

AI Enabled Local Employment Platform For Informal Workers Using Voice-Based Accessibility

Abhay Purohit*, Dr. Manju Mathur**, Suhani Mathur***, Mayank Aitan***

*Assistant Professor, Department of CSE, Global Institute of Technology, Jaipur

**Associate Professor, Department of CSE, Global Institute of Technology, Jaipur

***B.Tech Student, Department of IT, Global Institute of Technology, Jaipur

ABSTRACT

The COVID-19 pandemic demonstrated some severe gaps in access to employment of informal and blue-collar workers, especially in the rural and semi-urban regions. Massive population shift, loss of employment, and unstable sources of income were some of the indicators of the inexistence of a formal system to help connect people to the immediate employment opportunities available in their immediate areas. This paper is a proposal of an AI-driven local job board that would help to reduce the job market disparity between job seekers and job conglomerates by matching jobs locally and ensuring an inclusive communication system. The platform will employ advanced technologies to match a worker with the best job opportunities, e.g. based on skills, availability, and proximity, utilizing advanced technologies such as AI-based matching algorithms, geolocation data and government datasets (e.g., MGNREGA). To solve the problem of digital inequality, the system implements voice communication, which involves making automated phone calls, to make it accessible to workers who do not have access to smartphones or the Internet. The platform will also seek to streamline the process of hiring on the part of the employers through the reduction of manual coordination efforts and also faster deployment of work forces. Through incorporation of financial inclusion strategies like bank accounts linkage and formal employment in the form of formal agreements, the system supports transparency, trust, and employment security. In general, the suggested solution will help to decrease migration rates and increase the employment rates in the local area, as well as develop a more resilient and inclusive labor ecosystem. It illustrates how innovation driven by technology can solve the centuries of inefficiencies in informal labor markets and make the systems accessible to the underserved population.

Keywords — Artificial Intelligence, Informal Workers, Hyper local Employment, Voice-Based Systems, MGNREGA, Digital Inclusion, Labor Market, Job Matching System.

I. INTRODUCTION

Informal labor sector constitutes a large amount of labor force in the developing economies, especially in such countries as India, where millions of the workers have their income as daily wages. These workers such as construction laborers, farmers and other blue-collar workers tend to experience instability owing to intermittent employment opportunities, absence of job security as well as accessibility to correct output of the available work. This became even more serious in the time of the COVID-19 pandemic, as it resulted in a significant number of job losses and a massive flight of workers out of cities to their home countries. This emphasized the lack of a well organized and effective mechanism to link workers with job opportunities in their respective areas of residence.

Disconnection between workers and the employers is one of the most significant issues in the present labor

market. Contrary to the situation with labor shortages in the industries, particularly in construction, and agriculture, there are a lot of workers who are not employed or underemployed because they are not aware of the nearby employment opportunities. This imbalance leads to inefficiencies, heightened migration, and economic pressure on both workers and local people. Moreover, the recruitment process is in most cases manual and time consuming since an

employer has to make a personal call to a worker and this makes operations complicated.

The digital divide is also another important problem. Most of the informal workers lack access to smartphones, internet connectivity, and digital literacy to access the already existing job platforms. Consequently, they do not access the digital job realms, which further restricts them. Also, the lack of official communication, payment, and contracting systems

predisposes the exploitation and wage delays, which diminishes confidence between workers and employers.

A solution to these challenges is the increasing need to have an efficient yet inclusive solution that is technology-driven. The gap between the workers and employers can be narrowed by utilizing the future of artificial intelligence, data analytics and voice-based systems of communication. Such solutions can decrease the necessity of migration, enhance the accessibility of employment opportunities, and establish a more stable and robust labor market due to the hyper-local employment matching.

This study examines the creation of an AI-based system that would improve employment opportunities in the local areas among informal workers. The suggested solution would help to increase job access and optimize the process of hiring workers and make work more inclusive to people with lower access to digital technologies, thus making the labor ecosystem more equal and efficient in general.

