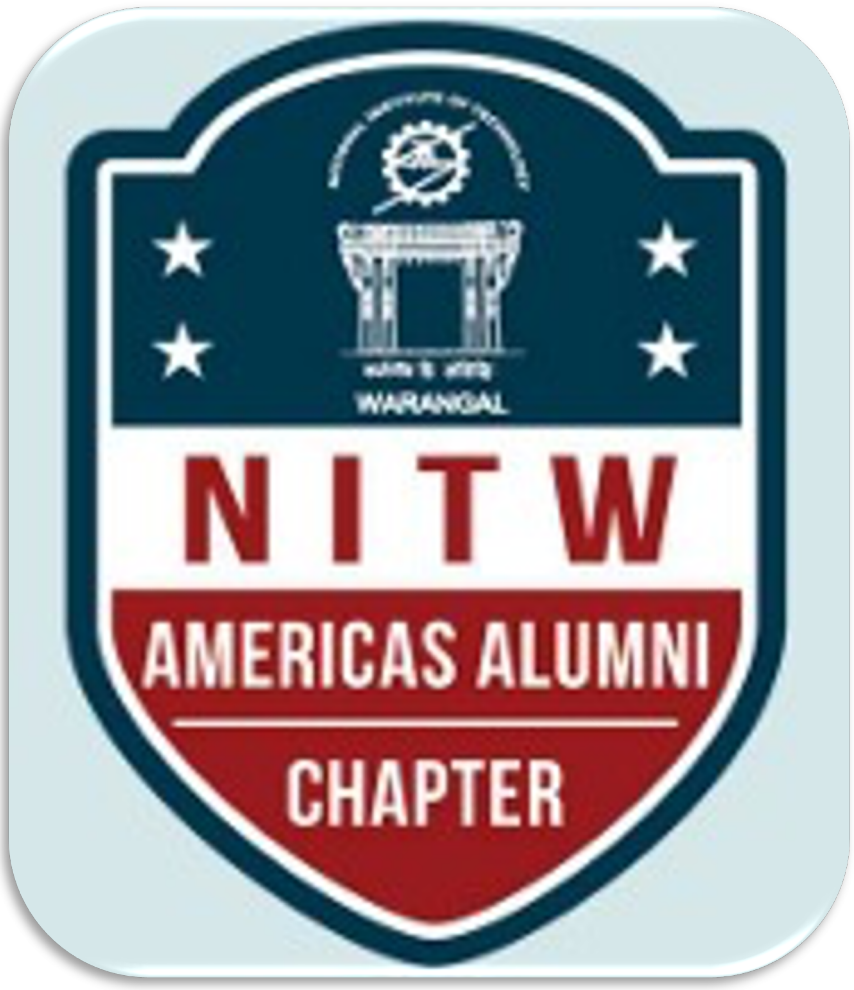


NEWSLETTER

PRESENTED BY NITW ALUMNI AMERICAS

Ram K Iruvanti | Jags Porandla | Ram Gangaraju | Balaraj Pudota

Building Bridges Across the Americas: A Message from the President

Dear Fellow Alumni,

It is a profound honor to address you as the President of the NITW Americas Alumni Chapter. As I reflect on our shared journey—from the familiar paths of the Orugallu campus to the diverse professional landscapes we now navigate across the Americas—I am struck by the enduring strength of our community.

Our alma mater gave us more than just a world-class technical education; it instilled in us a spirit of resilience, innovation, and lifelong friendship. Today, as we find ourselves leading industries, driving research, and building communities across this hemisphere, that "NITW spark" continues to be our common denominator.

Campus Update: A New Era of Growth

Back in Warangal, our institute is witnessing a transformative phase under the visionary leadership of Professor Bidyadhar Subudhi. Since taking charge, Director Subudhi has prioritized institutional excellence, faculty enrichment, and global integration.

Key highlights of the current campus status include:

* Massive Faculty Recruitment: To meet growing student needs, the institute has successfully conducted major recruitment drives, appointing nearly 100 new faculty members, predominantly from IITs and prestigious foreign institutions.
* Research & Innovation Surge: In the last academic year, the campus saw a record output of over 880 journal papers and secured significant research funding exceeding ₹45 crore.
* Global Footprint: NITW has recently signed strategic MoUs with international institutions, including Nordhausen University of Applied Sciences, Germany, and AIT Thailand, fostering joint research and student exchange programs.
* Industry Integration: With new centers like the industry-Academia Innovation Conclave (IAIC) and MOUs with leaders like ZF India, the campus is bridging the gap between classroom learning and industrial application.

Director Subudhi's perspective on AI and education

This video provides an insightful interview where Professor Subudhi discusses his vision for integrating AI into the curriculum at NIT Warangal, reflecting the modern academic direction of the institute.
https://youtu.be/cTLJkT3bI3U?si=AaHqr545rEVe744L

Our Vision for the Year

The goal of this newsletter is to transform our vast network into a vibrant ecosystem of support. We are focusing on three core pillars:

* Professional Synergy: Creating platforms for mentorship where seasoned leaders can guide young graduates arriving in the Americas.

* Cultural Connection: Celebrating our roots while embracing our roles as global citizens through regional meetups and digital forums.

* Giving Back: Finding meaningful ways to support NIT Warangal’s growth, ensuring future generations have the same—if not better—opportunities than we had.

I encourage each of you to stay engaged, share your milestones, and reach out to one another. Our collective success is the greatest tribute we can pay to our heritage.

Warm regards,

Balaraj Pudota.

President
NITW Americas Alumni Association.

NITW Alumni Americas Presents

NEWSLETTER

JANUARY 2026 Issue # 02

Latest News & Articles

By our distinguished Alumni

EDITORS PROLOGUE

Friends!

We are delighted to bring you this first issue of revived NITW Americas Alumni Association (NITWAA) Newsletter. As some of you may recall, we had this NITWAA Newsletter publication earlier in 2021 and due to variety of reasons, could not be continued thereafter.

At the behest of the present NITW Director Prof Bidyadhar Subudhi and with the strong support and enthusiasm of the current NITWAA Executive committee, we are happy to revive the Newsletter once again. The revived first issue is intended as a "teaser" to gently wake us all from our slumber and as nicely emphasized by Balaraj Pudota in his Message from The President, NITWAA, to inspire each of you to stay connected, share your milestones, and reach out to fellow alumni.

The Newsletter offers a wonderful platform to share your interests and ideas, highlight professional achievements and awards, celebrate both professional & personal success stories and keep everyone informed about NITWA events you may have participated in during the Year.

The NITWAA Community in North America is a very vibrant group of accomplished, resourceful, and forward-looking Alumni. We encourage you to make full use of this Newsletter to stay in touch with one another, strengthen our connections, and contribute to the continued growth and standing of our beloved Alma mater NITW through ongoing engagement, exchange of ideas, and active participation in NITWAA initiatives.

We warmly invite articles from all of you on technical topics, general topics & interests, success stories, biographies and in short on anything of relevance to NTWAA. Submissions are welcome on a continual basis to keep the Newsletter alive and engaging. There is no strict deadline – any additional articles we receive can always be featured on future issues. The articles are to be sent to " MagazineEditor@nitwamericas.org".

Wishing you all a very Happy New Year and continued success in the year ahead.

Ram Iruvanti
Jags Porandla
Ram Gangaraju
Balaraj Pudota.

NEWSLETTER TEAM

Contents

What we have in this edition.

Prompt Engineering Essentials

How to Think, Design, and Communicate Effectively with Large Language Models

Prompt engineering represents a paradigm shift for software engineers. Instead of defining behavior through code syntax, engineers now articulate logic, tone, and reasoning through structured natural language. By crafting effective prompts, developers can guide Large Language Models (LLMs) such as ChatGPT, Claude, or Gemini to generate meaningful, context-aware responses that accelerate automation, creativity, and decision-making.

Prompt engineering is not just about 'talking to AI'—it's about designing precise linguistic interfaces that bridge human intent and machine inference. The skill now sits at the heart of modern automation, data science, and software architecture.

SUBHA RAJAN RAM

1. Building Effective Prompts

Just as an API needs clear specifications, LLM prompts require explicit structure. A strong prompt defines role, context, goals, and constraints, ensuring predictable, high-quality output. Think of it as the software specification for a conversation. Engineers can refine prompts iteratively, debugging them the same way they would debug code.

