

# DGI TECH CHRONICLE

# SIT EDITION

Volume IV, Issue II (Jan - Jun) 2024

# EDITORIAL BOARD



Dr. Aadarsh Malviya

#### **Editor in Chief**

In this issue, we delve into a captivating array of topics and developments, all tailored to the inquisitive minds of the future engineers. As an engineering college community, we stand at the forefront of technological breakthroughs, and it is our mission to empower you with the knowledge and insights to not only keep pace but to lead in this ever-accelerating race of innovation.



Gargi Kalra (15202; CSE)

**Editor- Design** 



Nitish Kumar (15206; CSIT)

**Co-Editor** 



Bhawna (15199; CSIT)

#### **Editor- Text**





## Department Vision and Mission

## Department PEO, PSO and PO's

My Pen and Me: Students Articles



Promoting technologists by imparting profound knowledge in information technology, all while instilling ethics through specialized technical education.

Delivering comprehensive knowledge in information technology, preparing technologists to excel in a rapidly evolving digital landscape.

Building a culture of honesty and responsibility in tech, promoting smart and ethical leadership.

Empowering individuals with specialized technical skills and ethical values to drive positive change and innovation in the tech industry.



# Program Educational Objectives (PEO)

To enable graduates to think logically, pursue lifelong learning and will have the capacity to understand technical issues related to computing systems and to design optimal solutions.

To enable graduates to develop hardware and software systems by understanding the importance of social, business and environmental needs in the human context.

To enable graduates to gain employment in organizations and establish themselves as professionals by applying their technical skills to solve real world problems and meet the diversified needs of industry, academia and research.



To adapt to emerging technologies and develop innovative solutions for existing and newer problems.

To create and apply appropriate techniques IT tools to complex engineering activities with an understanding of the limitations.

To manage complex IT projects with consideration of the human, financial, ethical and environmental factors.

## **Program Outcome (PO**

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Modern tool usage: Create, select, and apply appropriate techniques, resources,& modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### How To Utilize Chat GPT TO Improve Your Coding Skills?



#### How to utilize Chat-GPT to improve coding Skills:

To utilize Chat-GPT to improve coding skills you can follow these steps:

#### 1. Ask conceptual questions:

If you are unclear about a programming concept or language feature, you can ask Chat-GPT to explain it to you in a simplified manner. For example, you could ask about object-oriented programming, recursion, or the usage of specific libraries.

#### 2. Seek code examples:

Request code examples for specific tasks or algorithms you want to learn or understand better. Ask for examples of how to implement certain functionalities or solve common coding problems.



#### 3. Discuss best practices:

Ask Chat-GPT about coding best practices, design patterns, or efficient algorithms. This can help you improve your code structure and optimize your solutions.

#### 3. Discuss best practices:

Ask Chat-GPT about coding best practices, design patterns, or efficient algorithms. This can help you improve your code structure and optimize your solutions.

#### 4. Request code reviews:

Share your code with Chat-GPT and ask for feedback. It can help you identify potential issues, improve code readability, and learn alternative approaches.

#### 6. Solve coding exercises:

Ask Chat-GPT to provide you with coding exercises or challenges. Work through them and compare your solutions with the suggestions provided. This will help you practice problem-solving and learn new techniques.

#### 7. Explore new technologies:

Inquire about emerging technologies, frameworks, or libraries that you're interested in. Chat-GPT can provide you with information on their usage, advantages, and implementation details.

#### 8. Debugging assistance:

If you're encountering a bug or an error, describe the issue to Chat-GPT and ask for suggestions on how to approach debugging. Chat-GPT might provide insights or ask clarifying questions to help you identify the problem.



# Use of AI on Mars: Artificial Intelligence



(15240; CSIT)

### **Uses of AI on Mars**

Here are some potential uses of AI on Mars:

**1.Data Processing and Analysis:** AI can assist in processing and analyzing the enormous volumes of data collected from various instruments on Mars missions. This includes data from spectrometers, cameras, and other scientific instruments, helping researchers gain insights into Martian geology, climate, and atmosphere.

**2.Dust Storm Prediction**: Mars is known for its frequent dust storms. AI models can help predict and analyze these storms, providing valuable information for mission planning and ensuring the safety of robotic explorers.

**3.Resource Utilization**: AI can help efficiently use resources on Mars, such as energy, water, and materials. This is crucial for long-term human missions, where sustainability and self-sufficiency are key considerations.

