FINAL SYNOPSIS

1. **Project Group ID:** G10
2. **Title of the Project:** On demand labour for agriculture
3. **Domain:** Agriculture, Web Technology, Big Data, Analytics
4. **Team Members:**

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5. Abstract:

The On Demand Labour Platform for Agriculture is a technology driven solution designed to address the fluctuating labour needs of the agricultural sector. Agriculture is highly dependent on labour intensive processes that vary seasonally, making it difficult for farm owners to maintain a consistent workforce. This platform allows farm owners to post job opportunities for tasks such as planting, harvesting, irrigation, and maintenance. Workers, on the other hand, can browse through available job listings, apply for suitable positions, and receive real time notifications for new opportunities.

The platform offers key features such as a mobile friendly interface, real time labour matching, and secure payment gateways. It reduces the time and effort required for farm owners to find labour while offering workers flexible, temporary employment opportunities based on their availability. The platform also ensures accountability by incorporating ratings and feedback for both workers and employers. With the increasing challenges of labour shortages and changing agricultural demands, this system is poised to revolutionize labour sourcing in agriculture, offering a more dynamic, reliable, and efficient alternative to traditional hiring methods.

Keywords: Seasonal Labour demand, Agricultural Workforce, Job Scheduling, Remote Worker allocation.

6. **Problem Definition:** To develop a scalable and secure on demand labor platform that connects Farmers with skilled workers in real time.

7. List of modules/ functionalities:

1. User Management

- **User Registration/Login:** Allow users (farmers and labourers) to create accounts using email, phone numbers, or social media logins.
- **Profile Management:** Users can manage their personal details, contact information, skills (for labourers), and field requirements (for farmers).
- **Role based Access:** Different access levels for farmers, labourers, and admin users.

2. Labour Farmer Matching

- **Job Posting:** Farmers can post available tasks or jobs, specifying the type of work, duration, location, and payment.
- **Labourer Availability:** labourers can set their availability, location preferences, and the type of work they can perform (e.g., harvesting, irrigation, sowing).

3. Location & Map Integration

- **Geo location Services:** Farmers and labourers can use GPS to pinpoint job locations and get directions.
- **Distance Calculation:** Automatically calculate the distance between the farm and the labourer's current location to suggest nearby opportunities.
- **Route Optimization:** For larger farms, optimize the path or route for labourers to reach work sites.

4. Job Scheduling & Notifications

- **Job Calendar:** A calendar for farmers to view their scheduled and completed jobs, and for labourers to view their assigned work.
- **Real time Notifications:** SMS, push notifications, or email alerts to inform users of new job postings, job confirmations, reminders, and updates.
- **Reminder System:** Automatic reminders for upcoming tasks or job deadlines.

5. Payment Management

- **Payment Gateway Integration:** Integration with payment providers (Stripe, PayPal, or local gateways) for seamless payment transactions.
- **Invoicing:** Automated generation of invoices after job completion for transparency and record keeping.

6. Job Tracking & Management:

- **Live Job Status:** labourers can update job status (e.g., pending, in progress, completed), and farmers can view the progress of ongoing tasks.
- **Time Tracking:** Track the amount of time labourers spend on a job to facilitate accurate payment.

- **Job Feedback & Rating:** Both farmers and labourers can leave feedback or rate each other after the completion of the job.

7. Communication Tools:

- **In app Messaging:** Allow farmers and labourers to communicate directly through in app chat or messaging.
- **Voice/Video Call Integration (optional):** For direct communication on complex job tasks.
- **Support & Queries:** Helpdesk or FAQ section for users to ask questions or request assistance from customer support.

8. Review & Rating System:

- **Labourer Reviews:** Farmers can review and rate labourers based on work quality, punctuality, and reliability.
- **Farmer Reviews:** labourers can review farmers based on payment fairness, work conditions, and clarity of instructions.

9.Admin Module:

- **User Management:** The admin can manage user profiles, verify users, and resolve disputes.
- **Job Oversight:** Admins can monitor job postings, view job statistics, and intervene if necessary.
- **Revenue Tracking:** View platform earnings from commissions or fees charged to users.