• Specify the role or persona (e.g., 'Act as a backend architect designing a microservice for log aggregation.')

• Provide relevant context—inputs, assumptions, and environmental details.

• Define success criteria, output formats, and constraints (e.g., 'Return a JSON schema for the API endpoints.').

• Iterate and evaluate—refine the prompt based on the model's performance or ambiguity.

An iterative feedback cycle helps improve accuracy. For instance, when designing a database schema, engineers might begin with a high-level description, then refine the prompt to include data types, normalization rules, and indexing strategies.

2. Prompt Patterns and Frameworks

Patterns are the building blocks of prompt design—standardized approaches that encode logic, consistency, and adaptability. Prompt patterns enable reusable reasoning frameworks, helping engineers develop structured interactions that yield predictable outputs. Below are several key patterns with software-centric examples:

🔷 Persona Pattern

Establishes domain expertise to control tone and vocabulary.
Example: 'Act as a Kubernetes architect. Recommend a high-availability topology for a three-node cluster using Helm charts.'

🔷 Few-Shot Pattern

Shows a few examples to guide structure, tone, or reasoning steps.

Example: 'Example 1: SQL query listing employees by department. Example 2: SQL query calculating average salaries per department. Task: Generate a query that returns top-earning employees per department.'

🔷 Flipped Interaction Pattern

Prompts the model to ask clarifying questions before providing an answer.

Example: 'Before designing a REST API for a logistics app, ask me three questions about endpoints, authentication, and payload structure.'

🔷 ReAct Pattern (Reason + Act)

Encourages transparent reasoning before execution.

Example: 'Think step-by-step: identify the algorithm for anomaly detection, then implement it in Python.'

🔷 Cognitive Verifier Pattern

Adds a self-check phase where the LLM validates its output.

Example: 'Generate a bash script to back up a directory, then verify each command for Ubuntu 22.04 compatibility.'

These frameworks transform LLMs into collaborative reasoning agents. By combining patterns—such as pairing ReAct with Cognitive Verifier—engineers can design prompt workflows that mirror robust human review processes.

3. Applying Prompt Engineering in Automation

Prompt engineering underpins modern automation pipelines. In MLOps, DevOps, and data integration, prompts act as dynamic control surfaces—executing cognitive logic instead of code syntax.

Common use cases include:

• Generating test cases and API documentation automatically.

• Transforming natural-language requirements into executable scripts or queries.

• Building AI agents that chain reasoning tasks (e.g., data validation → transformation → summarization).

• Creating self-correcting automation flows where the LLM evaluates and refines its own output.

For example, a data engineer might use chained prompts to automate ingestion workflows: one prompt describes schema validation, another generates transformation scripts, and a third performs error logging and documentation.

4. The Mindset Shift for Engineers

Prompt engineering introduces a new mindset—thinking like a system designer of cognition. Rather than hardcoding logic, engineers now orchestrate reasoning steps, context boundaries, and expected behaviors.

It requires empathy (anticipating user intent), linguistic clarity (communicating with precision), and experimentation (testing multiple prompt versions). In essence, engineers become meta-programmers—writing the rules for how AI itself writes code, explanations, and reasoning.

💡 Takeaway

Prompt engineering is the new literacy of the AI age. It blends software design, cognitive science, and natural language clarity into a single discipline. Engineers who master it gain a superpower: the ability to make intelligent systems reason, build, and adapt through words alone.

As automation accelerates, prompt engineering will shape how software engineers define workflows, validate data, and scale intelligence across enterprise systems. It's not just a new skill—it's the future of engineering itself.

Journey Of a Lifetime

Musings of a nomadic NITW (RECW) Chemical Engineer from 1970-75 Batch!

RAM KISHORE IRUVANTI

My journey began in 1970, when I joined the Regional Engineering College, Warangal (Present National Institute of Technology - NITW), embarking on a path that would shape not only my professional identity but also my adventurous spirit. Studying "Chemical Engineering" at NITW set the foundation for what would become a truly nomadic and fulfilling career as a chemical engineer—a journey that I have cherished immensely.

I am deeply grateful for the remarkable teaching staff at NITW, whose dedication and knowledge provided us with a thorough grounding in the fundamentals of chemical engineering. This robust education equipped us to confidently face diverse professional challenges and adapt to varied environments throughout our careers.

My nomadic life is closely intertwined with Chemical and Petrochemical installations around India and around the world. As a designer and builder of these plants I had a great opportunity of visiting, living and working in remote corners of India and the world.

My earliest experiences in the field took me to places that, at the time, were far removed from industrialization. Constructing chemical plants in Dewas, outside Indore—long before the area transformed into an industrial hub—was just the beginning. I also spent considerable time in Tonsa, Punjab; Gangtok, Sikkim; and District Kheda in Malaysia. In each of these distant locales, I was stationed for months or even years, fully immersed in launching these projects.

Despite their remoteness, these assignments offered opportunities for exploration and connection. For instance, while stationed near Indore, I spent a year absorbing the vibrant local culture and in Mohali and Chandigarh, I enjoyed the unique blend of tradition and modernity. The pristine beauty of Sikkim left a deep impression on me, as did the bustling energy of Penang, Malaysia, just across the water from Butterworth port enroute to the project site in district Kheda.

Photo above - Indore Kajlighar Fort

I have vivid memories of crossing daily by ferry, collaborating with local Chinese contractors, and engaging in the project challenges and camaraderie of building an international plant.

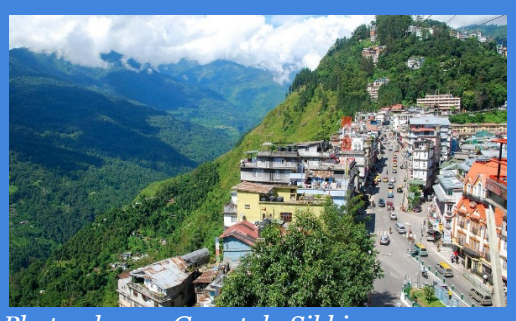


Photo above - Gangtok, Sikkim

Photo above - Butter Worth Penang Ferry

As my career progressed, I entered the demanding world of refinery and petrochemical plant design and construction. This chapter allowed me to experience even more far-flung regions, each with their own distinctive character and challenges. Building a pilot plant for coal-oil co-processing in Duliajan, Assam, stands out as a memorable experience. My travels often took me to Digboi, especially during turbulent times, and frequent trips to Numaligarh in Assam remain etched in my memory.

I recall journeys during the monsoon season, when flooding transformed the landscape and brought Kaziranga's famous rhinos into view—an encounter that bridged the worlds of engineering and nature in an unexpected way. In such moments, it became clear to me how the building of the Plants in remote areas and the rhythms of the natural world are intertwined.

There was a time when I was traveling to

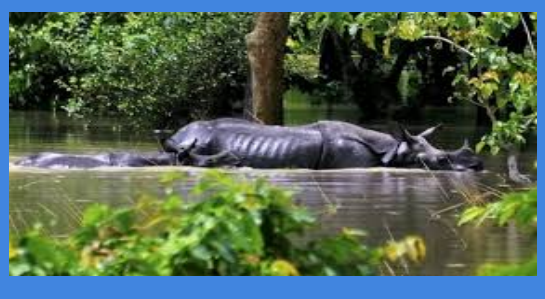


Photo above - Rhinos from Kaziranga Forest during Flooding

Numalighar during a flooding time, when the Rhinos from Kaziranga forest could be sighted. It is a world away from Chemical Engineering but somehow relates to it in this case. Because one is a cause and the other is a result.

The nomad chemical engineer's life is not all that rosy as it sounds so far. There were tough encounters with the locals at another refinery site where I had drifted innocently to the banks of river Ganga for a visit only to be admonished and brought back to our lodging by our concerned site manager.

And to think of the times when against my wishes was to be provided armed escort outside the gates of another Refinery where warring factions could cause trouble for us.

Of course, the nomad chemical engineer is also thankful to NITW for providing a good base so that he can enjoy building plants in relatively nicer locales like Visakhapatnam, Koyali, Jamnagar and even an opportunity to visit the lands' end town of Mithapur.

And then at a "surprisingly difficult to Site" this time in a supposedly conventional and easier state. The horrific experience of managing local contractors in the area while building a grass root Gas processing unit is an unexpected experience in an unpleasant direction though the intermediate halts at beautiful small towns were a small compensation. And imagine the nomad engineer's plight when he has to build plant in another refinery in late 90's when the unions were very strong. Here is when this nomad engineer thought that NITW, besides providing good basis of Engineering, should impart some training to Engineers on real life Project and interpersonal management aspects.