II. BACKGROUND AND CURRENT GAPS

The digital transformation of the informal labor market is a trend that has been on the rise with platforms trying to establish digital connections between workers and employers. However, the majority of solutions that exist do not provide a holistic solution to the issues of accessibility, efficiency, and inclusivity, especially to workers who are located in rural and semi-urban areas. Even though digital labor platforms have enhanced job discovery, they are highly dependent on user engagement, digital literacy, and manual coordination and as such, limit their effectiveness to significant groups of the labor force.

A. Competitor Analysis

A number of platforms and systems are currently aimed at reducing the employment issues within the informal sector, but each of them has its unique shortcomings:

Digital Labour Chowk (DLC):

Digital Labour Chowk is a site that has been created to connect the informal workers with employers in various industries, especially in the construction industry. Its goals are to enhance the visibility of the job, provide fair wages transparency, and promote accessibility of the workers in digital formats. However, the platform is geographically vast and hyper local job matching is not a priority; this means that

workers have to travel long distances. Moreover, the DLC is characterized by the excessive reliance on manual information input and online access, which requires worker registration and their active interaction with the platform, which can be an obstacle to people with a low level of digital literacy or without access to a smartphone. Lack of automated communication channels also enhances use of manual communication between employers and workers.

Other Job Portals and Gig Platforms: Most other platforms require active use of internet, registration, and job search which make them inappropriate to low-literacy or rural workers.



Fig. 1: Visualization of Neuralink

Government Systems (e.g., MGNREGA): Other government programs like MGNREGA offer good worker information but do not integrate in real-time with the private employment opportunities.

B. Gap Covered by the SMUS System

Absence of Hyper-local Job Matching: Most of the available platforms such as Digital Labour Chowk are based on large geographic locations and not on proximate opportunities. This will force the workers to go over long distances and thus increases the costs and reduces the sustainability of employment.

Digital Exclusion of Workers: The existing systems are currently heavily reliant on smartphones, internet access, and digital literacy. These types of dependencies marginalise a significant proportion of the informal workers especially those who are found in rural and semi-urban areas.

Relying on Manual Data entry: The users are required to create a record and provide their information manually a task which is time consuming and may not work well with people with lower level of literacy. The obtained statistics are often incomplete and erroneous.

Ineffective Communication Processes: Employers have to contact workers manually, explain details of the job, and align availability schedules. This strategy makes labor more intensive, the hiring period is longer

and the efficiency of work will be reduced.

Lack of harnessing Government Data: Strong datasets, including those based on MGNREGA are not effectively implemented in existing systems, limiting the opportunity of effective and extensive matching employment.

Formal Structure and Security Lack: The absence of formal contract and safe payment system breeds job insecurity, wage delay, and mistrust among the workers and employers.

III. SYSTEM ARCHITECTURE AND IMPLEMENTATION

The proposed system is an AI-based, hyper-local employment system that is designed to match informal workers with proximate employment opportunities in an efficient, inclusive and scalable way. The architecture integrates several layers, including front-end interfaces, back-end processing, AI/ML, communication systems, and data management, to make the workforce and employers communicated in a smooth manner.

A. Overall System Architecture

This system is based on multi-layered architecture which has four major layers:

- User Interface Layer (Frontend)
- Application Layer (Backend Services)
- AI/ML Processing Layer
- Data and Communication Layer

All the layers are architecturally defined to perform particular duties and ensure seamless flow of information and responsiveness in real-time across the platform.



Fig. 2: Visualization of the Neural Interfaces

B. User Interface Layer (Frontend): This is the interface that the workers and employers will interact with as the front end. It is also meant to be easy, user-friendly, and available especially to those who are not as digitally literate.

• **Mobile/Web Interface:** It is built on technologies like Flutter or React.js, thus making it affordable in terms of cross-platform accessibility.

• **Simplified User Experience:** The interface has few input requirements, the usage of icons, and the use of local languages to enhance the interface.

• **Voice-Based Interaction:** Since not all workers have smartphones, the system will be made available to them using automated voice calls and this will make it inclusive.

• **Employer Dashboard:** Employers will be able to post job requirement, see filtered workers and confirm hiring with minimum effort.

This layer will ensure that despite the relative lack of technological exposure, users can utilize the system successfully.

