Agriculture management System

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CHAPTER1: INTRODUCTION

Agriculture plays a major role in the growth and stability of the economy of Bangladesh. For increasing agricultural production appropriate crop management practice is essential. But due to several problems, agricultural production is hindered which results in low returns to the farmers. One of which is soil acidity. Acidic soil decreases plant nutrients uptake by lowering the availability of nutrients to the plant. Under acidic soil conditions iron, aluminum, and manganese ions are released in higher concentrations which becomes toxic to the plant. Soil acidity is measured by pH units. pH is measured on a logarithmic scale and the range is 1 to 14, where 7 pH is neutral, less than 7 pH is acidic and more than 7 pH is alkaline soil. Decreased pH level increases soil acidity and decreases the productivity of the soil. For higher productivity optimal pH level ranges between 6.5-7.5 and a pH level less than 3 and more than 9 is not suitable for agricultural production. Irrigation is another important factor for crop production. The time and the frequency of irrigation affect both plant growth and water resources. For that proper irrigation is necessary. Considering the above factors our aim is to develop a sensor device and mobile app that will be helpful for farmers. This device will be designed to measure the soil acidity, water holding capacity, soil temperature, humidity, rainfall, and evapotranspiration. Another important feature of the mobile app of the device is that it will serve as a communication platform between farmers and agricultural expertise. Using this app farmers will be able to contact experts and discuss their problems. This app will also help the farmers to know the market price of their products throughout the country which will stop the activities of the middleman who are depriving them of getting the proper price of their products.

1.1 Project overview:

This project will be an Agro Info and fully automated system against a manual system. We will develop a website and a device for farmers. In this system, farmers will get information about different kinds of crops. The website is for those who have problems with cultivating and don't have scientific knowledge about agriculture. Farmers and agriculturists have to be registered by personal information and device number. Those who don't have scientific knowledge must submit their National ID card number. Otherwise, the farmers will not register on the site. After providing

the information, the responsible person for that ward will get a request. After this, that person will check the information. A notification will be sent to the person's email or phone if the responsible person confirms or accepts the request. Besides, those farmers who have no internet connection can also register on this site. They will go to the responsible person of their own Union Agriculture Office, and the authority will give them information. The responsible person will be able to register them without sending any request. For that, the responsible person must be logged in to the site. Then the essential part of our system is soil scanner will detect the form of soil. Thus we can decide which crop is more suitable for that particular kind of soil. Management will be able to generate their ideas. In our country farmers are mostly illiterate and they have no scientific knowledge. So the sensor device and mobile app is very simple to handle for the farmers. The agricultural experts will suggest to the farmers by SMS or phone call about the crop production suitable for season and climate, also any problem during crop production. The device will keep the farmers updated about their soil position (whether the land is ready to sow), crop growth rate etc through SMS.

1.2 Motivation:

- Low agricultural production
- Lack of modernization on agricultural research.
- Low profit to the farmer.

・Lack of modernization in marketing channels.

・Poor communication link between farmer and agricultural expertise.

1.3 Objectives:

・Measuring soil pH.

・Increasing nutrients uptake by plants.

・Providing crop growth update,

・Ensuring proper use of fertilizer.

・Ensuring proper irrigation

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・To help the farmers to solve the problems in cultivation by contacting with agricultural expert.

・To help the farmers to market their products.

・To help the farmers to get the proper price of their products.

1.4 Benefits of DIU

・We will first implement this innovation in DIU.

・This project will be an IoT based automation project. So this device can be used for university promotional purposes.

・This innovation will encourage other students to innovate.

・DIU will be able to represent it in different programs.

・This innovation will help to represent the robotics subject.

・In extension, after the implementation, we will research crop data. We will implement various machine learning methods.

1.5 Stakeholder

There are four types of stakeholders in this project

・Owner (myself)

・Farmer

・Agriculturist

・Admin

CHAPTER2: SOFTWARE REQUIREMENT SPECIFICATION

2.1 Functional Requirements:

Registration for farmer

・For farmer's registration, they will submit their own information and device
number.

Registration for agriculturist

・The agriculturists will be registered through the admin.

Login

・Farmer and agriculturist can login.

Dashboard

・This will show the Farmers live field reports like humidity, temperature, soil pH
etc.

Crop update

・This system will provide crop growth updates.

Generate reports

・This system will create a Field report of the lands and it can be send to

Agriculturists Email.

Help

・This will be alert notification via agriculturist & connected farmer's phone

Price Update

・This system will provide updates about market prices.

2.2 Non-functional requirements

Performance

・The web application must load in under three seconds.

Reliability

・This system is user friendly. So users can easily trust the system.

Availability

・This system will be available 24/7.

Safety

・This system will be safe enough.

Maintenance

・Constantly keep the server updated.

Adaptability

・The user interface will be adaptive to the user.