The benefits of NITW(RECW) education get reflected in the more exotic places where this nomad chemical engineer had opportunity to work and stay. That is the most beautiful Netherlands & Paris where work has taken me and was to stay for years. That compensated for all the trials & tribulations

Then of course NITW education paved the way as an icing on the cake of letting this nomad engineer to build plants in South Texas and Louisiana in the United States.

This life, rich with movement and discovery, has been inseparable from my identity as a chemical engineer and remains a source of pride and inspiration.

So, I can only conclude that our wonderful stay of five years at NITW paved the way for this exciting and rewarding nomadic career of over 40 years yielding an output ratio of 1:8.

A picture of the entire assembly at the main library

A Short walk Down Memory Lane.
35th Coral Jubilee Reunion.

SUBHA RAJAN RAM

Early in the spring of 2025, a familiar spark appeared in one of our WhatsApp groups: talk of another reunion, our **35th Coral Jubilee Reunion**. Having missed many past reunions due to family commitments, kids heading to college, and a planned trip to Chennai, the timing of this one felt… right. A small group of us about half a dozen girls from the 1990 batch across different branches, reconnected, coordinated schedules, and decided to make this reunion happen. Some of us were flying in from the U.S., others from different states across India.

Once the pieces fell into place, I registered with a mix of excitement and nostalgia — a chance to revisit the campus that shaped me, reunite with friends who colored my youth, and return to the institution that laid the foundation for my professional and personal life

Arrival & First Moments Back on Campus

On 22nd August 2025, after a lovely preliminary meet-up in Hyderabad, we began our drive to Warangal. That journey itself was filled with laughter, memories, decades of untold stories, and updates on the winding paths our lives had taken.

Walking through the main entrance of NIT Warangal after multiple decades was indescribable. A rush of emotions, joy, nostalgia, disbelief, gratitude flooded in all at once. The campus looked different but familiar: newer buildings, lush summer greenery, familiar paths that somehow felt both unchanged and entirely new.

Registration & First Gatherings

We made our way to the registration area, where we were greeted by bright, energetic faces of current students, volunteers, and fellow alumni. Here, we received: event kits, badges and Memorabilia. Light refreshments and informal introductions followed in the lounge area/ALC Auditorium. The atmosphere was warm and buzzing with nostalgia.

Lunch at Krishna Mess IV

One of the highlights of the day was returning to Krishna Mess IV. Sharing a meal here felt like a time loop: the chatter, the clatter of plates, the easy camaraderie all so reminiscent of our hostel days. After lunch, we wandered through campus, rediscovering pathways that held decades of memories. The buildings had changed, trees had grown taller, amenities had modernized but the spirit of NITW remained intact.

Faculty Interactions & Alumni Sessions

The afternoon featured: Faculty meetups across departments, Felicitations by students, Department-wise gatherings, Panel discussions and alumni talks.

I had the special opportunity to give a short speech on behalf of my batch expressing gratitude to the institute for shaping our careers and character. Listening to current professors discuss the institute's vision, challenges, and advancements was incredibly inspiring.

Morning with the Director

On 23rd August 2025 morning we began with:

- A gathering with the Director
- Informal conversations
- Panel discussions
- A hearty breakfast
- Photo sessions and deeper catch-ups.

We shared contact details, made promises to stay connected, and spoke about ways we could give back to the institute.

Below is group pic with the director Prof. Bidyadhar Subudh.

Golden Jubilee Reunion.
1970-75 batch Students.

A picture of the entire assembly of 1970-75 batch at the main library

RAM K IRUVANTI

The 1970-75 batch students of NITW Celebrated their Golden Jubilee Reunion Celebrations in a Grand style.

Befitting the occasion of 50th year of passing from NITW, a Golden Jubilee Reunion was organized between February 6 - 12, 2025. The Meet was planned to be organized in two parts. Part one, a one-day Meet at our beloved NITW Campus and the second part, a four-day holiday Meet at a beach resort in Goa.
Such long and two-part Meet required lot of planning, coordination with various agencies including NITW authorities, the Resort, the vendors, logistics, arrangement of buses, collection of funds, accounting, etc. To meet this requirement an organization committee (OC) was formed consisting of few batchmates. The OC worked very hard during the preceding few months which resulted in a near perfect and memorable Golden Jubilee Reunion Meet 2025.

Celebrations at NIT, Warangal Campus on February 6, 2025.

The first part of the Meet was the inaugural sessions on February 6, 2025, at the NITW Campus. A bus was arranged from Hyderabad to NIT Campus at Warangal and it was with Nostalgia that the batchmates entered the Campus. The campus welcomed us with banners of 1970-75 batch Golden Jubilee Reunion. About 50 people attended the Meet at NITW and few of them brought along their Spouses. The event featured moving tributes, heartfelt speeches, and a lively exchange of ideas with respective departments about nurturing current students and giving back to the institute.

The Meet at Warangal campus kicked off with a wonderful inaugural session held at the " Ambedkar Hall" on February 6, 2025, which was graced by the in-charge Dean - Alumni affairs Dr. Sirish Hari Sonawane, The Dean Prof. Venu Vinod, the Joint Secretary - Alumni affairs Prof Ms. Rama and the revered professor Dr. Pandu Ranga Rao who taught the 1970-75 batch.

The Meet was Coordinated by Ram Kishore Iruvanti of 1970-75 batch who welcomed the august gathering.

Professor Pandu Ranga Rao Garu gave an illuminating lecture on the work undertaken by the staff of NITW in restoring the famed "Ramappa Temple".

Celebrations at Goa, February 8 to 12, 2025.

The Next day after breakfast the group left for Hyderabad enroute to Goa, which formed the Second part of the Golden Jubilee Reunion.

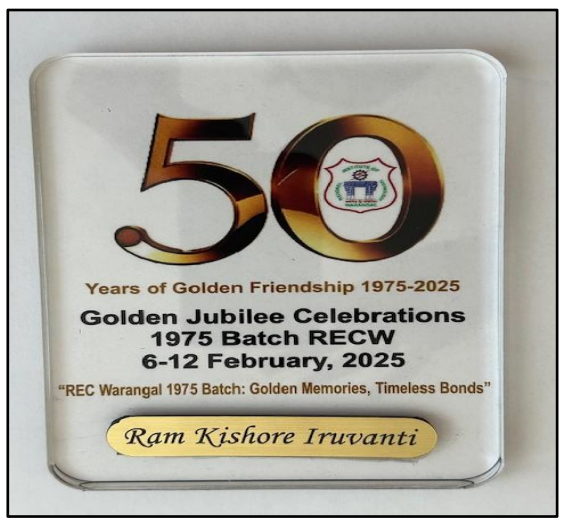
The second part of the memorable Golden Jubilee Meet took place between February 8-12, 2025, at a beautiful Resort on a quaint beach strip in North Goa. A few more batchmates and their spouses joined the Meet at Goa taking the strength to almost eighty people.

The batchmates had a relaxing time with friends and had a completely in-house produced entertainment session on all the evenings. Everyone let their hair down and enjoyed participating in the dance, music and fun activities.

On one of the evenings, a cruise on river “Mandovi” was arranged for batch mates. During one of the days a sightseeing trip in Goa was arranged which the batchmates enjoyed very much.

A memento commemorating the Golden Jubilee Year Reunion of batch of 1970-75 was presented to all the Meet participants.

Finally, on February 12, 2025, after the conclusion of a fantastic and memorable Golden Meet the 1970- 75 batch students bid “goodbye” to each other and returned to their respective destinations.



