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Smart Agriculture on Computers and Handheld Devices

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ABSTRACT

Technology plays an important role in development, even though it seems that technology has modified certain aspects of it in areas where development is challenging. Telecom has been successfully implemented all over the world. In a developing country like Pakistan, technology can be found in even the most remote villages. Nowadays, a mobile tower can be seen anywhere, and many people use mobile phones. With the help of Information and Communication Technology, this beautiful use of technology has helped growth of almost every profession. Saving crops from diseases has become a major concern for policymakers in the twenty-first century. Countries are also working to increase yields in order to satisfy rising domestic demand and generate exportable surpluses. Farmers fertilize a variety of crops for food, fiber, and hay for their livestock. The available resources are limited and cannot be increased. Different diseases, such as black stem rust of wheat, orange or leaf rust of wheat, fungicides, and others, cause damage to wheat, cotton, maize, and millet, resulting in a marginal to 100% loss in production. All major food crops, such as wheat, cotton, maize, and millet, are continuously attacked by unique diseases, making it difficult to enforce policies or procedures that would improve per-hectare production. There are several apps available for agricultural guidance, but ours is interesting in that it is written in Sindhi, while other apps are written in English. Sindh has a large population, and the female literacy rate was 43% last year, compared to 47% the year before. In contrast to 2012-19, male education in Sindh has decreased from 72% to 67%. So, if a person does not understand the language, how can he be properly guided? That is why we have developed an app in Sindhi.

Key words : Computers, Crop Diseases, Handheld Device, ICT, Mobiles, Sindhi Language.

1. INTRODUCTION

Since FY10, progress has been made in stopping the spread of this disease over the last six years. Meanwhile, the federal Ministry of National Food Security and Research (MNFSR) and federal research commissions such as Suparco and PCSIR continue to help provincial efforts to recognize and fight crop diseases. Suparco's satellite imagery or graphical representational surveys of crops aid in generating early forecasting on overall weather effects on crops, including its potential impact on the spread of crops diseases, a senior official of Sindh Agriculture Department said. Farming has had a major international impact in a relatively short period of time. To survive, the farmer had to change his profession from farmer to businessman. The rapidity of this change caused issues, especially with the farmer's ability to gather and act on acceptable information to make informed decisions that affect the agribusiness's profitability. An App must be user friendly and accessible from several devices generally. Many applications do not have a user guide or manual. Our app can be accessed from both computers and mobile phones, and it will instruct users on how to protect crops from various diseases. They would be able to grow better crops if they are properly driven from the start.

2. LITERATURE REVIEW

It appears to be a dominant instrument from the time when computer technology was developed, based on the measurement and arrangement of records. Since information was being passed from one point to the next, communication structures were also maturing at the same time [1],[2],[3]. Two technologies collide here and there, resulting in the beginning of modern communication technology, which is commonly referred to as standard (IT) [4],[5]. Because of the explosion of emerging technologies that have changed the way production is coordinated [6],[7],[8], agriculture and pastoral growth are experiencing rapid and innovative changes [9]. Since the approach, modes, and operations found in IT change almost daily, there is no cosmically established communication technology definition here [10]. It happens so quickly that it's difficult to keep up with the transition. ICT is characterized as any brand that transmits or receives data electronically, stores, retrieves, or manipulates data digitally, such as computers, digital television, robots, email, and so on [10]. E-Agriculture is concerned with the development,

mapping, production, evaluation, and implementation of new approaches to the management of information and communication technologies (IT) in the agrarian sector [12],[13],[14],[19]. ICTs establish the agile burgeoning industries that dominate the macroeconomic significance of growth in many flourishing countries [11],[15],[16],[17],[24]. The lack of a sound high-tech framework on which Pakistan's current problems of complexity and scarcity can be based is one of the main causes of the country's current problems of complexity and scarcity. Actually, information and communication technology (ICT) are limited to countries' urban centers, but statistics indicate that about 70% of people in developing countries breathe in agrarian areas [13]. The signs of improving ICT for agricultural improvement and deficit reduction are increasingly becoming palpable, thanks to a relatively recent anomaly, the use of ICT in crop protection [10],[11]. Some common concerns about ICT acceptance in rural areas, such as a lack of ICT knowledge, a lack of admissible and sectarian content in their own languages, the difficult and costly convenience, and other issues, such as the alertness and eagerness of rural communities to approve new technologies, can be easily addressed using ICT [18],[20],[21]. Agriculture and agrarian areas are similar in that agriculture is affected by what disrupts rural development. Technology must be developed at the disposal of the agricultural zone for it to have a genuine effect in productive countries [22.

