

# Techonology Informatica

Volume 2, Issue 2 Dec., 2021

A Technical Newsletter by Techno India NJR Institute of Technology, Udaipur

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# Vision

Empowering student with recent and emerging technologies to create innovative technical leaders capable of contributing to industrial and societal needs for betterment of mankind across the globe.

# Mission

To provide avenues and opportunities to faculty for domain specific trainings and qualification upgradation.

# Articles

# The Evolution of Online Marketplaces: Transforming the E-Commerce Landscape

In the fast-paced digital age, online marketplaces have emerged as dynamic platforms that connect buyers and sellers, reshaping the way we engage in commerce. These virtual marketplaces provide a space for various vendors to present their products and services to a global audience, fostering competition, innovation, and convenience. In this article, we delve into the fascinating world of online market places, exploring their significance, mechanics, and impact on the e-commerce domain.

### The Power of Online Marketplaces:

# Machine Learning in the Diagnosis of Alzheimer's Disease

Machine Learning (ML) plays a crucial role in the diagnosis of Alzheimer's Disease (AD) by analyzing various data sources to assist in early detection and accurate assessment. Here are some keyways ML is used in AD diagnosis:



- > Medical Imaging Analysis: ML algorithms can analyze brain images, such as MRI and PET scans, to detect subtle changes in brain structure and function associated with AD. These algorithms can identify biomarkers and patterns indicative of the disease.
- > Cognitive Assessment: ML can process cognitive assessment data, such as neuropsychological test results and speech patterns, to detect early signs of cognitive decline and assess the severity of AD.
- > Genomic and Proteomic Data: ML models can analyze genetic and protein data to identify potential risk factors and biomarkers associated with AD susceptibility and progression.
- > Predictive Modeling: ML algorithms can predict an individual's risk of developing AD based on their demographic, genetic, and lifestyle factors, helping with early intervention and personalized care
- > Natural Language Processing (NLP): NLP techniques can analyze written or spoken language, such as medical records or patient interviews, to identify linguistic markers of cognitive decline and assist in diagnosis.
- > Clinical Decision Support: ML systems can aid healthcare professionals by providing decision support tools that combine multiple data sources to make accurate and timely diagnoses.
- > Monitoring Disease Progression: ML models can track changes in AD patients' condition over time, helping clinicians adjust treatment plans and assess the effectiveness of interventions.
- > Drug Discovery: ML is used in drug discovery to identify potential therapeutic targets and screen compounds for their efficacy in treating AD.
- > Data Fusion: ML can integrate data from multiple sources, such as imaging, genetics, and clinical records, to provide a comprehensive view of a patient's condition and risk factors.
- **Early Detection:** ML models can assist in the early detection of AD, potentially before clinical symptoms become apparent, enabling early intervention and better outcomes
- > Patient Stratification: ML can classify patients into different subgroups based on disease progression and response to treatment, allowing for more personalized and effective care plans.

ML in AD diagnosis is an evolving field that holds promise for improving early detection, understanding disease mechanisms, and developing more targeted interventions for individuals at risk or already affected by Alzheimer's Disease

Apart from natural calamities, rapid industrialization has also contributed towards degradation of the environment. The problem of air, water and soil pollution is increasing continuously due to rapid urbanization, increasing population, and unplanned industrialization. The air and water pollution is responsible for increasing respiratory diseases, cancer, stomach ailments, acid rain, global warming etc. Hence, to protect the environment it is important to detect and locate the source of all pollutions.

Application of wireless sensor network (WSN) technology can help to detect and locate various parameters related to pollution of the environment in precise manner. The components of WSN include: monitor, sensors/actuators, controller, memory, communication device and power supply. Sensor nodes collects the data related to environment and send the same to the base station using transmit and receive unit.

The server then process the raw data store them and then provide meaningful information related to environment. By using WSN the environment can be protected from wildfire, natural reserves can be protected from unauthorized access and illegal destruction of trees. Petroleum companies use WSN for monitoring oil exploration, transportation and spilling of oil due to accidents. Wireless sensor networks also plays a vital role in the field of agriculture as continuous monitoring of agriculture fields is the growing need of farmers. This helps farmers to take timely action to save crops from different types of damages.