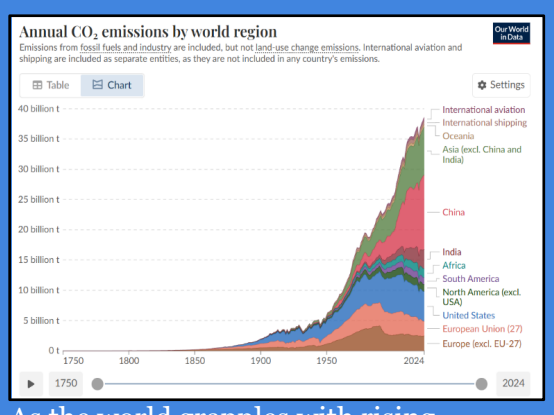
Carbon Capture and Sequestration:
A Global Perspective

RAM K IRUVANTI

Introduction:

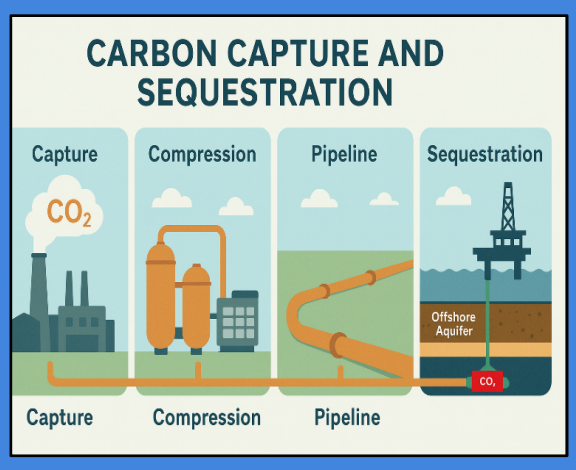
Human activities to provide food, energy and Materials result in emission of Greenhouse Gases (GHG's), one of the prime gases of GHG being Carbon Dioxide (CO 2). Large amounts of CO_2 emissions in the atmosphere result in undesirable climate changes. Climate change has become one of the most pressing challenges facing humanity in the 21st century. Climate change and especially Global warming would not only increase high heat related disorders in the population, putting an enormous strain on the already strained Healthcare systems worldwide but also could result in fatalities.

The estimated 2024 Carbon Dioxide emissions from Fuel Industry excluding land use change are about 39-40 GT (Billion tons). USA contributed about 15% of these emissions.



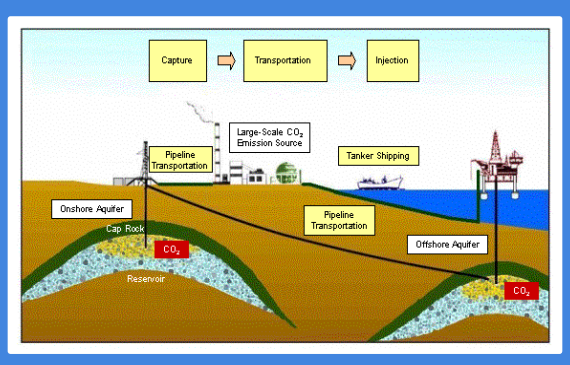
As the world grapples with rising temperatures, extreme weather events, and the long-term impacts of greenhouse gas emissions, innovative solutions are urgently needed. Among these, Carbon Capture and Sequestration (CCS) stands out as a promising technology with the potential to reduce atmospheric carbon dioxide (CO 2) levels. CCS does not come in the way of Industrial progress or Industrialization but helps mitigate the impact of the emissions of Carbon Dioxide resulting from the Industrial Activity by providing a system to capture, process, transport and sequestrate the emitted Carbon Dioxide.

Carbon Capture and Sequestration: Carbon Capture and Sequestration refer to the process of capturing CO2 emissions from sources such as power plants, LNG installations, Process plants like Hydrogen & Ammonia production units, Refineries and other industrial facilities and storing it safely underground, in geological formations. The goal is to prevent CO2 from entering the atmosphere, thereby reducing the impact on climate change. CCS involves four main steps.



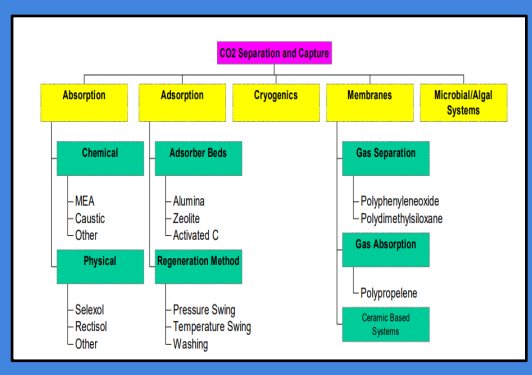
1. Carbon Dioxide Capture:
Carbon dioxide is captured from the CO_2 bearing exhaust gases of an Industrial source.
Carbon Capture Capex and Opex costs increase exponentially as the concentration of CO_2 gets lower. Hence, the lowest cost option for a CCS system is to capture the CO_2 from streams with higher concentrations.

1.1) The large CO_2 stationary sources emitting CO_2 in the order of decreasing concentrations of CO_2 are(in Vol%):
a) **LNG Plants** where Natural gas is pretreated to remove all the CO_2 before Liquefaction which gives a 95% and above pure CO_2 stream which can be further polished and compressed and sequestrated.
b) The stream after separating **Industrial Hydrogen from Gray Hydrogen** Steam Methane Reformer plants in Refining, Ammonia, Chemical and Blue Hydrogen plants. The concentration of CO_2 is in the range of 45-60 vol%.
CO_2 can also be captured from the stream after shift reactor in this plant where the CO_2 concentration would be around 20%. However, these two streams yield about 80% of total direct CO_2 emissions from the plant. There is a third stream which contains CO2, the flue gas from the Steam Methane Reformer having 15% CO_2 concentration and if CO_2 is captured from this stream also, then a total of 95% of the CO_2 emissions from the Hydrogen Generation unit can be captured.
c) **Steel Plants** : Blast furnace gas after combustion which has about 27% concentration of CO_2 or Blast furnace gas before combustion which has about 20% concentration of CO_2 .
d) **Cement plants** : Kiln off gases containing about 14 to 30% CO_2
e) **Power Plants**:
- IGCC after combustion contains 12-14% concentration of CO_2
- Coal fired Boilers – 12-14% concentration of CO_2
- Oil fired Boilers – 12-14% concentration of CO_2
- Gas fired Boilers – 11-13% concentration of CO_2
- Power station Flue Gas – 7-10% concentration of CO_2
-Natural Gas Boilers – 3-4% concentration of CO_2

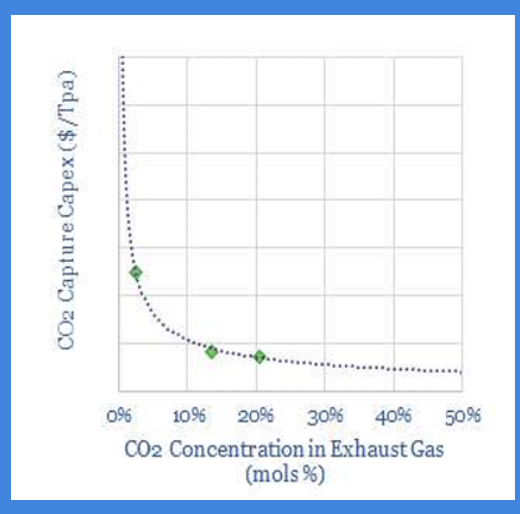


1.2) Capture Methodologies/Technologies:

At present, majority of commercially available technologies use proprietary enhanced Amine solutions for absorption of CO_2 which is the predominant Carbon Capture process.



Comparison of various Carbon Capture Technologies:



Care should be taken while selecting the Capture technology for emissions from different sources which contain widely varying concentrations of CO_2 . Various techno economic studies based on the actual composition of emissions from a specific site is carried out during "Feed Engineering" and a technically suitable and cost-effective technology is chosen before proceeding with the "Detailed Engineering "phase.

Technology Option	System Requirements	Advantages	Problems/ Drawbacks
Absorption (Chemical)	Absorber and stripper sections Chemical solvent (*e.g.* MEA, HPC)	Suitable for dilute CO_2 streams (typical flue gas from power plants) Operates at ordinary T & P Commercially available, proven technology	The heat of solvent regeneration is very high Significant solvent losses due to acidic impurities in the gas stream
Absorption (Physical)	Absorber and stripper sections Physical solvent (*e.g.* Selexol)	Less energy required Solvents are less susceptible to the impurities in the gas stream	Requires high operating pressure Works better with gas streams having high CO_2 content
Adsorption	Adsorber bed(s)	Very high CO_2 removal is possible	Requires very high operating pressures Costly
Membranes	Membrane filter(s)	Upcoming, promising technology Space efficient	Requires very high operating pressures May require multiple units and recycling due to lower product purity Very costly

Continued on page 9...

Carbon Capture and Sequestration Continues...

