



Megh Mitr: A Mobile Application for Weather Based Crop Advisories under Meghdoot Scheme

Completion Report

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Submitted By:

Shiraz Imam

Managix Technology and
Management Services LLP

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Glossary

- Agile: It is a software development methodology
- CMS: It stands for content management system
- Ubuntu: Ubuntu is a linux based operating system
- MEAN Stack: Stands for MongoDB, ExpressJS, Angular and NodeJS
- API: It stands for Application Programming Interface, this helps in sending data to & fro the server and the mobile app
- Json: it is a type of file that contains data which is transferred between the server and the mobile app
- MVC: Models, Views and Controllers - A type of software framework

Chapter 1 - Introduction

Overview

Meghdoot is a unique initiative of the Department of Agriculture, Government of Bihar that aims to provide enhanced Early Warning and Weather based crop advisories to the farming community for better management of farming activities and building resilience to adverse impacts of climate change. This is being achieved by developing a dense network of Telemetry based weather and rain gauge stations in 3 pilot districts of Supaul, East Champaran, Nalanda, Gaya and Arwal.

This Agri Mobile Application has been developed under the meghdoot scheme to solve the problem of the farmers. This application binds the gap between an Agronomist and a Farmer. With the help of the server we receive Advisory for the farmers and their fields from Agronomists and we share these on the application with the Farmers. With the help of this application, the Farmers are able to take correct and appropriate measures for their crops.

Benefits

This application helps in providing weather forecasts related to the crops in the field. Depending upon the studies conducted by the Agronomist and their summarized result and directions for the Farmers, different sets of Advisories are sent over to the internal server which is then bifurcated and fed into the application for the benefit of the Farmers. The Application helps the Department in establishing two way communication with the farmers and helps the farmers in reducing climate risks through early warnings and forecast based actionable advisories on intercultural operations on their farms.

Background

- New UI And UX of the CMS portal
 - The advisory system and structure have changed to adapt to the new requirements of the mobile app and the CMS dashboard, because of which the UI and the features on the CMS dashboard have been revamped. Now the agromet scientist can create advisory of every block at the crop level and the farmer can filter the advisories based on the crop of their interest. Following are the UI screenshots and the accommodation of new features in the CMS dashboard.

- New Database structure of advisories to map the advisory with crop type, this is helping us in dissipating crop specific weather based advisory and helping the farmers in searching advisories for his or her crops
- Change in data entry system of advisory to accommodate the new database structure
- AI model to generate advisories automatically based on the weather forecast
 - AI systems work by **combining large sets of data with intelligent, iterative processing algorithms to learn from patterns and features in the data that they analyze**. Each time an AI system runs a round of data processing, it tests and measures its own performance and develops additional expertise.
- Push Notification system implemented at the API server
 - Push notifications are short messages that pop up on the user's mobile or desktop, nudging them to take some action. It is like a reminder to farmers to read the crop based advisory and take adequate actions in respect to the advisory

Objectives and Activities

Under one of the interventions of the Agriculture sector “Establishment of telemetric based hydro-meteorological early warning system”, a weather dashboard and an Mobile App has been developed to provide weather information to functionaries of agriculture department as well as farmers. As part of the data dissemination system and feedback mechanism, a Mobile App has been proposed. The mobile app will have the capability to provide information on forecasted weather to users.

The team was assigned to work with the ADPC team in Bihar to design and develop the mobile app for the Department of Agriculture for integration with the weather forecast Mobile App deployed at Indian Meteorological Department (IMD), India along with a content management system for publishing crop advisories for the farmers. The consultant will also be responsible for preparing documentation on the mobile app including its architecture, functionality and usage

Purpose of the mobile app

- The mobile app has been completely revamped to improve the user experience of using the app and to accommodate new features. The new advisory system is now segregated at the crop level and block level hence now the farmers can read and filter the advisories based on their crop of interest.

Input data of the mobile app:

The input data architecture of the mobile application includes the following components:

- Farmer registration – Name of the farmer, Location details (District, Block & Panchayat)
- Panchayat (Village) level weather forecasts using API from NWP models of Indian Meteorological Department for weather related early warning
- Content Management System dashboard developed for Agrometeorological scientists for publishing Block Level Crop advisories and Feedback Survey Questionnaire on the mobile app

Chapter 2 - Technical Specs and Details

Specification

- Operating System - Ubuntu 18x
- Languages used
 - NodeJS
 - ExpressJS
 - Angular
 - Mobile App: Ionic framework, Angular Native
- Database - MongoDB
- Editors for content creation – CK-Editor. (WYSIWYG)
- Data Parsing & Webservices – RESTFUL API using JSON.