3. SMART AGRICULTURE SYSTEM

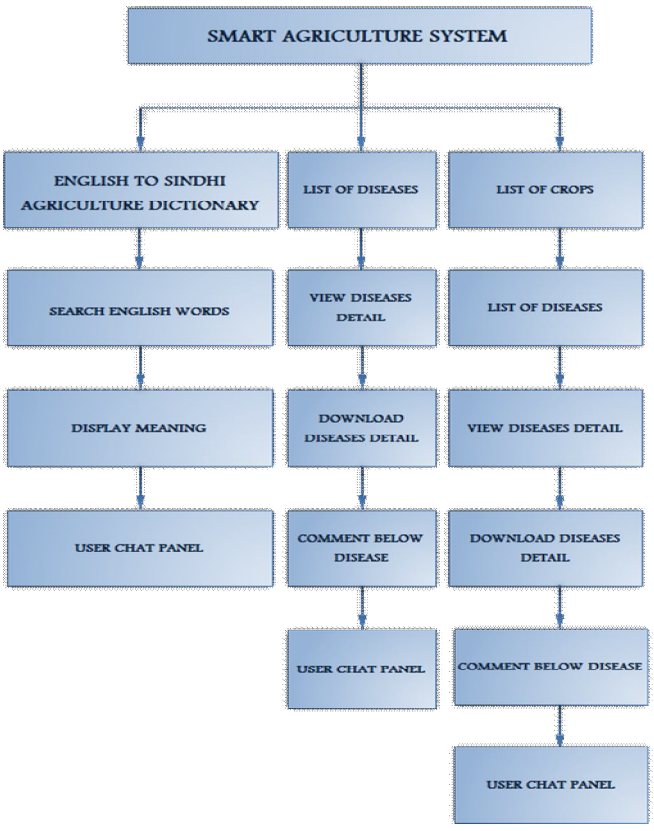

Figure 3.1: Smart Agriculture System

Smart agriculture system consists of numerous components (See Figure 3.1).

A variety of sometimes-challenged parameters fascinate the model of this system. Such parameters are:

3.1 Preservation: There are five types of user roles listed below that can access this web-based app.

3.1.1 Administrator: The most important administrator position of all user positions. If a user can add new posts to an administrator function, edit any posts generated on the system by another user and even remove posts from other users. He or she can also install and uninstall system plug-ins as well as themes. This user can add other users to this system, alter details about registered users plus their passwords, and remove any user (yes, other administrators as well).

3.1.2 Editor: Users with an editor position in this framework have complete control over the website's content pages. All posts on this system, including those written by others, can be added, modified, published, and removed by users. An editor-capable user can also moderate, edit, and remove comments.

Correctors cannot change this system setting, install plug-ins and new users adding.

3.1.3 Author: If an author is a user, he or she can write, edit, and publish his or her own posts and delete his or her own posts, even if they are written. He or she cannot create categories when an author writes articles, but they can select from categories already built in. They can add tags to their messages, though. And those awaiting review will see comments by writers, however they have the power to moderate, accept or remove comments. They are unable to control settings, plugins, or themes, so it is a moderately low-risk user position on a platform that omits their ability to remove their own posts after they have been written.

3.1.4 Contributor: hey can add fresh posts and edit their own posts, but they are unable to create any posts that are not their own. They cannot create new categories while writing posts and will have to select from categories already built in. They can create tags for their posts, though. The biggest disadvantage of a contributor role is that they are unable to upload files (meaning that they are unable to add images to their own article). Even those pending moderation, contributors can see comments. But they cannot accept or delete comments. They are unable to access settings, plugins, or themes, and are unable to change any settings on your web.

3.1.5 Subscriber: This user function allows users to log in to the system and update their user profiles. If they want to, they have the option to modify passwords. In this admin area of the framework, they do not write messages, access comments, or do anything else. If you need users to login first before they can read a post or leave a comment, this user function is especially helpful.