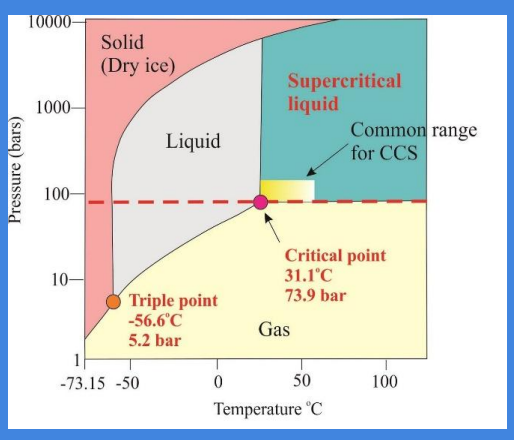
2. Compression:

After carbon Capture, the next step is compressing the pure CO_2 stream to the required phase and pipeline pressure for long distance transportation to the Sequestration site.

But, prior to compression, the moisture content and Hydrogen sulfide content in the gas need to be reduced to CO2 pipeline specifications. Especially moisture content in the gas stream would give rise to carbonic acid which is very corrosive to carbon steel pipeline. Various CO_2 pipeline operators in USA specify slightly differing levels of moisture. The most common specification for allowable moisture content in CO_2 pipelines is in the range of 630 ppm to 250 ppm. Hence, necessarily, a dehydration pretreatment step is required upstream of the compressor or pump.

It is also proven that the most techno economical state of transporting CO_2 through a pipeline is for CO_2 to be in dense phase liquid (super critical liquid). The dense phase of CO2 enables flow through a much lower diameter pipe for the same flow rate when compared with the Gas phase transport and hence results in the overall lower cost of the CCS system. Compression stations are required typically every 100 miles (approx. 150 kms) onshore.

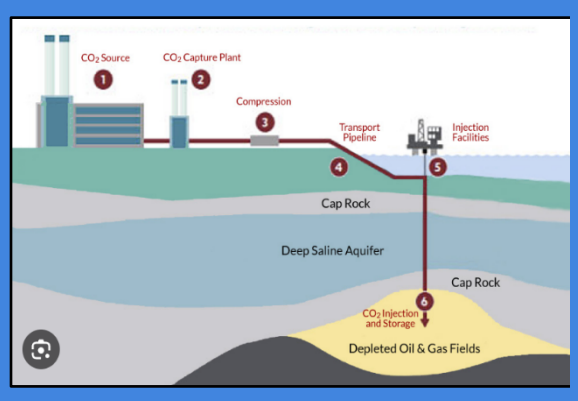
The phase diagram of CO_2 shows the range of operating conditions for CO_2 transport through pipelines.

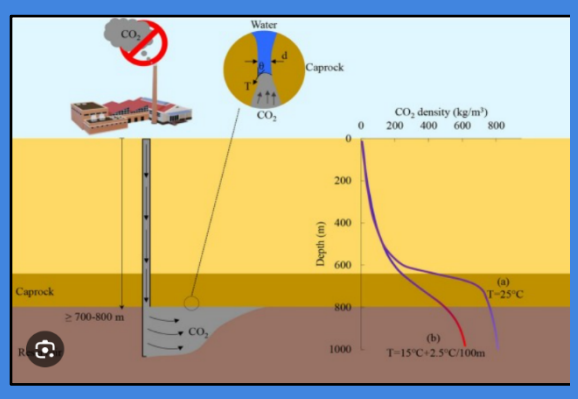


3. Pipeline transport: Moving the captured CO2 via pipeline to the offshore Saline aquifer sequestration site or to an onshore sequestration site is the next step in the process. With the moisture content in the range of 630-250 ppm, carbon steel pipe can be selected from corrosion aspect. However, at 630 ppm moisture content level, the designer should check against the possibility of Hydrate formation if there are likely to be cycles of depressurization and pressurization during the operation. To avoid this, it is better to aim to reduce the moisture content to the lower limit of 250 ppm.

4. Sequestration: In the USA, larger sequestration pore spaces are found in Saline aquifers offshore though few onshore sequestration sites could be found.

The pure dried and compressed CO_2 is injected deep into the selected aquifers. Though CO_2 in dense phase with 250 ppm moisture content can be transported in Carbon steel pipeline without getting subjected to corrosion, the downstream injection well head would need anti corrosive materials to handle the CO_2 at this moisture level. So, it is a cost benefit analysis that is to be made between choosing the costly SS internals for the wellhead vs bringing down the moisture content in the dense phase CO_2 to 50 ppm at the dehydration stage. At this level of moisture, Carbon Steel internals at the injection wellhead can handle the CO_2 without getting subjected to corrosion.





(Source: Image from World Wide Web)

For selecting suitable aquifers, lot of 3 D seismic studies and CO_2 plume analysis of injected CO_2 need to be done before an operator could file for getting the permit to drill a Class VI well. In the USA, CO_2 injection wells are permitted only in Class VI type of wells.
EPA has stringent stipulations for getting the permit to drill a Class VI well. Also, EPA stipulates a very comprehensive, stringent and ongoing analysis and reporting regimen after the CO_2 is injected into a Saline Aquifer often at depths of about a mile below the Ocean ground and below a leakproof Caprock layer. Hence, there can be no apprehension that Sequestrated CO2 plume could leak into either drinking water aquifers or could harm marine life or human health. These EPA requirements can be obtained by the designers, operators, etc. before they prepare the application for a permit to drill a class VI type well for sequestration of CO_2. These requirements are either enforced directly by EPA or in some instances EPA utilizes an authorized state agency to act on their behalf in enforcing these requirements.

For example, in the state of Texas, the Railroad Commission of Texas (RRC) is the sole overseeing agency to handle all aspects of Class VI permitting, including reviewing Geological data, modelling Plume movement and ensuring protection of underground drinking water. Five more states, North Dakota, Wyoming, Louisiana, West Virginia and Arizona were allowed by EPA to handle all permitting matters pertaining to Class VI wells. It takes anywhere from 1.5 to 2 years to obtain EPA Class VI Well permit after submission to the designated authorities.

Carbon Capture and Sequestration in the United States

The United States is a global leader in CCS technology and deployment. The US has more than a decade of experience in carbon capture, particularly in the oil and gas sector. As of 2025, the US has over 15 commercial CCS facilities in operation, with a combined annual capture capacity of approximately 25 million metric tons of CO2. The Petra Nova project in Texas, for example, was one of the largest post-combustion carbon capture projects, capable of capturing 1.6 million metric tons of CO2 per year.

The US Department of Energy has invested billions of dollars in CCS research and demonstration projects. According to the Global CCS Institute, there are over 30 CCS projects in various stages of development in the US, which could increase the country's annual capture capacity to over 70 million metric tons by 2030.

- In 2022, US CCS projects captured about 20 million metric tons of CO2, equivalent to removing roughly 4 million cars from the road.
- The US has over 5,000 miles of CO2 pipelines, the most extensive network in the world.
- In 2023, the US government announced $2.3 billion in funding for new CCS demonstration projects.

Carbon Capture and Sequestration in Canada

Canada has made significant strides in CCS, particularly in the province of Alberta, where oil sands production is a major source of emissions. The country's flagship CCS project is the Quest facility, operated by Shell, which has captured and stored more than 7 million metric tons of CO2 since starting operations in 2015. Canada also hosts the Boundary Dam project in Saskatchewan, the world's first commercial-scale CCS project on a coal-fired power plant.

Continued on page 10...

Carbon Capture and Sequestration Continues...

- Canada's total annual CCS capacity is about 4 million metric tons of CO_2 as of 2024.
- The Quest project alone captures approximately 1 million metric tons of CO_2 per year.
- Canada aims to capture and store 15 million metric tons of CO_2 annually by 2030 as part of its climate action plan.

The Canadian government has committed substantial funding to CCS, including a $319 million investment announced in 2021 to support new projects and research. The Pathways Alliance, a coalition of major oil sands companies, has proposed a $16.5 billion CCS network to capture up to 10 million metric tons of CO_2 per year by 2030.

Carbon Capture and Sequestration in Europe

Europe has positioned itself as a pioneer in climate action, with CCS playing a crucial role in its net-zero strategies. The European Union's Green Deal and Fit for 55 package emphasizes the deployment of CCS, especially for industrial decarbonization. Norway's Sleipner and Snøhvit projects have been operational for over two decades, collectively capturing more than 25 million metric tons of CO_2 to date.