C. Application Layer (Backend Services): The backend layer is the processing unit of the system and handles requests by the user, data processing, and communication between the components.

• **Server Framework:** Node.js or Express.js created to handle APIs and logic of the system.

• **Job Management Module:** Deals with the posting of jobs, updates and tracking of the status of jobs.

• **User Management Module:** Stores worker and employer information, skills, location and availability.

• **Matching Engine Integration:** The matching engine relates services in the back-end with AI models to give

real-time job suggestions.

• **Notification System:** Sends notifications through SMS, application notifications, and voice.

Such a layer guarantees effective integration of frontend inputs and AI-based outputs.



Fig. 3 : Visualization of the Memory Re-experiencing Methods

D. AI/ML Processing Layer

The AI/ML layer is the heart of the innovation of the system as it makes intelligent decision-making and automation possible.

- **AI Matching Algorithm:** Pairs workers to jobs according to various criteria which include:
 - Location proximity
 - Skill set
 - Availability
 - Employer requirements
- **Geospatial Analysis:** Using location data to create hyper-local spots of jobs ensures that workers are paired with local chances.
- **Predictive Analytics:** Patterns are required in analyses to predict labor needs in a particular area hence enhancing workforce distribution.
- **Data Optimization:** Handles large amounts of data, particularly those of government, e.g. MGNREGA, to automate and optimize accuracy.

This layer significantly reduces the time and effort involved in job matching besides increasing system efficiency.

E. Data Layer:

It is the role of the data layer to ensure that all system data are stored, managed and retrieved in a secure and efficient manner.

- **Database Systems:** Stores in Firestore or MongoDB:
 - o Worker profiles
 - o Employer data
 - o Job listings
 - o Communication logs

- **Government Data Integration:** Uses data sets like the MGNREGA to provide quality data about the workers and as such eliminates the need to enter data manually.
- **Real-Time Data Processing:** Makes sure any change in the job availability or status of the worker is immediately reflected throughout the platform.
 - **Data Security:** Adopts encryption and safe storage measures to protect confidential user data.

F. Communication and Accessibility Layer

A key feature of the system is its focus on inclusivity through advanced communication mechanisms.

- **Robotic Voice Calls:** Workers(workers) are informed of the job specifications including job location, payment, and working hours through automated calls, which makes the system user-friendly to non-smartphone users.
- **SMS Notifications:** Provides text-based updates for users with basic mobile phones.
- **Interactive Voice Response (IVR):** Allows workers to accept employment opportunities with the aid of keypad, which enables them to communicate with each other.
- **Multilingual Support:** Assures regional language communication as a means of improved understanding and application.

This layer will ensure that no employee will be left out on technological reasons.

G. Implementation Workflow

The following workflow is applied by the system:

- **Data Collection:** The government databases and minimum input by the user amass worker data, and job requirements are posted by employers.
- **Data Processing:** The backend uses this information and sends it to the AI engine.
 - **AI-Based Matching:** The system finds the right workers depending on the proximity, skills, and availability.
 - **Notification Delivery:** Matched workers get job notification through app notifications, SMS or voice calls.
 - **Worker Response:** Workers will be able to accept or reject job offers with the help of simple inputs (app or IVR).
 - **Employer Confirmation:** Employers are assured and complete the hiring process without having to coordinate manually.

Such a workflow will guarantee a fast, automated, and efficient

hiring process.

G. Scalability and Performance

The system will be scalable and flexible:

- **Cloud Infrastructure:** Resorts to platforms like Google Cloud or AWS to process massive data and traffic of users.
- **Serverless Architecture:** AWS Lambda services or Google Cloud Functions can be used to facilitate the optimal use of resources.
- **Modular Design:** Individual components can be scaled or updated on their own without any impact on the system as a whole.

This architecture guarantees that the platform will be able to support more and more users or data volumes as time goes by.

G. Security and Reliability

In order to achieve trust and reliability; the system will have:

- Safe Authentication Systems.
- Encrypted Data Storage and Communication
- Consistency in System monitoring and updates.

In addition, the banking system integration will ensure that there are safe and transparent payments to workers.