Overview Diagrams

Below are the flow diagrams and architectural diagrams of the system

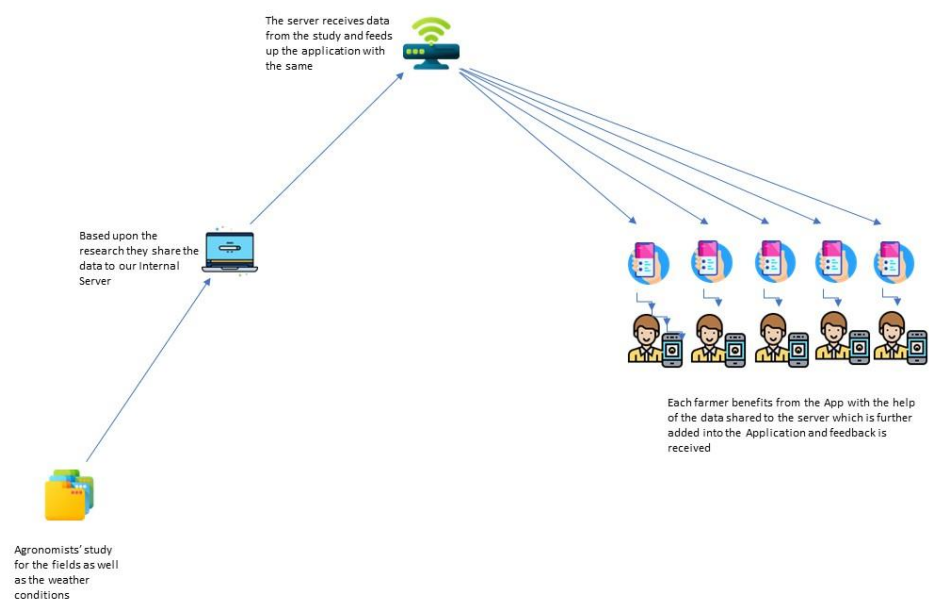


Fig1: Flow of the System - Here you can see the system distribution and the entities: cloud server, web portal for the department and agromet scientists, and mobile app for farmers

Building Blocks of the CMS web portal



Architectural Diagrams

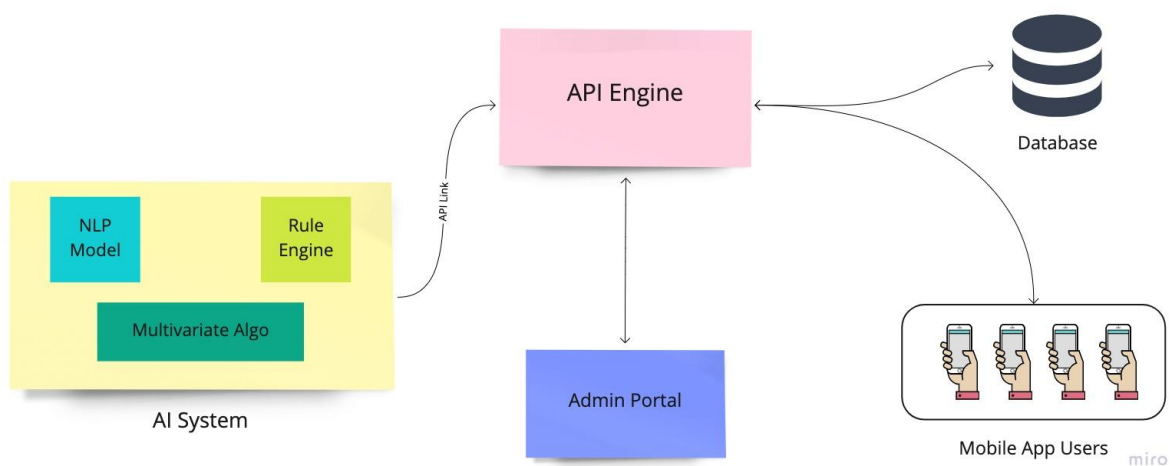


Fig2: Architectural Diagram of the system

User Flow Diagram (Mobile App)

