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AgroTech is a web-based app which helps farmers, owners and customers. This application provides assistance to users throughout the lifecycle of a crop i.e. from recommending a crop to monitoring it and from harvesting it to selling it. It will provide recommendation about optimal crops based on soil and climate data, monitoring crops periodically, detect diseases and pests and recommend pesticides and medicines, optimizing resource allocation, streamline harvest operations, facilitating access to market and pricing decisions. It will provide decision and recommendation support along with training for farmers to continuously improve to meet ever growing agricultural needs. By achieving these goals, our software aims to empower farmers, enhance productivity of crops and facilitate comprehensive market linkage for both farmers and customers. AgroTech is a web-based application. It revolutionizes agricultural practices by empowering farmers with advanced tools and data driven decision making capabilities along with streamlining soil and crop monitoring process, utilization of resources and market place availability. AgroTech includes crop recommendation, monitoring, and marketing. It uses artificial intelligence, machine learning, and image processing to provide efficient crop recommendations based on soil and climate data. The system facilitates crop health monitoring, disease detection, and pest prevention to optimize resource allocation and prevent yield loss. AgroTech includes four main users, Admin, Farmers, Sellers and Customers. Admin holds the highest level of authority and access and can easily add, remove and view anything at any time. Farmers can access the recommendation and monitoring functionalities along with option to buy and sell crops. Customers only have access to marketplace for buying agricultural products and reviewing them. They can also participate in bidding. However, they have to register for Seller profile to provide services. Sellers have access to marketplace to sell their products/services. They can bid their products. Moreover, they can view reviews and reports. FE-1: Sign-up (Select User Type (Ecommerce Admin, Farmer and customer)). FE-2: Sign-in. FE-3: Manage Profile (Edit, View, Deactivate Account, Change Password). FE-4: Recover

Account. FE-5: Social Sign-in (Gmail etc.). FE-1: Analyzes Nitrogen, Phosphorus. Potassium content in soil. FE-2: Analyzes previous soil record. FE-3: Farmers can give input according to specific needs to analyze the soil. FE-1: Analyzes seasonal weather. FE-2: Analyzes climate according to specific location. FE-3: Fetches weather report from API. FE-1: Using the reports of soil and climate analysis to recommend crops. FE-2: Provides different options according to budget. FE-3: provides pros and cons of different crops on that soil. FE-4: Provides tutorials for the methods for planting crops. FE-1: Provides assistance according to user queries. FE-2: Provides educational content, tutorials to help user learn about the system. FE-3: Provides facility of different channels like email and phone support. FE-1: Identify stresses in crops including water, nutrient and pest infestations stress etc. FE-2: Identify visual symptoms of diseases in crops and classify them against databases. FE-3: Provides information about crop health periodically using images for timely intervention to minimize damage. FE-1: Utilizes ML models on factors such as temperature, rainfall, soil moisture, and nutrient availability to estimate crop yield. FE-2: Provides accurate yield prediction for planning and resource allocation. FE-3: Assesses yield risk factors such as drought, disease outbreaks, and pest infestations, allowing farmers to implement risk mitigation measures. FE-1: Using image recognition (IR) to assess crop maturity and readiness for harvesting. FE-2: Determines optimal time for harvesting based on crop growth and maturity indicators. FE-3: Provides feedback to farmers on crop readiness to optimize harvest scheduling. FE-4: Assess the Quality of crops based on factors such as sugar content, starch levels, size, color, and overall visual appearance. FE-1: Provides a scheduling tool to plan and manage harvesting activities, specifying crop types, quantities and preferred dates. FE-2: Recommends tools and techniques for harvesting. FE-3: Provides an access of a catalog of harvesting equipment for rent and purchasing. FE-4: Provides detailed guidelines for proper handling of tools and freshly harvested crops, helping farmers maintain quality of crops. FE-1: Provides a facility of transportation to farmer directly from platform, specifying pickup and delivery locations. FE-2: Provides option of different recycle and biodegradable packaging material for sustainable transportation practices. FE-3: Provide shortest route to desired location for fuel efficient transportation, minimizing emissions and transportation costs. FE-4: Provides facility of logistic planning for scheduling time and routes to deliver. FE-5: Provides facility of different delivery options based on types and quantity of crops. FE-6: Provides facility of guide lining to farmer for packaging crops securely for better transportation. FE-1: Provides facility to reserve climate-controlled storage facilities through this platform. FE-2: Provides option to assess crop quality and assign grades providing buyers an accurate information. FE-3: Provides different training suggestions to improve farmer’s grading skills. FE-4: Provides guidelines for complete process of storage and handling techniques for each quality grade. FE-1: Provides facility to list item with their name, description, price, quality grade and image. FE-2: Provides facility to manage inventory, track orders through single dashboard. FE-3: Provides facility to perform digital marketing campaigns directly through platform. FE-4: Provides description of farming practices used to harvest these crops to highlight their eco- friendly processes. FE-5: Provides facility to customer to directly buy crops at listed prices. FE-6: Provides facility to customer to participate in bidding process. FE-7: Provides facility to farmers to manage inventory levels. FE-8: Provides secure online payment gateways. FE-1: System will provide comparative reports and analytics about user engagement (before and after using our tool). FE-2: System will provide reports containing various terms of webpage (visits, web pages visited at max etc.). FE-3: System will provide reports about sales and revenues. (total crop sale, total pesticides and fertilizers sale, total renting equipment). FE-4:

System will provide user with various filters for user to filter out required data. AgroTech will be developed using Procedural Programming Design Methodology. We will be using MERN stack and this approach aligns well with it. This methodology simplifies processes such as user management, recommendations and analysis by step-by-step execution. This method ensures that code is organized, making it easier to debug, maintain and integrate with middleware. Incremental Process Methodology will be used for AgroTech development due to its cost efficiency and flexibility. Milestones will be achieved in iterations and it is easy to change requirements. At each iteration, some functionality will be delivered. Furthermore, debugging and testing is done in every iteration improving the overall quality of the system. The AgroTech application’s frontend, developed using the React.js framework, will be hosted on Vercel, a cloud platform optimized for frontend frameworks and static site generation. Vercel ensures seamless deployment, optimized performance, and scalability, leveraging its Jamstack architecture. The current version of Vercel being utilized is 34.2.0, providing cutting-edge features for frontend deployment. For the backend services, we plan to utilize Heroku, Microsoft Azure, or Amazon Web Services (AWS), depending on the application's scalability, reliability, and infrastructure needs. This combination of Vercel for frontend hosting and one of these leading cloud platforms for backend services ensures a robust, scalable, and efficient deployment solution for the AgroTech application.