## The Role of Programming in Problem-Solving: Beyond the Name

But can a single universal compiler be created to translate any high-level language? The answer is no, and here's why. High-level programming languages are incredibly diverse, each with its own syntax, semantics, and features. Attempting to create a universal compiler would require it to be incredibly complex, burdened with the rules and nuances of countless languages. This would make the compiler unwieldy and challenging to maintain. In conclusion, the course "Programming for Problem Solving" underscores the significance of programming as a potent tool for automation and addressing complex challenges. While programming isn't the solution to every problem, learning it equips us with the skills to tackle a wide array of tasks and empowers us to leverage technology for efficient solutions. The intermediary role of compilers is essential for facilitating communication between our human readable instructions and the machine's binary language. However, the diversity of high-level languages makes a universal compiler an unfeasible endeavor. Hence, learning programming remains a valuable asset for those seeking to embrace the power of automation and systematic problem-solving

# **Outrigger Systems in High-Rise Buildings**

In the world of modern architecture and construction, high-rise buildings are becoming increasingly common. These towering structures are not only marvels of engineering but also serve as symbols of progress and innovation. One key element that plays a crucial role in ensuring the stability and safety of these skyscrapers is the outrigger system.

Mr. Akhilesh Deep Arya (Asst. Prof., CSE)

# **Role of Wireless Sensor Networks in Environment Monitoring**

The effect of global warming is increasing continuously in the world thereby generating different types of adverse effects on the environment. Adverse effect on the environment is leading to increased natural calamities such as: cyclone, tsunami, drought and flood etc. Availability of reliable monitoring and warning systems should be able to minimize the effect of these natural calamities. Wireless sensor network technology may play a very important role to fulfil all these needs. Latest research on wireless sensor networks shows that sensors of the WSN may be operate for long time due to use of non-conventional energy sources viz. solar cell, wind energy etc.



### Mr. Hitesh Sen (Asst. Professor, ECE)

The phrase "Programming for Problem Solving" might lead one to believe that programming is the ultimate solution for every problem. However, this assumption falls short when considering the diverse nature of challenges that we encounter in our lives. While programming is indeed a powerful tool, not all problems necessitate its application. Let's explore the nuanced relationship between problem-solving, programming, and the rationale behind learning programming.

Consider situations like deciding which car to buy or how to lock a door. These problems exist in a domain that doesn't inherently require automation or computerized solutions. In such cases, human judgment and actions suffice. This showcases that certain problems can be effectively solved without delving into the realm of programming.

So, why should we learn programming if it's not a universal solution? The answer lies in recognizing that programming shines when it comes to automating tasks and solving complex problems that involve large datasets, intricate calculations, and repetitive operations. Programming empowers us to instruct machines to execute tasks accurately and efficiently, often faster than human intervention. It bridges the gap between human insight and machine execution. However, communicating with machines isn't as straightforward as having a direct conversation. Machines understand binary language, which is far from human-friendly. This is where high-level programming languages come into play. These languages, akin to English, are more intuitive for humans to understand and write. But how do we translate these human-readable instructions to something a machine can execute? Enter the compiler, an intermediate software that translates high-level language into low-level binary code that machines comprehend.

### - Dr. Rimpy Bishnoi (Prof., CSE)

Outrigger systems are structural elements employed in high-rise buildings to enhance their stability and structural integrity. They are designed to counteract the lateral forces such as wind and seismic loads that can exert tremendous pressure on tall structures. These systems are particularly important in regions prone to earthquakes and strong winds.

The primary components of an outrigger system include outrigger beams, belts, and diagonal braces. Outrigger beams are horizontal structures that connect the core of the building to exterior columns. Belts, on the other hand, are vertical elements that connect the exterior columns to the core. Diagonal braces are inclined members that provide additional support.

One of the main advantages of outrigger systems is their ability to distribute the lateral forces evenly throughout the building. By connecting the core and exterior columns, these systems effectively transfer the loads, preventing excessive swaying and deformation during extreme conditions. This results in improved occupant comfort and safety.