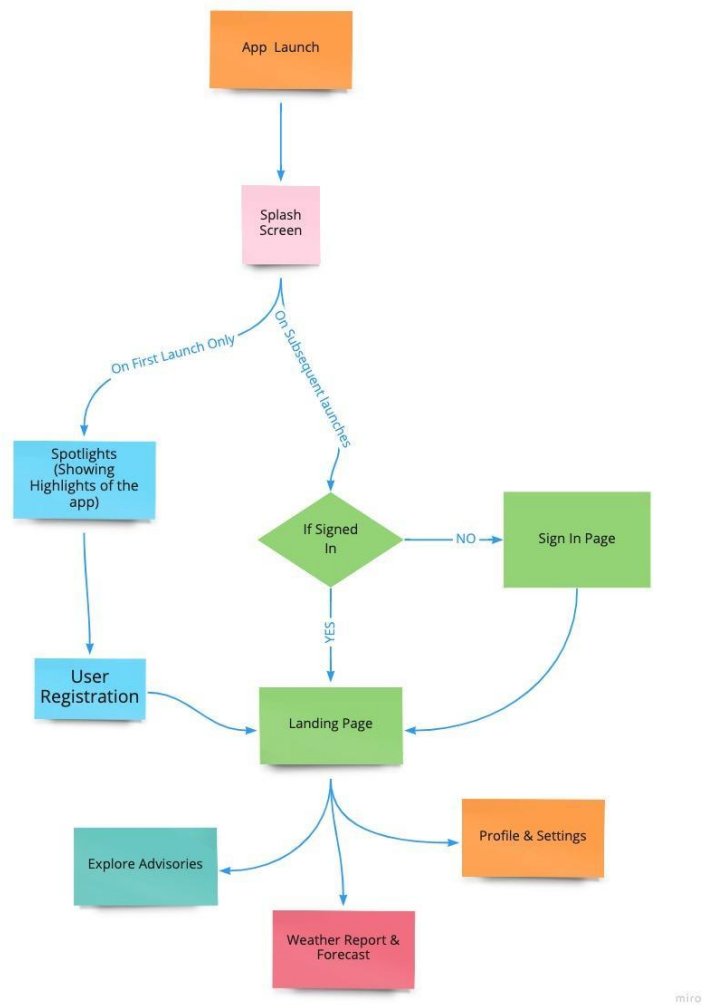


Fig3: Mobile App User Flow Diagram

Development Process

Agile (Scrum) development methodology was used in developing this project. The entire project was completed in 6 sprints of 2 weeks each. The development cycles involved writing codes, reviewing the codes, testing phases and delivery of the stories. Below is the sprint cycle of the development:

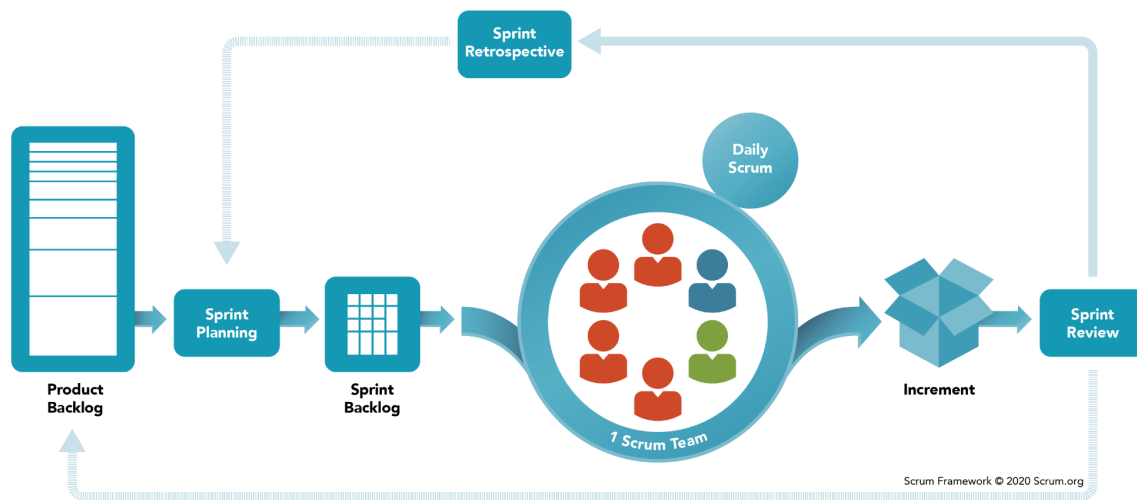


Fig7: Agile sprint diagram.

