**Literature survey and analysis**

**2.1 Existing System**

As per the 2015 statistical reports of Registrar General of India & Census, 68.86% of the total population in India came under rural population. Out of this, 14.24% were cultivators, 17.13% were agricultural labourers. Of the 160 million hectares of cultivated land in India, only about 35% is reliably irrigated. The irrigation is done either using traditional or modern approach. Traditional farming is entirely dependent on the environmental factors, which many times prove to be unpredictable and unfavourable. It involves manual effort in using chain pump, moat or a pulley system. Out of the total water used for irrigation using traditional farming, only about 20-50% actually reach the crop. These inefficient practices have exhausted renewable water sources. The wastage is due to runoff, evaporation, excess release into farm plots.

The efficiency of irrigation can be improved by studying the crop requirement, analysing the weather patterns and using a proper crop management and monitoring system.

The existing crop management system uses metrics like soil temperature, moisture, pH level of soil etc. Depending upon the values of these parameters the decision to supply water to crop is taken. This data is collected by microcontroller and depending on data received it will take decision. This system uses relay which will switch on water pump. It uses lcd display to show current status. The major disadvantage of this system is it is not suitable for farms spread over large geographical area.

For operation over large are, need for wireless sensor network arises. The system divides the large geographical area in different zones. Each zone consists of wireless sensor unit which uses different sensors like temperature, soil moisture, humidity and water level. Each of these zones reports to a gateway unit, which handles all sensor information, takes appropriate action and transmits data to a web application. The sensor values can be monitored on the web page. In order to check this data user must have access to web application which is not possible all the time. To overcome this issue, GSM system is used. The system will use GSM messages to control the automation of system. This replaces the need of internet connection. The users of this system are able to monitor the system using GSM messages and a simple android application. It is designed to allow users to access system at any time by eliminating need of web application. This GSM messages are used to control system and to monitor information using android application. Android application will read data contained in message and display it to users. The disadvantage of this system is, it covered a low range of agricultural land and not economically affordable for all.  As email is cheaper as compared to GSM messages, newer systems started using emails to control and monitor the system. It makes the system affordable for users by reducing operational cost. This system used raspberry pi with microcontroller; this increased the range of operation. This raspberry pi works as central coordinator which controls various ends. Arduino microcontrollers works as local coordinator which are used to receive the on/off commands from the raspberry pi using zigbee protocol. Some irrigation systems make use of both messaging and emailing system to inform users. These systems are more modern compared to other systems and are being used recently. At the same time the system is power efficient.

Currently there are many entrepreneurs and start-ups trying to revolutionize Indian agriculture with mobile apps for farmers. Some of these are NaPanta, which facilitates farmers to book agri-equipment rentals and sales; Mandi trades, which helps to sell the agricultural produce in near-by markets. But such crop management and marketing come at a cost not affordable by the farmers, also due to lack of user-friendliness of these applications, farmers stick to traditional means. There are many NGOs

**2.2 Requirement analysis**

**2.2.1 Problem Definition**

As per the analysis of existing system mentioned in the above section, majority of the work is focused mainly on automating the irrigation system by reducing the cost. But, no efforts are made for increasing the crop production or increasing the revenue of the farmer. In order to increase production and revenue it is necessary to guide farmers through every stage of farming by providing him the suggestions of crops that can be taken and giving options for selling the same once it is harvested.

**2.2.2 Requirement Traceability Matrix**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr.No.** | **Requirement** | **Priority** | **Test Case ID** |
| **1** | **Take input for user and farm detail** | **High** | **TC1, TC2** |
| **2** | **Predicting the crops suitable as per soil details** | **High** | **TC6, TC7** |
| **3** | **Allow user to select multiple crops** | **High** | **TC6** |
| **4** | **Notification for pump status** | **Normal** | **TC9, TC10,TC11** |
| **5** | **Continuous monitoring of farm** | **High** | **TC3, TC4, TC5** |
| **6** | **List and select Nearby market** | **High** | **TC15** |
| **7** | **Profit comparison from nearby markets** | **High** | **TC15** |
| **8** | **Allow user to set bids for manufacturing companies** | **High** | **TC13, TC14** |
| **9** | **Monitor Water tank status** | **Normal** | **TC12** |
| **10** | **Change application language** | **Normal** | **TC8** |