10. Multilingual Support

- **Language Selection:** Provide support for multiple languages based on the region or country to enhance accessibility.

8. Scope of the project:

1. **AI and Automation Integration**: Explore the integration of AI driven tools and automation in matching labor demand with the workforce, using real time data for optimized scheduling and resource allocation.
2. **Blockchain for Transparency**: Implement blockchain technology to enhance transparency and trust between labor providers, farmers, and regulatory authorities, ensuring fair wages and contractual obligations.
3. **Data Analytics for Forecasting Demand**: Use big data analytics and machine learning to predict labor demand trends, allowing farmers to anticipate labor shortages or surpluses based on weather patterns, crop cycles, and market conditions.
4. **Mobile Accessibility and Expansion**: Expand the platform's reach by developing user friendly mobile applications tailored for rural farmers and labourers with low digital literacy, enhancing accessibility.
5. **Sustainability and Green Labor Practices**: Focus on labor practices that promote sustainability in agriculture, offering environmentally conscious labor solutions like organic farming or conservation based labor methods.
6. **Global and Cross Regional Expansion**: Expand the platform to cover more regions and countries, addressing international labor shortages and offering solutions for migrant farmworkers across borders.
7. **Skill Development and Certification**: Develop a system for on demand labourers to acquire certifications or training, empowering them with new skills to meet evolving agricultural needs and access higher paying jobs.
8. **IoT Integration for Smart Farming**: Incorporate Internet of Things (IoT) technologies to create a network of connected farms and labor systems, where real time sensor data informs labor needs and optimizes farm management.
9. **Labor Rights and Policy Advocacy**: Collaborate with governmental and non governmental organizations to improve labor laws, protect worker rights, and advocate for fair labor conditions within the agricultural sector.
10. **Labor Pool Diversity**: Broaden the labor pool by focusing on underrepresented groups, including women and refugees, to offer inclusive and diverse workforce solutions for the agricultural industry

9. Literature survey:

Publisher	Author(s)	Year	Name of Publisher	Objective	Methodology	Limitations
The Pharma Innovation Journal	P Vaishnavi and G Manisankar	2022	Labour Scarcity in Agriculture : A Review	To review the extent and reasons for labor scarcity in agriculture.	Literature review on agricultural labor scarcity.	Focuses on secondary data, lacks primary data or field based research.
IJRDO	Dr. K. CHINNAM NAIDU	2019	Legal Regulation of Agricultural Labour in India: A Critical Study	To analyze legal frameworks governing agricultural labor in India.	Critical analysis of legal regulations and their impacts on labourers.	Limited geographic scope, lacks coverage of informal labor scenarios.
Current Agriculture Research Journal	M. Satishkumar and K. B. Umesh	2018	Farmers' Strategies to Cope with Labour Shortage in Northern and Southern Dry Zones of Karnataka, India	To examine farmers' strategies to cope with labor shortages in Karnataka.	Field surveys and interviews with farmers in Karnataka's dry zones.	Geographically limited to Karnataka, lacks cross regional comparison.
International Journal of Agriculture	Sarda Prasad	2014	MGNREGA: A Strategy to Overcome Labour	To evaluate MGNREGA's role in addressing labor	Analysis of government reports and case studies on	Focuses on government policy, lacks insights into private sector strategies.