3.2 Multi-user: This system can be access from different users such as Farmers, Students, Teacher, and Experts Simultaneously using World Wide Web.

3.3 User Access: The system can be used by Farmers, Students, Teacher, and Experts from any point using secure World Wide Web and or handheld devices.

3.4 Availability of System: From the availability perspective it is available for users with the help of World Wide Web, handheld devices, and Users can easily access the device via the Internet, cell phones, and classical media, among others.

3.5 Integrity and Accuracy of System: Information in this system or web-based app gathered from specialist and gurus of Sindh Agriculture University Tandojam Sindh and tested as well as confirmed by them too.

The system's knowledge comes from specialists and experts and has to be checked and validated by scientific studies. No variation is permissible unless there is a modified version of the first data.

3.6 Testable: Farmers, Students, Teacher, Experts can test that the information they received is factual by visiting back to this web-based application the double time or more.

3.7 Accustomed: Every user can easily get the access of this information system. If they want to add their information, they can easily add through this system admin panel, but they must register or login on this system and they also can add data by just commenting below to disease posts.

4. SMART AGRITCULTURE SYSTEM ANALYSIS

The key factors have been defined through the help of architecture of this system and communications betwixt these components. This system is designed in a way that when a user wants to view information in the system, the user has to just write web-based app address and he or she can see a list of crop disease, list of crops with names, and English to Sindhi Agriculture Dictionary. If farmers, students, teachers, experts visit a disease he or she can see details of disease, which include introduction of disease, cause of disease, and how to save crops from disease, a person can zoom-in and zoom-out the text of disease, and a person can comment below to the disease. If a user selects a single crop such as wheat, he or she can view all list of only that crop disease from where he or she also visit crop disease. If a user visit English to Sindhi dictionary he or she can search English words into English if word match to our database user can see its meaning in Sindhi else he'll see message "Word Not Found", and not found word will be automatically send to email and message over mobile phone through which admin can add that word into database. There is also a panel from where a visitor can chat with administrator. This system permits farmers to visit this system at same time for valid information. Update module in this system is accessed by registered user and administrator with the help of email or username and password through admin panel.

To create an app which is affordable for every former due to the availability of low-cost devices our app can be access from computers as well as handheld devices.

To research on crops, we will create a guide for limited crops because there are a lot of crops all over the world so this research will be on limited cereal crops such as Wheat, Barley, and Corn. The app will be consisting of cereal crops introduction, disease, Pesticide, Graphically or Imaginary representation of crops.

How to model and appliance the very cheap and user-friendly app in Sindhi Language for formers as well as common persons related to agriculture? It is fair that this is a central interest, which need results and it is the resolved of this research to direction some of them with appropriate target to model and appliance the Crops guide application for formers or common persons. In trying to fix some of these analyses, it may fit the study of an agriculture guide app for formers based upon World Wide Web of things technology with smart phones will subject the basis for an considering of the problem.

4.1 DATABASE

Database is main component of the system, where data of crops are stored (See Figure 4.1). It is software which is used to store and organize data in computer terminology. It is like a file locker which can be affected by storing data in different sections called tables. When you want to access an appropriate file, you query into that appropriate section (table) and receive the file (data) you require. We had used word press to create our web-based app, so database has been managed by word press which uses MySQL. When you want to create database, store, and want to receive data with a single request you need MySQL. It is open-source software by the capability of open source software MySQL work best with other famous open source software for example PHP, Apache web server, and Linux operating system. Databases have sections or cases in database system which you can call it tables. Each section has columns and data is stored as row. Every row is consisting of fields for each column in the table.