**4.Robotics for In-Situ Resource Utilization (ISRU):** AI can enhance the capabilities of robotic systems involved in extracting and processing local resources on Mars, supporting potential efforts for producing fuel, oxygen, or other essentials for future manned missions.

**5.Autonomous Rovers**: AI can enable Martian rovers to navigate autonomously, avoiding obstacles and selecting the most efficient paths to reach their destinations. This involves perception, path planning, and decision-making algorithms.

**6.Image Analysis and Object Recognition**: AI algorithms can analyze images captured by rovers to identify interesting geological features, potential hazards, or signs of past or present life. This includes techniques like object recognition, classification, and anomaly detection.

**7.Mission Planning and Scheduling**: AI can assist in generating optimized mission plans and schedules, considering various constraints such as energy availability, communication windows, and scientific objectives.

**8.Resource Management**: AI can help manage resources efficiently, such as energy, water, and supplies, by predicting consumption patterns, optimizing usage, and identifying opportunities for recycling or replenishment.

**9. Communication Optimization:** AI algorithms can optimize communication between Earth and Mars by predicting network conditions, prioritizing data transmission, and adjusting protocols for efficient data exchange.

**10. Robotic Manipulation and Sample Collection:** AI can improve the accuracy and efficiency of robotic arms for sample collection, analysis, and manipulation tasks, enabling precise operations even in challenging environments.

**11. Environmental Monitoring and Control:** AI systems can monitor environmental conditions inside habitats or spacecraft, regulating temperature, humidity, air quality, and other parameters to ensure the well-being of crew members and equipment.



**12. Predictive Maintenance:** AI can analyze telemetry data from Mars-based equipment to predict potential failures or maintenance needs, enabling proactive maintenance activities and minimizing downtime.

**13. Scientific Data Analysis:** AI techniques such as machine learning can analyze large volumes of scientific data collected from Mars missions, helping scientists discover patterns, correlations, and insights that may not be immediately apparent.

**14. Crew Support and Assistance:** AI-powered virtual assistants can support human crews on Mars, assisting with tasks, providing information, and offering companionship during long-duration missions.

# **Ethical Hacking**



Nitin Adhikari Adhikari (15242; CSIT)

#### What is Ethical Hacking?

When we talk about Ethical Hacking, it is explicitly implied that we are talking about hacking that is based on ethical or moral values, without any ill intent. Ethical Hacking is defined as any form of hacking that is authorized by the owner of the target system.

#### **Types of Ethical Hacking**

#### Web Application hacking

Web hacking is the process of exploiting software over HTTP by exploiting the software's visual Chrome browser, meddling with the URI, or colluding with HTTP aspects not stored in the URI.



#### **System Hacking**

Hacktivists gain access to personal computers over a network through system hacking. Password busting, privilege escalation, malicious software construction, and packet sniffing are the defensive measures that IT security experts can use to combat these threats.

#### Web Server Hacking

An application software database server generates web information in real-time. So attackers use Gluing, ping deluge, port scan, sniffing attacks, and social engineering techniques to grab credentials, passcodes, and company information from the web application.

#### Hacking Wireless networks

Because wireless networks use radio waves to transmit, a hacker can easily squirt the system from either a location nearby. To discover the Identifier and bodge a wireless network, often these assailants use network snorting.

#### Social Engineering

The art of manipulating the masses so that they divulge sensitive information is known as social engineering. Eugenics is used by criminals since it is generally easier to attack your organic hard time trusting than it is to figure out how to spoof your device.

Check out our Ethical Hacking Course in India now to learn about the concepts involved in the domain!

#### **Types of Hackers**

A hacker is a person who solves a technical issue by using a computer, networking, or even other abilities. Anyone who uses their skills to gain access to a system or network in application to break laws is referred to as a hacker.

#### 1. White Hat Hackers

On the dark web, these are the right people who come to our aid. White hat hackers, also known as ethical hackers, are cybersecurity experts who assist the government and businesses by performing penetration testing and identifying security flaws. Ethical hackers use a variety of techniques to protect themselves from black hat hackers and other cybercriminals. They break into our system with the good intention of finding vulnerabilities and assisting you in removing viruses and malware.

#### 2. Black Hat Hackers

These days, black hat hackers are the main perpetrators of cybercrime. The majority of the time, the agenda of a black hat hacker is monetary. These hackers look for flaws in individual computers in businesses and banking systems.