			Shortage in Agriculture	shortages in agriculture.	MGNREGA.	
Agricultural Economics Research	Ashwani K. Sharma and Brahm Prakash	2011	Causes and Consequences of Supply Demand Gap for Labour in Sugarcane in India	To identify causes and effects of labor gaps in the sugarcane sector.	Field surveys and data analysis on labor demand in sugarcane production.	Narrow focus on the sugarcane industry, limited to a single crop sector.
Agricultural Economics Research	S.H. Baba, M.H. Wani, F.A. Shaheen, Bilal A. Zargar, S.S. Kubrevi	2011	Scarcity of Agricultural Labour in Cold Arid Ladakh	To study labor scarcity issues in Ladakh's cold arid agricultural regions.	Field based research in cold arid environments.	Regional specificity, not generalizable to other climates or regions.
Aguirre et al.	Verónica Aguirre, Rodrigo Echeverría, Clara Olmedo, Gustavo Blanco	2013	Farmer Strategies to Face Labor Shortages in Chilean Agriculture	To investigate how Chilean farmers respond to labor shortages in agriculture.	Case studies and field observations in Chile's agricultural regions.	Regional focus on Chile, lacks broader Latin American context.
Agricultural Economics Research	M. Selva Maheshwari and L.S. Gangwar	2011	Impact of Rural Development Scheme on Availability of Agricultural Labour	To analyze the impact of rural development schemes on labor availability.	Survey based research on rural development programs and labor markets.	Limited by its focus on specific rural schemes, without a national overview.

Agricultural Economics Review	A. Subramanian, V. Ramanathan	2015	Role of Migration in Addressing Labour Shortage in Agriculture	To explore how migration helps alleviate labor shortages in agriculture.	Quantitative analysis using migration data and farm productivity trends.	Limited to specific migratory patterns, lacks focus on internal displacement.
Journal of Development Studies	R. K. Sharma and P. Mehta	2017	The Role of Technology in Mitigating Agricultural Labour Scarcity	To assess the impact of technological interventions on labor scarcity.	Case studies and survey data from farms using technological innovations.	Focuses on technology heavy solutions, excludes small scale or traditional farms.

10. Project Requirements

Hardware Requirements

1. Smartphones (User Devices)

- Purpose : Farmers and labourers will access the on demand labor platform primarily via mobile applications.
- Specification :
- Operating System : Android (v6.0 and above) and iOS (v12.0 and above).
- Processor : Smartphones should have a minimum of a quad core processor to ensure smooth running of the app without lag.
- RAM : At least 2 GB RAM for handling data synchronization and smooth user interaction with the app.
- Display : Minimum screen size of 5 inches for a comfortable user experience.
- Connectivity : 4G/5G and Wi Fi enabled for internet access.

2. Processor (Backend Infrastructure)

- Purpose : Servers that manage the backend processes such as matching farmers with labor, handling real time updates, and processing payments.
- Specification :
- Type : Multi core processors (e.g., Intel Xeon, AMD EPYC) for cloud infrastructure or physical servers.
- Minimum requirement : A quad core processor to handle multiple concurrent users.
- For cloud solutions : AWS, Google Cloud, or Azure can be used to provide scalable, managed processing power.

3. **Hard Drive (Storage)**

- Purpose : To store user data, transaction records, farm information, and app assets (like images, GPS data).
- Specification :
- For development: 500 GB SSD for fast read/write operations.

- For production: Minimum 1 TB SSD to store large amounts of real time data with low latency.
- For cloud storage: Services like Google Cloud Storage or AWS S3 for scalable storage solutions.

4. Memory (RAM)

- Purpose : For efficient processing of user requests, real time GPS data, laborer farmer matching, and database interactions.
- Specification :
- Development and testing: 8 GB RAM minimum.
- Production server: Minimum of 16 / 32 GB RAM to handle heavy traffic, data processing, and concurrent users.
- For mobile devices: Smartphones should have at least 2 GB RAM for seamless app functioning.

Software Requirements

1. Figma (App Development Framework)

- Purpose : To build the mobile app for both Android and iOS platforms using a single codebase.
- Why Figma ? :
- Cross platform : Figma allows you to develop apps for both Android and iOS simultaneously, saving time and effort.
- High performance : Uses Dart programming language, which compiles to native machine code, ensuring smooth performance even on lower end smartphones.
- Rich UI : Figma provides extensive UI components, ensuring a responsive and intuitive user experience.

2. Firebase (Backend Services)

- Purpose : Firebase provides cloud based backend services, including real time database, authentication, push notifications, and analytics.
- Features :

- Real time Database : Allows farmers and labourers to see updates (like job availability) in real time.
- Firebase Authentication : Handles user login (via email, phone, or social media) securely.
- Cloud Firestore : For scalable and efficient database management.
- Push Notifications : To notify labourers about new job postings and farmers about available workers.
- Analytics : Helps in tracking user behavior and optimizing app performance.