UI & UX Development Methodology:

Process

- 01 Learn. Gain knowledge of users, context, and technologies; gather user data, research knowledge portals, conduct survey and field studies.
- 02 Explore. Build user profiles on gathered data, produce materials that will aid the outlining of the project, site maps, content inventories, screen flows, navigation models, task flows, user journeys, and scenarios.
- 03 Select. Evaluate, test, and select wireframe concepts for prototype development.
- 04 Develop. Create design specifications and evolve concept/wireframes into a full design solution.
- 05 Refine. Evaluate design with stakeholders to obtain feedback and conduct usability testing.
- 06 Deliver. Complete design and produce deliverables.

Process Flow

Setting goals & Objectives for User Experience (UX) → Reference Analysis → Building Personas → Mind Maps → Creating Sitemaps → Sketches → Creating Wireframes → Creating Siteflows → Creating User Flows → High-Fidelity Designs and Guidelines → Delivering End Product

Tools Used

- Trello Board - This online tool is used to manage user stories and bugs to track development stages
- Github: A git repository for source codes
- Mantis: Project Management tool
- Miro: For mind mapping

Chapter 3 - Overview of the Admin CMS Panel

A CMS Portal is developed to help the Agriculture Department with a setup to feed in Weather Based Advisory for the Farmers and also provide them with Weather Forecast with the help IMD Server, and collect their feedback on the Advisory provided.

The CMS Portal consists:

- Dashboard to show overview of the system
- Advisory menu
- Feedback menu
- Farmer List as per Mobile App registration
- Admin User List

The Dashboard offers following features:

- Number of Advisory issued
- Number of Feedback form filled
- Number of Registered User
- Number of Admin User
- Metrics for the Farmer Registration and Feedback

Advisory Module:

Advisory module allows users to manage Advisory based on weather forecast. Agromet scientists can add new advisory and manage existing advisories in this module

Feedback Module:

Feedback module allows users to create feedback questions based on the advisories issued. The user can also view feedback reports and analytics based on the answers received.

Access Module:

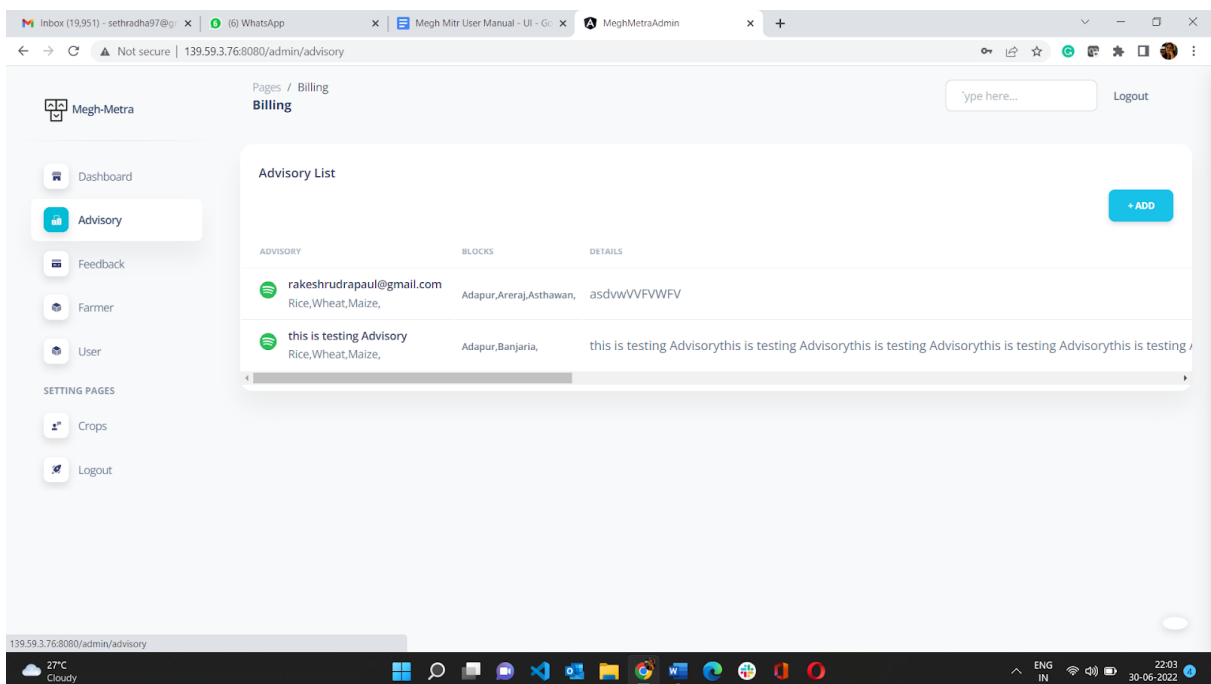
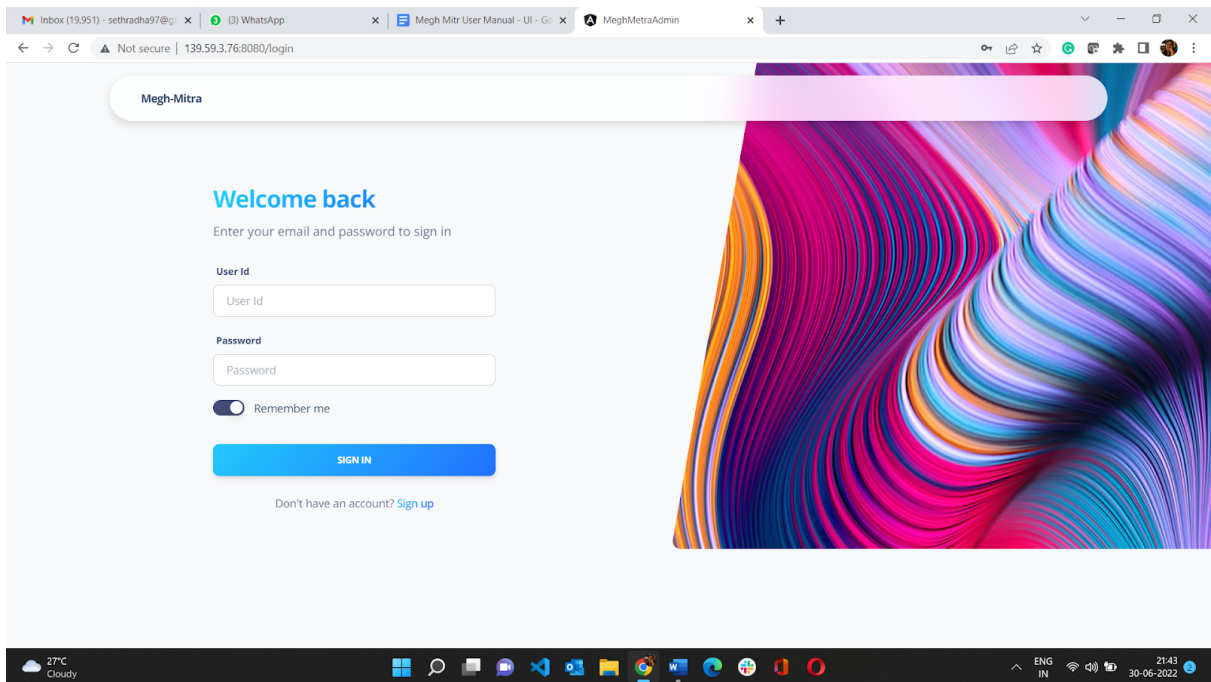
This module helps in managing the farmers registered on the mobile app and also to manage CMS portal users

AI Based Advisory Generation:

The new AI system has been introduced in the advisory system which generates advisory based on the guidelines and anomalies of the weather forecast.

In App Push Notifications:

The push notification is triggered when any alert is to be shown in the farmers location based on the weather forecast or any information is to be pushed on the mobile app.



Pages / Billing

Logout

type here...

Megh-Metra

Dashboard

Advisory

Feedback

Farmer

User

SETTING PAGES

Crops

Logout

Farmer List

FARMER	ADDRESS	CONTACT	LAND TYPE	Education
 Rakesh r paul Female / 34	East Champaran Adapur	9088817188		No
 rakesh rudrapaul Female / 45	Nalanda Adapur	6788813221		no
 Rakesh Male / 23	East Champaran Chauradano	6544890883		Gvj
 Rakesh r paul Male / 32	Nalanda Ben	8099912224		No
 Rakesh Rudra Male / 32	East Champaran Adapur	9077712334		dcvf
 rakesh /		9088817994		
 chandan Kumar पुरुष / 35	Supaul Supaul	8709122544	वर्षा आधारित	matric
 Rakesh Kumar Singh पुरुष / 44	East Champaran Paharpur	9472562782	सिंचाई आधारित	M.sc
 Naresh kumar Goit	Supaul	9061601609	सिंचाई आधारित	graduate

27°C Cloudy

21:44 30-06-2022

Pages / Billing

Logout

type here...