J. Summary

The suggested system architecture is a combination of AI, cloud computing, and voice-based technologies to create an all embracing employment platform. The system also tackles the major issues that are inherent in the informal labor market by merging smart job matching, inclusive communications as well as reputable source of data. It is a well-developed solution to increase employment accessibility and efficiency because it is scalable, modular to meet future needs, and make it more efficient.

IV FEATURES & FUNCTIONALITY

It is proposed to combat the major inefficiencies of the informal labour market with the offered AI-based local employment portal incorporating smart technologies, omnipresent communication protocols, and efficient recruitment. The platform takes the focus on the intensification of accessibility, decreasing the delays in the hiring process, and providing better coordination of the workers and employers. The distinguishing features and capabilities of the system are outlined below.

A. Intelligent Hyper-local Job Matching

One of the key aspects of the platform includes giving hyper local job matching based on AI algorithms. This system unlike the traditional job platforms which cover large geographical

areas focuses on proximity hence matching workers with jobs found within their respective locations.

The matching engine considers a number of factors, including the skills, availability and geographical distance to produce optimised results. The strategy reduces unjustified commuting, decreases expenditure incurred by workers and increases job security. The platform also helps in mitigating the effect of migration and strengthening local economies by facilitating the employment of workers in their respective communities.

Moreover, the AI system is constantly being improved with the process of learning data, thus guaranteeing an increase in accuracy in the subsequent matches. The smart matching significantly boosts productivity as compared to the manual hiring processes.

B. Inclusive Communication and Accessibility

One of the most important aspects of the platform is its promise to inclusiveness, especially to those workers that do not have access to a smartphone or to the internet. To fail this, the system will include several channels of communication:

- Job information by automated voice calls.
- SMS messages to simple mobile users.
- Smartphone-user mobile-app notifications.

Voice based system will mean that even those workers who may be poorly digital literate can have a comprehensive grasp of the job information. It provides information like job location, salaries and time in regional languages hence increasing the reach of the system.

It also supports Interactive Voice Response (IVR) in the platform so that workers can reply using simple keypad input (e.g. accept or reject job offers). This will remove the need of complicated online interaction as well as ensure maximum participation.

C. Automated Hiring and Workflow Efficiency:

The platform has significant efficiency in the hiring process because the whole process of hiring is automated. The procedure is intended to reduce the human factor and limit the time wastage:

1. Employers post job requirements.

2. The system processes the data and identifies suitable workers.

3. Workers receive job notifications instantly. 4. Workers respond through voice, SMS, or app. 5. Employers receive confirmations and finalize hiring.

Such automation eliminates the need to call and arrange a number of workers manually by the employer, which would be a serious constraint of current systems. It also saves on time of hiring and ensures that there are fast deployment of workforce. The use of real time updates keeps the workers and the employers informed throughout the process. This simplified process promotes efficiency and reduces the complexity in operations.

D. Data Integration and Smart Resource Utilization

The platform makes use of organized data collections, especially those provided by the government, which include MGNREGA to enhance efficiency and prevent the use of manual data entry. Using already existing and tested data, the system guarantees:

- Faster onboarding of workers
- Higher data accuracy
- Reduced burden on users

Besides government information, the site combines employer and employee inputs to update its database constantly. This helps in making better decisions and enhancing the same results in the long term. Data analytics are also included in the system to determine trends, including labour demand, availability of workers, and gaps in employment in a region which could be useful in planning and assigning resources to employers, policymakers, and organisations.

E. Security, Financial Inclusion, and Reliability

The platform combines features to support security, transparency, and financial inclusion in order to achieve trust and long-term adoption.

- Data Handling: Data of users is secured through encryption and controlled access.
- Fixed Employment: The system facilitates the clear agreement between workers and employers hence minimizing conflicts.
- Digital Payments: The connection with bank systems will guarantee safe and timely payment of wages.

This idea reduces the reliance on cash payment by encouraging formal financial mechanisms and creates greater transparency, which is something that is

especially important in low-skill workers who often experience the issue of delayed or unfair payments.