3. Stripe / PayPal (Payment Gateway)

- Purpose : To manage secure, real time transactions between farmers and labourers.
- Why Stripe/PayPal :
- Payment Processing : Secure and efficient payment gateways for handling payments, refunds, and managing transaction records.
- Multi currency support : Both platforms offer support for various currencies, making it easy for users from different regions to engage.
- APIs : Both Stripe and PayPal have easy to integrate APIs for mobile apps built with Flutter.

4. Google Maps APIs (Location Services)

- Purpose : To provide location based services like finding nearby labourers or farms.
- Why Google Maps API :
- Real time GPS tracking : Enables farmers to locate labourers in real time or labourers to find nearby farms based on distance.
- Geolocation Services : Allows for location based notifications, job matching, and service requests.
- Map Display : Shows accurate maps for easy navigation and proximity searches.

5. Operating System (Development and Deployment)

- Development :
- For developers, an OS like Windows 10, macOS 10.15 (or higher), or Linux (Ubuntu) is needed.
- Flutter : Works on all major operating systems (Windows, macOS, Linux).

- Deployment : The app will run on Android (v6.0 and above) and iOS (v12.0 and above) .
- Server OS: If using a physical server or cloud based Virtual Machine (VM), the backend can be deployed on Linux (Ubuntu, CentOS) for its stability and security.

6. Browser (Web based Admin Panel)

- Purpose: To provide a web based interface for administrators or farm owners to manage labor requests, payments, and user data.
- Requirement: Modern web browsers like Google Chrome, Mozilla Firefox, Microsoft Edge , or Safari for managing the platform's web based admin dashboard.
- Why Browser Based :
- Flexibility for administrators to access the system from any location.
- Cross platform compatibility ensuring usability on different operating systems.

Additional Considerations

1. Security:

Ensure encryption of sensitive data, especially payment and user authentication, using SSL and OAuth protocols.

Regular security patches for the backend infrastructure to prevent vulnerabilities.

2. Scalability:

As the platform grows, cloud based solutions (like Firebase or AWS) can easily scale to handle increased traffic and data storage needs.

3. Connectivity:

Since the platform will rely heavily on internet access (for real time matching, payments, and GPS tracking), consistent connectivity is a must. Offline functionalities for remote areas can be developed to handle intermittent internet access.

11. Expected Outcomes:

1. **Improved Labor Availability**: Farmers will have access to a reliable pool of on-demand labourers, especially during peak agricultural seasons, reducing labor shortages.
2. **Enhanced Agricultural Productivity**: By ensuring timely access to labor, farmers can increase productivity, leading to higher yields and more efficient farm operations.
3. **Optimized Resource Allocation**: The platform will enable farmers to request labourers as needed, optimizing labor costs and resource management, reducing wastage of time and money.
4. **Increased Employment Opportunities**: The project will provide flexible job opportunities for labourers, especially in rural areas, improving their access to work and income.
5. **Streamlined Payment Systems**: The integration of secure payment gateways (e.g., Stripe, PayPal) will make payment transactions faster, safer, and more transparent for both farmers and labourers.
6. **Better Labor-Farmer Matching**: The platform's algorithms, possibly supported by AI, will match labourers' skills and experience with the specific needs of farmers, ensuring efficient use of the workforce.
7. **Reduction in Migration for Labor**: With labor more accessible locally through the platform, rural populations may experience reduced migration to urban areas, retaining workers within the agricultural sector.
8. **Data-Driven Decision Making**: The platform can provide farmers with data on labor trends, costs, and seasonal needs, enabling better planning and management of labor requirements.
9. **Improved Rural Connectivity**: The use of mobile technology and location-based services (e.g., Google Maps) will increase the connectivity and collaboration between farmers and labourers across rural areas.
10. **Increased Economic Stability**: By addressing labor shortages, improving farm efficiency, and providing job opportunities, the project could contribute to greater economic stability in rural farming communities.