- As of 2025, Europe has 10 large-scale CCS facilities in operation, with a total annual capacity of about 10 million metric tons of CO_2.
- The Northern Lights project in Norway, expected to start operations in 2026, will transport and store up to 1.5 million metric tons of CO_2 annually, with plans to expand to 5 million metric tons.
- The UK government has committed £1 billion to support CCS clusters, aiming to capture 20-30 million metric tons per year by 2030.

The Netherlands, UK, and Denmark are also investing in CCS infrastructure, including CO_2 transport networks and offshore storage sites in the North Sea. The European Commission estimates that CCS could account for the removal of 300 million metric tons of CO_2 annually by 2050 across the continent.

Carbon Capture and Sequestration in Asia

Asia, home to some of the world's largest emitters, is beginning to embrace CCS as part of its decarbonization efforts.

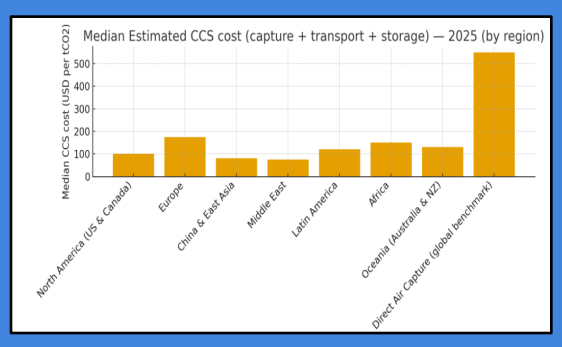
China, Japan, South Korea, and India have launched pilot projects and established national CCS strategies. China currently leads Asia in CCS deployment, with over 40 pilot and demonstration projects.

- China's total CCS capacity is about 3 million metric tons of CO_2 per year as of 2025, with plans to scale up to 50 million metric tons by 2030.
- Japan's Tomokomai CCS demonstration project has stored over 300,000 metric tons of CO_2 since 2016.
- South Korea's Ulsan CCS project aims to capture 1 million metric tons of CO_2 annually by 2027.

India is in the early stages of CCS research, focusing on industrial clusters and enhanced oil recovery. The Asian Development Bank (ADB) has supported regional CCS initiatives, and collaboration between countries is growing. Despite rapid industrialization, Asia's CCS capacity is expected to increase significantly, with China and Japan leading the way.

Median Estimated Costs by Region for CCS (Capture, Compression & transportation and Sequestration):

The following chart depicts the median costs for CCS (including Capture, Compression & transportation and Sequestration) by region is depicted below:



Challenges and Barriers to CCS Deployment

Despite its promise, CCS faces several challenges:

High Costs: CCS is capital-intensive, with initial investments ranging from hundreds of millions to billions of dollars.

Public Acceptance: Concerns about safety, environmental risks, and long-term liability persist.

Regulatory Frameworks: Clear policies and incentives are needed to drive investment and ensure safe storage.

Infrastructure: Building pipelines and storage facilities requires significant planning and coordination.

Overcoming these barriers will require continued government support, industry collaboration, and international cooperation.

Future Outlook: Scaling Up CCS Globally

To meet the Paris Agreement targets, the world must dramatically increase CCS deployment. The IEA projects that by 2050, CCS will need to account for about 15% of cumulative emissions reductions.

This means scaling up from the current global capture capacity of around 40 million metric tons per year to several billion metric tons.

Global CCS capacity in 2025: ~40 million metric tons CO_2 annually

Required by 2050: ~7.6 GT or billion metric tons CO_2 annually

Collaboration between governments, industry, and research institutions is key. International frameworks, such as the Mission Innovation Carbon Capture Challenge, are fostering knowledge-sharing and accelerating progress. Carbon pricing, subsidies, and investment in research will also play critical roles.

Future Research Directions in CCS

There are several promising avenues for future research in Carbon Capture and Sequestration. One area is the development of next-generation capture materials that are more selective, durable, and energy-efficient, which could significantly lower operational costs. Besides improved solvents, Metal Oxide Frameworks (MFO's) are a promising route for Carbon Capture especially for streams with higher concentrations of CO_2. Research in this area of CCS is very promising. Another key topic is improving monitoring and verification methods for underground CO_2 storage, using advanced sensors and remote sensing technologies to ensure long-term containment and safety. Additionally, integrating CCS with hydrogen production and expanding its role in decarbonizing hard-to-abate sectors, such as cement and steel manufacturing, are critical topics for future exploration. Collaborations across regions and disciplines will be essential to drive innovation and address the technical challenges that remain.

Conclusion

Carbon Capture and Sequestration is an essential tool in the fight against climate change. Across the United States, Canada, Europe, and Asia, significant progress is being made, with billions of dollars invested and millions of metric tons of CO_2 captured and stored each year. While challenges remain, technological innovation, supportive policies, and global cooperation offer a pathway to scaling up CCS and achieving net-zero emissions. As the world moves toward a more sustainable future, CCS will be indispensable in bridging the gap between current emissions and climate goals.

For policymakers, industry leaders, and citizens, understanding the potential and limitations of CCS is critical. With continued investment and collaboration, CCS can help ensure a livable planet for generations to come.

Mars Sojourn!

Human missions to Mars & Beyond!

RAM GANGARAJU

As part of preparing for a new life and establishing a new civilization space agencies like SpaceX, NASA and ESA are planning to send Human Missions to Mars in the next 10 to 15 years.

This article will focus on the challenges and opportunities of traveling to Mars, then building habitats down there right from the scratch like solar roads, terraforming towers, drones for delivery, boring machines for underground water, hyperloop tunnels & metals mining and building a temporary track connecting colonies to nearest underground water resource etc.

Traveling to Mars

We have seen the simulations of Starship by SpaceX and some of their experiments. However, I am more impressed with Virgin Galactic spaceship launching method. I want to go a little further and have Nuclear Fission or Fusion Reactor that generates high power electricity that can power a spaceship that zooms to Mars. This has to have a safe approach wherein we are dealing with radioactive materials.

Rocket propellants aren't too stable. It is taking nth trial for SpaceX to finish testing their Starship module. Don't know how many more will it take. It is an age-old method. Except that it is a BIG fancy rocket that's all to it. What I am looking at is an efficient and electrifying flight to Mars.

I am sure most of the space administrations across the world must be working on this Humans missions to Mars.

What makes it alive is

Curiosity!

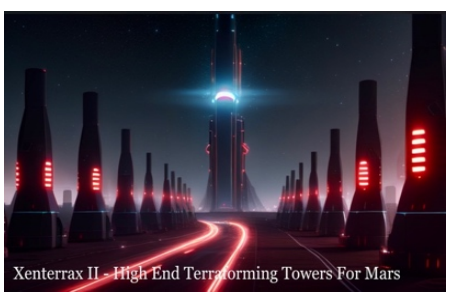
Terraforming Mars

It is a long and slow continuous process.

So many factors have to work in tandem to make the atmosphere breathable on Martian surface. There are several approaches suggested like importing ammonia and methane from neighboring planet's moon Titan to blasting nuclear bombs on Martian polar caps to melt and release Hydrogen, Oxygen and CO_2. However, remember Martian surface is prone to Solar Winds and that's how it has lost its atmosphere in to space. Hence, building Terraforming towers near the polar ice caps is appropriate and it can be controlled by recycling the air within an allowed radius. As Mars core is not active there is no powerful magnetosphere to divert solar winds from Sun, which needs to be protected from the same. We need to build a magnetosphere dome or a big glass dome that will protect us from UV light and solar winds. In the dome we can have the terraforming towers with recycling plant to maintained the atmospheric density and balancing the air quality just like on Earth. All this has to be accomplished before Humans reach Mars, with the help of AI based Humanoid robots. It can be achieved as it needs to more funding and best research. If not in the next 10 years, we can achieve it next 20 to 30 years.

Let's continue this pursuit of finding the solutions to live on Mars, at least 70% of how we are doing on Earth.

The tallest towers that you see in the pictures are the magnetospheres that will create the continuous magnetic field over the colony which will protect us from interstellar radiation, solar winds that are emanating from our host start Sun and UV light.



Orientation to Earthlings on Mars

I am sure most of the space administrations across the world must be working on this. What makes it alive is

Curiosity!