Furthermore, the platform provides the reliability of the cloud based infrastructure that will allow it to scale and maintain its performance despite the increase in the number of users and the amount of data.

Conclusion of Features

To conclude, the platform combines AI-based intelligence, inclusive communication, and automated workflows to create an all-encompassing ecosystem of employment. Its ability to deal with technological and social issues makes it very appropriate in informal labour markets. The system also enhances job matching besides making the overall experience of the workers and the employers much better by focusing on accessibility, automation and making decisions based on data.

V. ETHICAL, PRIVACY, AND SECURITY CHALLENGES

The adoption of a platform with AI-based employment features also presents various ethical, privacy, and security dilemmas, which can be explained by specific features of the labour data and the use of automated decision-making methods. All of these issues need to be addressed in order to build trust, be fair, and achieve the long-term sustainability of the platform.

A. Data Privacy and Confidentiality:

One of the main issues is the protection of personal data obtained on the workers and employers. The platform uses very sensitive information, such as identity details, geolocation, employment history, and government-related records including the ones related to the MGNREGA programme. Without authorization or due to misuse, these data may lead to breach of privacy and abuse.

Mitigation involves the establishment of strict data-protection measures that involve encryption, secure data structures and controlled access controls. Also, users should be asked to provide their consent before any personal information is gathered or used, and there should be no secrets about the use of the data as they will keep users trustful.

B. Ethical Use of AI and Bias in Decision-Making:

Jobs matching with the help of AI increases the chances of algorithmic discrimination. In case training data is either incomplete or artificially skewed, the system might end up favoring some demographic groups above the rest, thus betraying fair job distribution.

To ensure fairness it is required to:

- Regular monitoring of AI outputs
- Use of diverse and representative datasets
- Transparent decision-making processes

The system must be specially designed in such a way that it encourages equal opportunity and it should prevent

discrimination of variables like location, gender or socio economic status.

C. Security Risks and Cyber Threats

Being a digital platform where large amounts of information are processed, the system becomes vulnerable to cybersecurity threats, such as data breaches, hacking, and unauthorized access. These are threats to the integrity of information of users and systems.

To address these risks, the platform should add:

- Intense authentication procedures.

- End-to-end encryption
- Regular security audits and updates

A robust security framework is essential to ensure system reliability and protect users from potential cyber risks.

C. Knowledgeable Consent and User Cognisance

Numerous users, especially informal workers, can have little awareness of digital systems and data-policy practices and it becomes a challenge to efficient informed consent. The platform must:

- Provide clear and precise explanations of the use of data.
- Have all communications in local languages.
- Be sure that users have a good understanding of their rights and decisions.

Such precautions are particularly important in the context of voice communications, in which consent procedures need clear communication and record keeping.

D. Openness, Responsibility, and Trust

Development of trust amongst users involves ensuring that there is openness and accountability in operation of the systems. The workers and employers need to be given clear information on the processes of job matches, processing of payments, and settlement of disputes.

The platform must, in this regard, include:

- Literary policies and guidelines.
- Well-established grievances- redressal measures.
- Responsibility measures in case of mistakes or disagreement.

Increased transparency will also improve the trust of the users, as well as encourage responsible use of technology.

Conclusion of Challenges

Even though the platform has the enormous potential to enhance the employment accessibility, the mitigation of the identified ethical, privacy, and security concerns is an inevitable step toward its success. Through establishing strong data-protection policies, ensuring justice in AI systems, and

transparency, the platform will be able to provide a safe, reliable, and inclusive digital economy to informal workers.

VI. REAL-WORLD APPLICATIONS AND FUTURE VISION

The suggested AI-based local job platform has significant potential in regard to real-world application, particularly in emerging markets that are characterised by informal labour markets. The system can achieve substantial social and economic outcomes by addressing the main challenges, including the lack of job opportunities, digital inequality, and unproductive recruiting procedures. This part outlines the real life uses of the platform and its future expansion path.

A. Real-World Applications

The platform can be successfully implemented in various sectors that strongly depend on informal labour.

Construction Industry:

The construction industry is regularly faced with the challenge of labour shortage even though there are workers available. The platform allows the contractors to quickly find and recruit local labourers, hence limiting delay in projects and improving efficiency in the workforce.