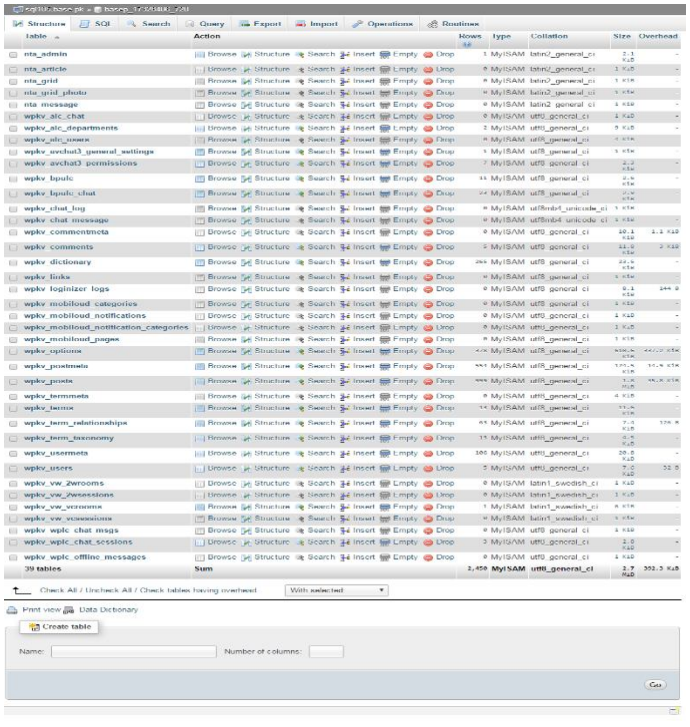

Figure 4.1: Database module prefix

For instance: A company may have table in databases such as employee_salary. This table may have columns below: emp_id, emp_first_name, emp_last_name, emp_mobile_no,emp_salary. There are no problem of creating tables again again writing quries wordpress has ability to create tables automatically below in database. During the installation of wordpress , it will create tables automatically, every table have wp_ prefix in front of tables but we used our own prefix in this system database due to security so table with prefix are: wpkv_commentmeta , wpkv_comments , wpkv _links , wpkv_options,wpkv_postmeta,wpkv_posts, wpkv_terms,wpkv_term_relationships,wpkv_term_taxonomy , wpkv_usermeta , wpkv_users. Every table would have different columns where a person can store data.

4.2 UPDATE MODULE

Update module shows the modifications which are happens via actors of the system(see Figure 4.2). There are four users who can update records from administrator panel according to their role which is defined above a user can add a new crop or category, or by updating or modifying a previously existing crops and categories in the database. To add more crop(s), click on insert page, add data, click update and data will be added as page then a user can click close button to exit.

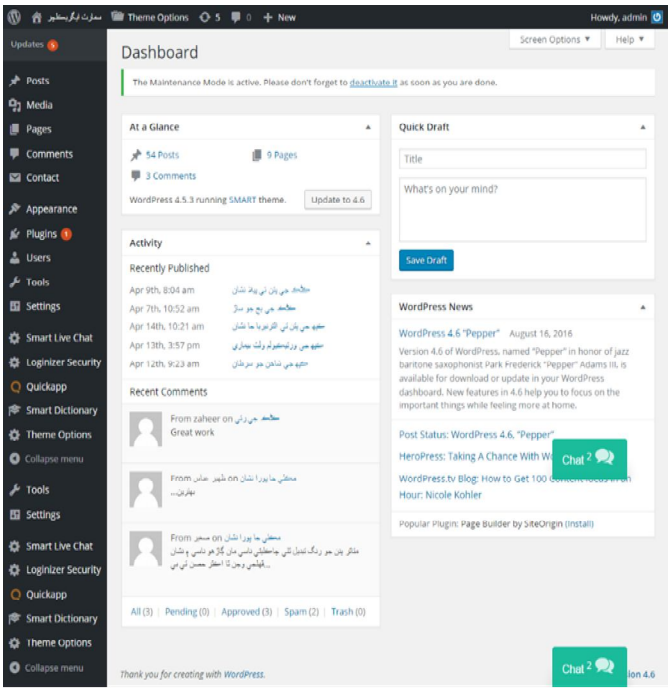

Figure 4.2: Modification module result

To make changes on the existing crop, click on ‘Edit, enter a crop name in an input box that appears, click ‘Update’, and your changes updated. The diseases in my web-based system are posts which can be update same as crop pages are update. There is also a panel for first ever web-based agriculture dictionary named as smart dictionary. That has two text fields through which user can insert English word and its meaning in Sindhi Language. There is also a panel for chat system through which a user can changes colors of web-based system text color, footer background, header background, link color, body background color, and upload media, change body font. Web based system also has smart live chat system through which an administrator can chat with users and also can update setting of plug-in which include enable/disable plug-in, switch between online and offline, enable / disable sound beep, change direction of chat panel in front-page left, right, top, bottom, change skin of panel, offline message, waiting message, welcome message, chat input placeholder, email input placeholder.