#### 3. Grey Hat Hackers

Grey Hat Hackers fall in between white and black hat hackers. Grey hat hackers may not use their skills for personal gain, they can however have both good and bad intentions. For instance, a hacker who hacks into an organization and finds some vulnerability may leak it over the internet or inform the organization about it. Nevertheless, as soon as hackers use their hacking skills for personal gain they become black hat hackers.

#### **Phases of Ethical Hacking**

There are multiple phases involved in any elaborate hacking process. Let's go through them one by one.

#### Reconnaissance

Before executing any hack, you need to gather some preliminary information about the target system. This information could be about the people or organizations associated with the target, details about the host system, or the target network.

#### Scanning

Most of the time, hacking is done through network access. Most of our devices, whether in an organization or at home, are connected to a network. The common form of this network is Wi-Fi or WLAN. In offices, ethernet connections are also laid down to ensure maximum efficiency.

#### **Gaining Access**

The two aforementioned steps complete the information gathering phase. Now, based on that information, you need to start your hack. This step involves breaking into the target system by cracking the password or bypassing the security m



#### Maintainir

After gaining access, you need to ensure that once you are done with your first session, you are able to retain access to the target system. This is done through a backdoor.

#### **Clearing tracks**

After finishing up with the attack or hack, it is important to remove the traces of your incursion. This step involves removing any backdoors, executables, or logs that may lead to the attack being traced back to you or found out in the first place.

## **R Programming Language -Introduction**



The R Language stands out as a powerful tool in the modern era of statistical computing and data analysis. Widely embraced by statisticians, data scientists, and researchers, the R Language offers an extensive suite of packages and libraries tailored for data manipulation, statistical modeling, and visualization. In this article, we explore the features, benefits, and applications of the R Programming Language, shedding light on why it has become an indispensable asset for data-driven professionals across various industries.

R programming language is an implementation of the S programming language. It also combines with lexical scoping semantics inspired by Scheme. Moreover, the project was conceived in 1992, with an initial version released in 1995 and a stable beta version in 2000. What is R Programming Language?

R programming is a leading tool for machine learning, statistics, and data analysis, allowing for the easy creation of objects, functions, and packages. Designed by Ross Ihaka and Robert Gentleman at the University of Auckland and developed by the R Development Core Team, R Language is platform-independent and open-source, making it accessible for use across all operating systems without licensing costs. Beyond its capabilities as a statistical package, R integrates with other languages like C and C++, facilitating interaction with various data sources and statistical tools. With a growing community of users and high demand in the Data Science job market, R is one of the most sought-after programming languages today. Originating as an implementation of the S programming language with influences from Scheme, R has evolved since its conception in 1992, with its first stable beta version released in 2000.

#### Why Use R Language?

The R Language is a powerful tool widely used for data analysis, statistical computing, and machine learning. Here are several reasons why professionals across various fields prefer R:

#### **1. Comprehensive Statistical Analysis:**

•R language is specifically designed for statistical analysis and provides a vast array of statistical techniques and tests, making it ideal for data-driven research.

#### 2. Extensive Packages and Libraries:

The R Language boasts a rich ecosystem of packages and libraries that extend its capabilities, allowing users to perform advanced data manipulation, visualization, and machine learning tasks with ease.

#### 3. Strong Data Visualization Capabilities:

•R language excels in data visualization, offering powerful tools like ggplot2 and plotly, which enable the creation of detailed and aesthetically pleasing graphs and plots.

#### 4. Open Source and Free:

•As an open-source language, R is free to use, which makes it accessible to everyone, from individual researchers to large organizations, without the need for costly licenses.

#### **5. Platform Independence:**

The R Language is platform-independent, meaning it can run on various operating systems, including Windows, macOS, and Linux, providing flexibility in development environments.

#### 6. Integration with Other Languages:

•R can easily integrate with other programming languages such as C, C++, Python, and Java, allowing for seamless interaction with different data sources and statistical packages.

#### 7. Growing Community and Support:

•R language has a large and active community of users and developers who contribute to its continuous improvement and provide extensive support through forums, mailing lists, and online resources.

#### 8. High Demand in Data Science:

•R is one of the most requested programming languages in the Data Science job market, making it a valuable skill for professionals looking to advance their careers in this field.