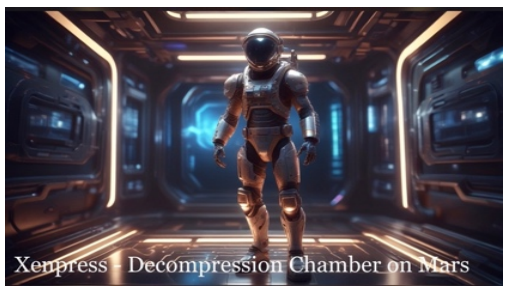
Before we start the journey to Mars, we will have to get educated about long term space travel and impact of zero gravity on the biological adjustment of our bodies to it just like the astronauts on International Space Station. That has to be clearly articulated and well taken care.

Next thing is the orientation once you reach Mars.

How and why?

This will be done based on the data given by the rovers that were sent for the last 20 to 30 years.

Mars atmosphere is having just **1%** (0.61 kPa (0.088 psi)) of Earth's pressure and only **38%** of the gravity of Earth. And the atmosphere is 96% Co2, Argon 2.1%, Nitrogen 1.9% and Oxygen is 0.145%. So, it is pretty harsh. Definitely the Human population needs to get confine to the designated designed habitats. All dos and don'ts have to be clearly articulated to sustain the Human civilization on Mars. More research and data are required to come up with a concrete agenda on this, which is still evolving.



Living on Mars

Now, we are talking about moving to Mars and that needs long term planning for living quarters. These colonies can be built by AI robots that are sent before the first Human transportation or the first humans will construct it with the help of AI robots. These quarters need to use the local materials and the systems that are taken from the earth like pressure maintenance systems. However, they need to be robust in order to sustain subzero to moderate temperatures on Mars as well the micro dust environment.

We need electricity to survive on Mars and that is the only way to efficiently live on Mars. First choice is Solar based power generators and the second choice is Nuclear Based Power generators. The concepts are readily available and within next 10 years we should achieve the power generation in these modes. Solar based generation is already happening on ISS, which needs to be extended to Mars. That's all.

Once the terraforming is done, we can start building family homes Xecoons with all terrain electric vehicle to go around. There can be bars, clubs and senate halls for gathering & entertainment. It would be another great world.

Water Resource on Mars

Exploration of water and transporting it on Mars will be a huge thing.

NASA announced that water exists on Mars on its poles which has ice caps. However, most of it is frozen CO2. We can melt it and produce water from it. Due to the low-pressure atmosphere this water can't ported through large pipes and it has to be transported using trains or trucks. It's very easy to build a train track on Martian surface as it has got less resistance which will be helpful for the faster transportation. There is a need for building a train for water transportation on Mars, which is a special requirement. The habitats that are built are near to polar ice caps will be definitely easy to access the water and the civilization can flourish around it.

Moreover, the Mars has underground water as well, which can be brought out by drilling and sucking the water out of it. More research needs to done on this matter.

Here on Earth the water logistics are going to be a next generation boom as the pure water resources are going to be scarce and the water treatment technologies and transportation (because of low temperatures piping is not an option on Mars) to extra-terrestrial will become a new area for science to improve.

Transportation on Mars

Confined to a closed environment can lead to fatigue and psychological effects and syndromes. So, moving around on Mars will be definitely a much-needed activity. This can be achieved in 3 ways - Surface, Aerial and Underground

Surface transportation on Mars

This can be achieved by building Solar roadways and using electric vehicles. We can build solar charging stations on Mars just like on Earth. However, the maintenance of it will be quite challenging as the Mars has micro dust in its atmosphere and those can get in to machines and interiors of the equipment. Solar roadways are the ones where the charging can be achieved during day time and night time their edges can be lighted, which displays the route clearly. This will solve half of visibility issues.

Another form of surface transportation is by constructing superconductor railway tracks which are connected to the solar or nuclear reactor produced electric grid. The trains are pressure maintained just like airplane and will have protection from solar or stellar radiation. Also, we can think of building a Hyper-loop as there is already a low-pressure environment on Mars. Then there are vehicles that are built to carry big machinery like boring machines or mining equipment or pressure maintenance equipment if any Martian habitat has dropped in pressure because of equipment failure. These things need to be thought as we are far away from Earth and immediate help is not at all easy from Earth.

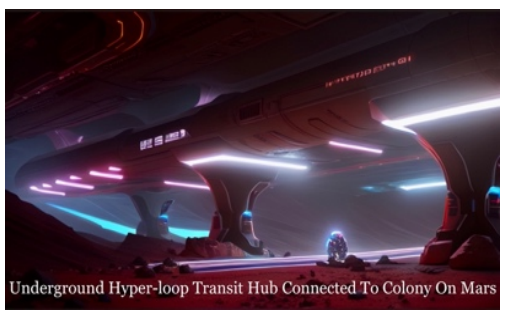
Continues on page 13...

Mars Sojourn continues…

Underground transportation On Mars

Connecting habitats with other colonies can be achieved by digging underground tunnels, wherein the temperatures can be maintained easily along with pressure. Because of less air density, building hyper loop kind of concept is achievable along with building underground networks. These can be efficient as there will be less traffic.

Hyper-loop on Mars



Hyper loop concept may be difficult to implement on Earth. But, on Mars it has got perfect conditions to implement it. The track can be built underground which is a low-pressure environment and only the pods need to maintain the pressure. Also, the electromagnetic tracks for levitation are easy to implement as the superconducting materials work efficiently at cryogenic temperatures. The stations for the pods can be built underground as well and can be integrated with the colonies very easily. The advantage of building it underground is better because exposing to to solar and stellar radiation can be completely avoided.

It is quite possible that Hyper-loop may be the best option for travel fast on Mars.

Air transportation on Mars

The size of Mars is about half the size of Earth. Its radius is around 2000+ miles that's a distance which needs air transportation for quicker coverage.

NASA has flown a helicopter on Martian environment and proved that it can be achieved on thin Martian atmosphere. As Mars has only 38% of Earth's gravity lift off can be achieved with less power. However, takes more time to create buoyancy for the lift off. This can be achieved by powerful electric jets or thrusters or with cryogenic fuel.

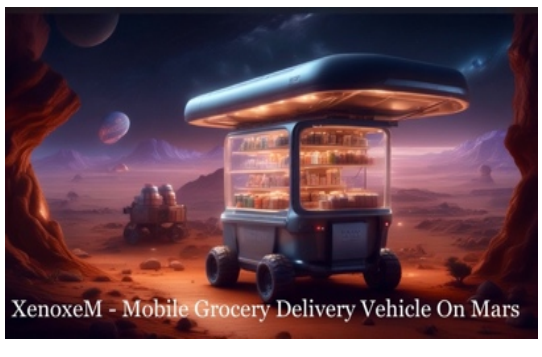
Fun on Mars

As we are on Mars away from crowded Earth, it will be challenging as we will be in smaller groups confined to closed environment that can lead to isolation syndrome. These things can be avoided if we gather at fun places like restaurants and bars. These can be built by clearly understanding the structural challenges and utilizing Martian extreme cold temperatures to our advantage. The restaurants will grow their own food by using the Greenhouse farming that we use on Earth in a more methodical way. This fresh food will improve the cognitive of the Martians. We still do not know how the impact of alcohol on Humans on Mars as we have a **circadian rhythm** synchronization issue as we are far from Earth. Still there can be Bars that can serve some healthy drinks while enjoying games in an environment with music and dance. This will elevate the spirits of Martians to have fun filled life far from Earth. Cafes can serve food and coffees where Martians can gather for meetings, discussions and entertainment.

Shopping on Mars

As you live in a habitat on Mars which is far from Earth, you still want to emulate some of the things that will keep you happy and forget that you are in isolation. One such thing is shopping. We just need to make it pleasure of doing the same. Research says shopping for groceries once in a week keeps psychologically happy and keeps you away from loneliness. And we will experience that when we are on the Mars in a colony.
There are two options. One going to a grocery store in the habitat under the same roof or two, a drone delivery vehicle will bring the goods that you have ordered.

Building a grocery store and storing it in there is not a big challenge as we don't need refrigeration that much as we will experience subzero temperatures on Mars. But, keeping it at reasonable temperature we need technology to do it, which we already have it on Earth.



These can be built all by themselves away from habitat, whereas people will come in a pressurized people transporter to these shops.