Megh-Metra

Dashboard

Advisory

Feedback

Farmer

User

SETTING PAGES

Crops

Logout

User List

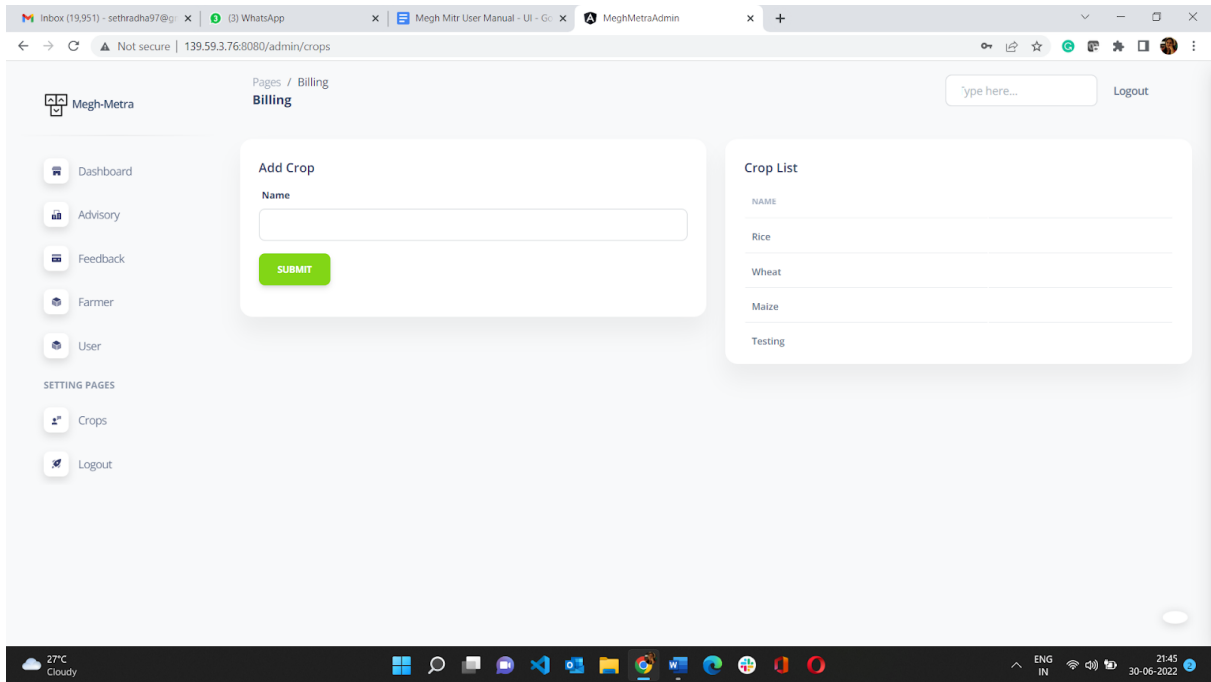
+ ADD USER

USER	CONTACT	TYPE	DISTRICT	STATUS	
 rakesh rudrapaul rakeshrudrapaul@gmail.com	9088817114	admin		ONLINE	Edit
 gfhgx CHGCGH	GHHVH			ONLINE	Edit
 gcbf hgchgchgc	09090099			ONLINE	Edit
 Rakesh rakeshrudrapaul@gmail.com	8766634520	Admin	East Champaran	ONLINE	Edit

139.59.3.76:8080/admin/user

27°C Cloudy

21:45 30-06-2022



Chapter 4 - Megh Mitr Mobile App

User Experience Enhanced

The megh mitr mobile app is an android app available on the Google play store. Users can download the app and register to access weather forecasts and advisories of their specific District, Block and Gram Panchayat.

Overview of the Mobile Application

The Mobile App is developed for the Farmers, which they can access with simple entry of their details like name, contact number, district, block, GP, personal details. The app gives them the feature to view weather forecasts, advisory based on the forecast, as well give their valuable feedback as per the advisory.

The Mobile App consists:

- User Registration Form: User Registration forms allows farmer to register as a verified user
- Weather Forecast as per location: Weather forecast helps farmer to understand weather conditions as per location and take measures accordingly
- Advisory based on the forecast: Advisory helps farmer to take appropriate measures and protect their fields
- Feedback form based on the Advisory: Feedback from the farmer is helpful for the department in understanding how the advisory is performing
- User Settings: User settings allow farmers to manage their profile

Enhanced UI UX of the Mobile App

The mobile app has been completely revamped to improve the user experience of using the app and to accommodate new features. The new advisory system is now segregated at the crop level and block level hence now the farmers can read and filter the advisories based on their crop of interest. Following are the screen mock-ups and the user flow.