Moreover, outrigger systems can also enhance the overall stiffness of the building, reducing the need for excessive reinforcement and making it more cost-effective. They allow for the construction of taller and more slender structures, which can be aesthetically pleasing and economically viable.

In conclusion, outrigger systems play a vital role in the construction of high-rise buildings. They provide stability, safety, and efficiency, allowing architects and engineers to push the boundaries of what is possible in modern skyscraper design. As our cities continue to grow vertically, outrigger systems will remain a critical component in ensuring the structural integrity and longevity of these iconic landmarks.

Mr. Jitendra Choubisa (Asst. Prof., CE)

# Understanding the NarrowBand IoT (NB-IoT)

Modern tech brings the world closer daily. In five decades, we've moved from ARPANET to 5G, with exponential growth in recent years. What began as node-to-node data exchange is now a global device network via the internet, including phones, e-readers, home systems, and smart bulbs. Unified via IoT tech, ordinary objects now share data through embedded sensors and software over networks, mostly the internet. Predicted: 38.6 billion IoT devices by 2025, needing a strong network. Enter NB-IoT.



### What is NB-IoT technology?

Narrowband IoT or NB-IoT, or LTE-M2, is a new wireless technology that does not conform to the standard and licensed LTE construct. It is an LPWAN (Low Power Wide Area Network) technology that operates independently in unused 200-kHz bands previously used in Global System for Mobile Communications networks known as GSM.

### Why NB-loT?

NarrowBand IoT allows multiple devices to send data even without standard mobile network coverage. The licensed frequency spectrum it uses does not interfere with other devices, facilitating more reliable data transfer. As a standards-based LPWAN technology, it can cover large areas while consuming a smaller amount of energy.

NB-IoT is supported by all key mobile equipment, module, and chipset manufacturers. It can concur with 2G, 3G, and 4G mobile networks. It has a simple infrastructure that permits faster and easier implementation. NarrowBand-IoT can also leverage the security and privacy features of mobile networks.

> Secure and Reliable – Using a licensed spectrum means greater reliability for users and guaranteed resource allocation for managed Quality of Service (QoS). It also means less interference and reliable transmissions. The underlying technology is simple to design, develop, and deploy. It offers security and privacy features similar to LTE mobile networks and supports user identity confidentiality, data integrity, entity authentication, and mobile equipment identification. > Wider Deployment and Global Reach – NarrowBand-IoT has lower bit rates than LTE-M1, can directly connect sensors to the base station and does not need a gateway to provide connectivity. This makes it an excellent option for broader deployment at low costs. NB-IoT is also able to function deep underground and in enclosed spaces. The usage of a mobile wireless network enables it to offer better scalability.

Solutions powered by NB-IoT are applicable in various scenarios and industries. In situations requiring automatic meter reading, NB-IoT offers a better solution than most other protocols and technologies. Its ability to transfer large amounts of data, especially in inaccessible areas, makes it the best fit for underground modules. NB-IoT use cases include:

### **NB IoT Benefits**

> Power efficient and Cost-Effective – NarrowBand-IoT consumes a small amount of energy while covering a large area, connecting up to 50000 devices per NB-IoT network cell. This improves the power consumption of user devices and makes the overall system cost effective. The low power consumption enables battery life of more than ten years

### NarrowBand IoT Applications and Use Cases

- Smart metering (electricity, gas, and water meter)
- > Smart buildings with intruder and fire alarms for residential and commercial properties
- > Personal appliances connected to measure health parameters
- Tracking people, animals, or objects
- Smart city infrastructure, for instance, smart parking, streetlights, or dustbins
- Connected industrial appliances.

### **Barriers to NB-IoT**

- The data rate is low compared to LTE cat-MI
- > NB-IoT is considered ideal for idle devices.
- > No support for VoLTE (Voice Over LTE) for speech transmission means no voice transmission.
- Roaming, though expected soon, is not supported yet.
- > With LTE support finding favour with carriers, deployment could be a problem.
- Increased initial costs.

- Mr. Yogendra Singh Solanki (Asst. Prof., ECE)

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