Farmers always need labour on a seasonal basis but in most cases, they find it difficult to get workers in time. Through the system, farmers will be able to relate to local labourers and this will guarantee that they will gain access to the labourers when the harvesting season is about to start and reduce the reliance on migrant labourers.

Small and Medium Enterprises (SMEs): Sanctioned Medium and Small enterprises (SMEs): The platform can also be used by local businesses including workshops, factories, and service providers in search of workers either on short-term or long-term basis without necessarily having to undergo the laborious recruitment process.

Government and Public Sector Use:

Linkage with schemes like MGNREGA would allow governments to streamline the available databases of workers and enhance the distribution of employment. It is also helpful in policy planning as it provides real time labour information.

Disaster and Crisis Management: In the event of an emergency, such as a pandemic or a natural disaster, the platform will be able to create temporary jobs

locally, which will decrease the rate of migration and stabilize employment.

B. Social and Economic Impact

The platform has the potential of developing a strong positive impact on society and the economy.

- **Alleviation of Migration:** The local workers will be able to obtain a job in the country and thus the need to move to urban centres will reduce.
- **Better Livelihoods:** Long time access to the labor market makes workers and their families financially stable. Employment of Informal Workers: Organized employment opportunities increase confidence and bargaining power. Enhancing Local Economies: Local hiring drives community economic growth.

The platform leads to inclusive growth and reduces labour market inequalities by increasing both the level of employment accessibility.

C. Scalability and Regional Expansion

The system is designed in such a way that it is very scalable and flexible in different regions.

- It is able to make local to state and national transition.
- Cloud-based infrastructure is useful in managing large user bases and datasets.
- The platform can be tailored to different industries as well as geographical requirements.

This scalability gives a guarantee of not limiting the

solution to a specific area but rather can be implemented on a large scale.

D. Future Technological Enhancements

The platform may be further enhanced with the help of the introduction of sophisticated technologies:

- **Premium AI Models:** Greater workforce and labour demand projections.
- **Multilingual AI Assistants:** More conversational and natural voice communication.
- **GPS and integration of navigation:** Live navigation guide to workers.
- **Blockchain of Contracts and Payments:** Safe and clear agreements and payments.

Such developments can make the platform smarter, safer and easier to use.

E. Future Vision

The vision of the platform in the long-term is developing a comprehensive, inclusive digital job market. The goal is to close the gap between informal workers and formal systems of

employment and make sure that everyone can (or cannot) access it, regardless of their digital literacy.

The platform may eventually become a national job marketplace in the future, connecting millions of workers to on demand jobs. It could also be used as a decision support system to governments and organisations to offer them an insight on labour trends and economic patterns. The vision eventually will be to make the informal labour market more organised, transparent and efficient- a place whereby workers can have steady access to opportunities and that employers can easily access suitable talent. With the help of AI and its embracing technologies, the platform hopes to come up with a sustainable resolution to the current problem, as well as future demands of the workforce.

VII. CONCLUSION

This study develops an AI-supported local labor market to overcome major issues experienced by informal workers such as job awareness, digital disparity, and ineffective recruitment strategies. Although extant solutions exist, including Digital Labour Chowk, are semi-supportive, they are neither inclusive nor automated and have a weak emphasis on hyper-local employment.

The suggested system uses the power of artificial intelligence, voice communication, and structured data

sources to create a more efficient and accessible job ecosystem. The platform reduces internal migration and leads to the finding of employment opportunities in the local communities by allowing hyper-local job matching. Its voice capabilities ensure that even those who do not have access to smartphones or the internet are able to participate.

Besides, automation of hiring process reduces the amount of manual work done by employers and hence increases temporal efficiency and speed of operation. Linkage to authoritative datasets, e.g. MGNREGA, enhances the accuracy and scalability of the data.

On the whole, the system depicts the way in which technology can convert informal labor markets by

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making them more accessible, efficient and transparent. It offers a scalable and encompassing solution that helps to support workers, employers, and as a result help to stabilize economies and empower workers.

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