4.3 VIEW MODULE

Information view module represents the information regarding the crops and pests (See Figure 4.3). On index page a person can see logo or title and menu of our website in header which is controlled by the admin panel. There is also list of posts are articles, search bar, login logout links, pages links and new posts or articles link by clicking on posts or links a person has been redirect to detail page. There is also Chat option available from which a user can chat with admin and get further information about their crops or he/she can get knowledge about our web-based app. As I said that all the things are controlled by admin panel, so I am publishing admin panel images too.

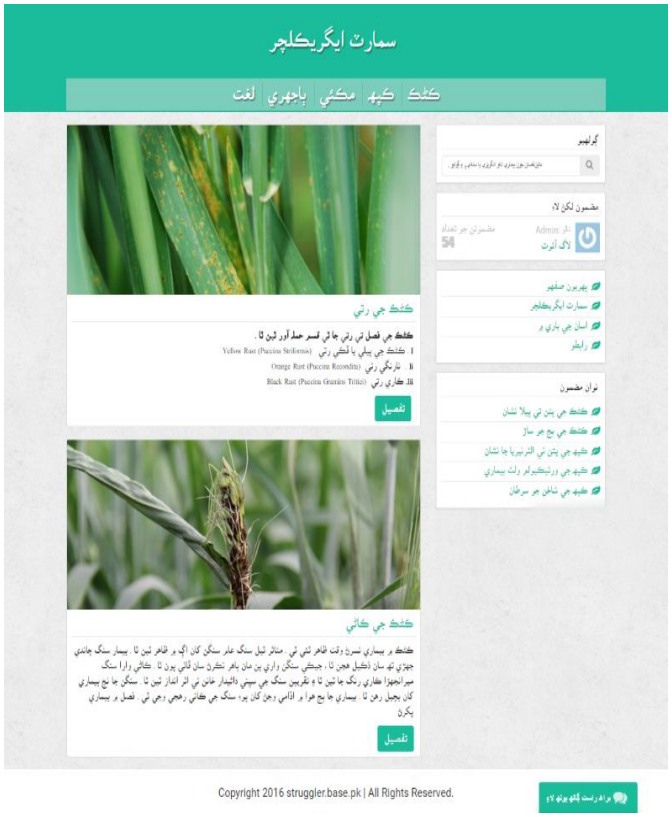

Figure 4.3: Smart agriculture information view module

5. CONCLUSION & IMPENDING WORK

Given the significance of agriculture to humanity, there is no question that crop protection and production can be improved by technical advancement and knowledge dissemination. Technology has emerged as a significant alternative to conventional methods in the dissemination of accurate and reliable information.

This study outlined the requirements, design, and implementation of a crop protection information system that allows farmers, students, teachers, and experts to update themselves at any time using a variety of electronic devices such as private computer networks, the internet, and mobile phones. Farmers will get better returns on their assistance after using smart farming because it is so stable and understandable. The implementation of this approach reduces administrative costs as well as the strain of time; the instantaneous communication capabilities of these systems reduce resources and distances. The findings of this study brought to light the endless possibilities and various methods of using ICT in the field of crop production, agricultural administration, and habit. Initially, there was no such system that provided knowledge of crops in Sindhi and could be accessed through Android or the internet. There are many websites that provide crop information, but we felt that there must be something for Sindh citizens that is written in English. Other websites may have some knowledge of crops, but it is limited; however, we research comprehensive illnesses in Asia and other European countries, and we have comprehensive crop information that will impact agriculture because of this type of app. Formators, and students face several challenges, so we made an effort with this system to make life easier for them. The system has several features that make it convenient for farmers and students to use. Farmers and students can share their expertise and learn about crops based on crop protection. Different crops with different diseases can be put into this web-based system. This web-based application focuses on crop safety, but other agricultural fields such as crop production, soil sciences, and others are easily accessible.

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