Healthcare on Mars

We all know that NASA is doing tremendous research on Space Health conditions and challenges of long-term space travel on Human bodies on its ISS. However, the conditions on Mars are little different. Even there

they have done lot of progress. Apart from psychological conditions due to isolation and being away from Planet Earth, we at present don't know the impacts on Humans by living on Mars.

One thing is for sure is fatigue from entering and leaving the pressurized habitats or colonies, demand for hydration as Mars doesn't have any humidity, inner ear problems due to the pressure differences while traveling between the colonies, bends, tunnel vision, cognitive decline due to hypoxia & blisters on skin due to the exposure to Solar radiation or UV light etc. One thing for sure, we definitely need an ER, pressurized hospitals and couple of flying and terrain driving capable hybrid ambulances along with pharmacies that have 3-D printers for medicines and organs. As we have a smaller number of Martians, we need to have a designated doctor amongst us and also everyone needs to know the primary care. Apart from this NASA prefers to select healthy individuals who are fit and can survive harsh extra-terrestrial environments.

Mars Sojourn Continues on Page 14…

Mars Sojourn continues…

Agriculture on Mars

On earth we have mastered crops farming using greenhouse technologies. Similar techniques can be applied on Mars too. However, more steps of processes are involved like building the protective layers for stellar radiation and UV rays, little more humidity, 1 pa pressure and there is abundant CO2 available on Mars, which is sufficient for crops or plants. Water is extracted from underground or polar ice caps, which can be delivered to the farms. Crops can be grown on low gravity places like the ones experimented on ISS already.

Security on Mars

The colonies on Mars need security, not for intruders. But, for leaks, radiation exposure, power loss, battery's losing power due to

micro dust storms, solar panels need cleaning. All these need drone surveillances which can be automatically maintained. However, Terraforming towers and magnetospheres needs manual human checking by using AI operated surveillance helicopters. Solar power generators and nuclear power generators need all around the clock checking as well. Also, the solar roadways, underground tunnels, water resources, power lines, bullet train's super conducting tracks need to be monitored for any malfunction as well.

Power Generation on

There are numerous methods of power generation can be done on Mars. The predominant ones are Solar and Nuclear. Solar power generation is done on Earth on massive scale already.

By using lenses, the sunlight can be concentrated one particular point and generate HT current using that source. The other method using solar panels just like on Earth, you can generate the power as well. And the other way is using nuclear reactor. Voyager 1 and 2 are powered by the small thermo nuclear reactors and they are still running even after 48 years of being in service. On Mars it can be achieved in much bigger scale and can be stored in the battery cells, in which we have made significant progress.

Wrap-up!

We have discussed about the journey to the Mars, making it habitable by terraforming and by building

habitats or colonies, surviving the harsh Martian terrain, building hospitals, high speed transportation,

drone surveillance, solar roadways, power generation, green house farming and many more. These are all concepts, they might become reality one day or not, it is an opportunity for us to discuss about it to get a scientific perspective.

Conclusion!

Look, going to Mars and coming back is not an easy task. But someday when you really might need to get out of planet Earth, you can't search for solutions at that time. Hence, you have got to prepare way ahead of it even if you can't do it today, at least you paved the way for the next generations to pick it up where we have left it off.

Hey, it's worth a shot discussing about it!

Goodbye Mars!

(All graphics are generated using Artist.Ai tools.)

A picture with the team who made it happen.

Alumni Funded State-of-the-Art Equipment at 3D Printing Lab Inaugurated at NITW.

SRIDHAR KUNISETTY

NITW Americas Alumni and 89 Batch recently completed a project to install state-of-the-art equipment in the Mechanical Engineering Department's 3D Printing Lab at NITW.

Sridhar Kunisetty represented the NITW Americas Alumni and 89 Batch at the inauguration ceremony.

Sincere thanks to everyone at the institute for their support in making this initiative possible in record time.

The energy on campus was palpable. Seeing the students' excitement firsthand — and their eagerness to dive into the new research possibilities this equipment enables — was truly rewarding. This new facility has the potential to increase R&D, patents and journal papers.

This milestone was made possible by the generous contribution from the 89 Batch, the NITW Americas Alumni Association, and a few donors.

The Director expressed his deep gratitude to everyone who contributed and to NITW Americas Alumni Association for their donation and coordination.

The Department of Mechanical Engineering at the National Institute of Technology Warangal (NITW) has inaugurated a Masked Projection SLA Machine and 3D Scanning facility at its Additive Manufacturing Lab, marking a major boost to research, innovation, and hands-on engineering education at the institute.

The facility features two state-of-the-art systems: the Formlabs Form 4 SLA 3D Printer and the SHINING 3D EinScan Rigil Tri-Mode Laser 3D Scanner. It was inaugurated Mr. Sridhar Kunisetty (NITW Alumnus, 1989 batch), Prof. Bidyadhar Subudhi, Director of NIT Warangal and attended by Prof. Y. Ravi Kumar, Head of the Department of Mechanical Engineering, Prof. S. Srinivasa Rao, Dean (International Relations & Alumni Affairs), Prof. Sonawane Shirish, Dean (Research & Development), Prof. K. Kiran Kumar, Dean (Student Welfare) and Faculty members of Mechanical Engineering Department who highlighted the role of modern manufacturing infrastructure in enabling interdisciplinary research and industry-oriented learning.

The new facility was inaugurated on Jan 7th, 2026, at 11:30 a.m. at the Additive Manufacturing Lab, Mechanical Engineering Department (Room No. B-605).

The Form 4 SLA 3D Printer is a high-performance additive manufacturing system known for its speed, precision, and reliability, using advanced stereolithography technology to deliver excellent surface finish and dimensional accuracy for precision prototyping, functional components, and academic research. Complementing this, the EinScan Rigil Tri-Mode Laser 3D Scanner, described as the world's first tri-mode scanner with built-in computing, wireless operation, and hybrid light technology, enables a fully integrated wireless scanning workflow for reverse engineering, inspection, and digital design validation.

The Additive Manufacturing Lab functions under the supervision of Prof. Y. Ravi Kumar, Faculty In-Charge, who noted that the newly installed systems will significantly benefit students, researchers, and faculty by enabling advanced experimentation, rapid prototyping, and innovation-led research. With the commissioning of these facilities, NIT Warangal strengthens its commitment to excellence in additive manufacturing, advanced engineering research, and technological innovation, positioning itself as a leading center for future-ready manufacturing education.

Jags Porandla (4th from left) at NIT Warangal with hostel staff, reviewing the installed solar water heaters.

A Purpose Driven NITW Dallas Alumni Effort That Made a Real Difference at NIT Warangal

JAGS PORANDLA

Some of the most meaningful alumni initiatives begin with a simple conversation and a shared desire to give back. This one took shape when an executive member of the NIT Warangal Alumni Association reached out to me to explore supporting a solar water heater for the Ladies' Hostel at NIT Warangal.

As part of the NIT Warangal alumni community in Dallas, I proposed taking this up as a focused project and coordinated it end to end with fellow Dallas alumni. What followed was a powerful demonstration of how engaged and committed our Dallas alumni network truly is.

Dallas Alumni Stepping Up

When we shared the idea with the NIT Warangal Dallas alumni group, the response was overwhelming. Twenty-one alumni came together and contributed generously. In a short time, we were able to raise ₹3 lakhs for the project.

This was not just about collecting funds. It was about alumni trusting one another and uniting around a cause that directly benefits current students.

From Planning to Execution

Once the funds were in place, we reviewed proposals from several solar companies in India. Our objective was clear. Select a solution that is reliable, sustainable, and easy to maintain over the long term.

After careful evaluation, we identified Illuminate, led by our own NIT Warangal alumnus Naveen Rajaram from Bangalore. With his leadership and commitment, the project progressed smoothly and was successfully implemented in 2023.

What Matters Most Is Long Term Success

Recently, we received an update from a member of the NIT Warangal Executive Committee regarding the annual maintenance of the system. It was reassuring to learn that the system continues to perform well, not only at the time of installation but also after extended use.
That update meant a great deal to me personally. It confirmed that this was not a onetime effort, but a sustainable solution that continues to serve students every day.

A Reminder of What Alumni Can Do Together

This project is a meaningful example of what NIT Warangal Americas chapter alumni can accomplish when we remain connected and engaged. Regardless of where we live, we can continue to contribute, support, and make a lasting difference in matters that truly matter to our institute.
I hope this encourages more alumni to step forward, get involved, and take up similar initiatives in the future.