Scalability

・Any structural changes can occur at any time.
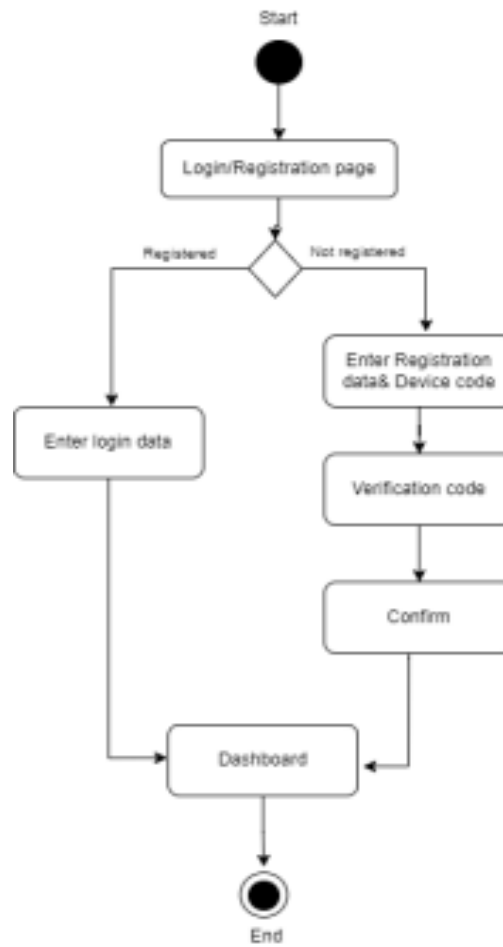
Capacity

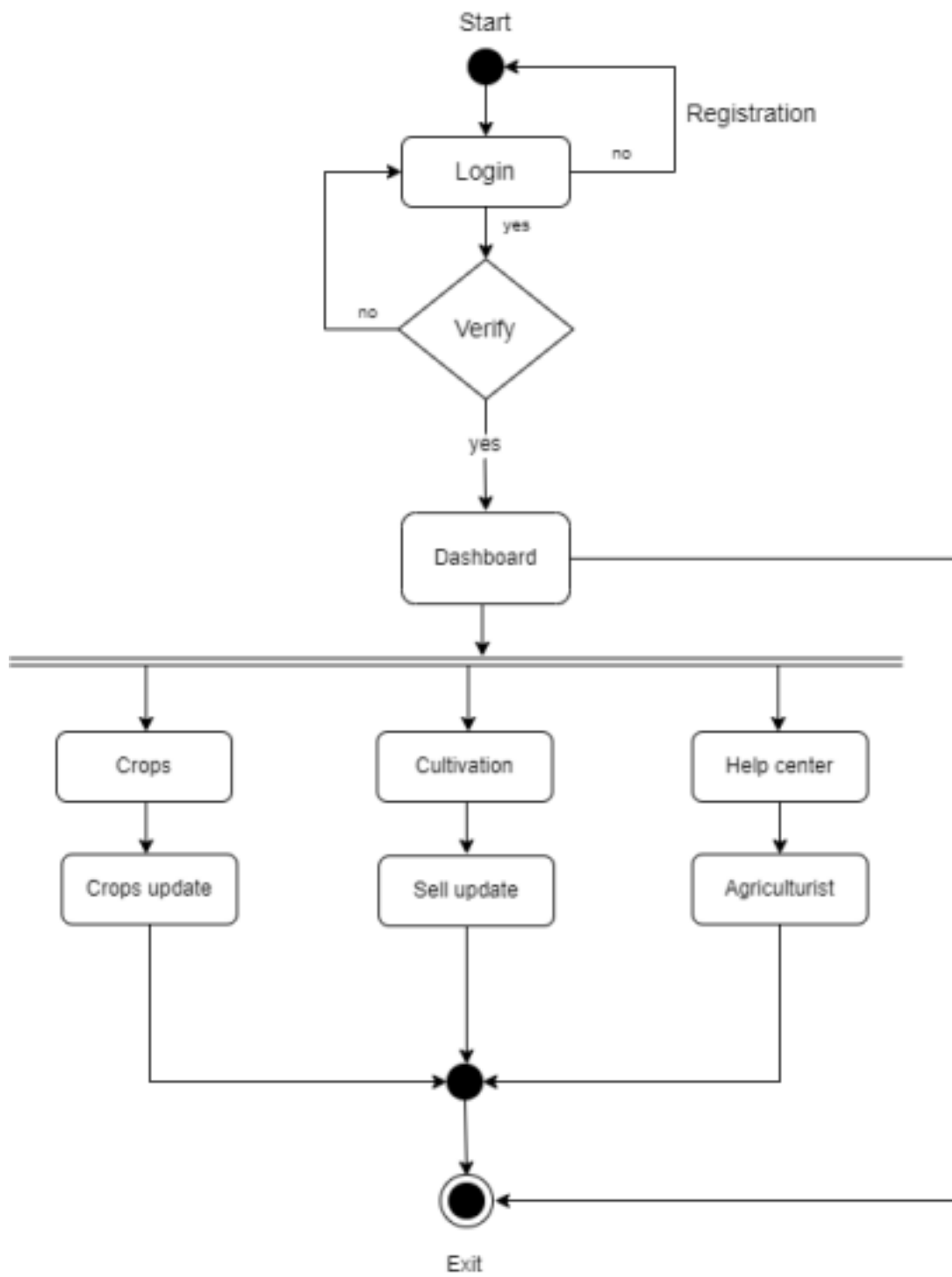・A minimum of 200 requests per second can be handled by the server.
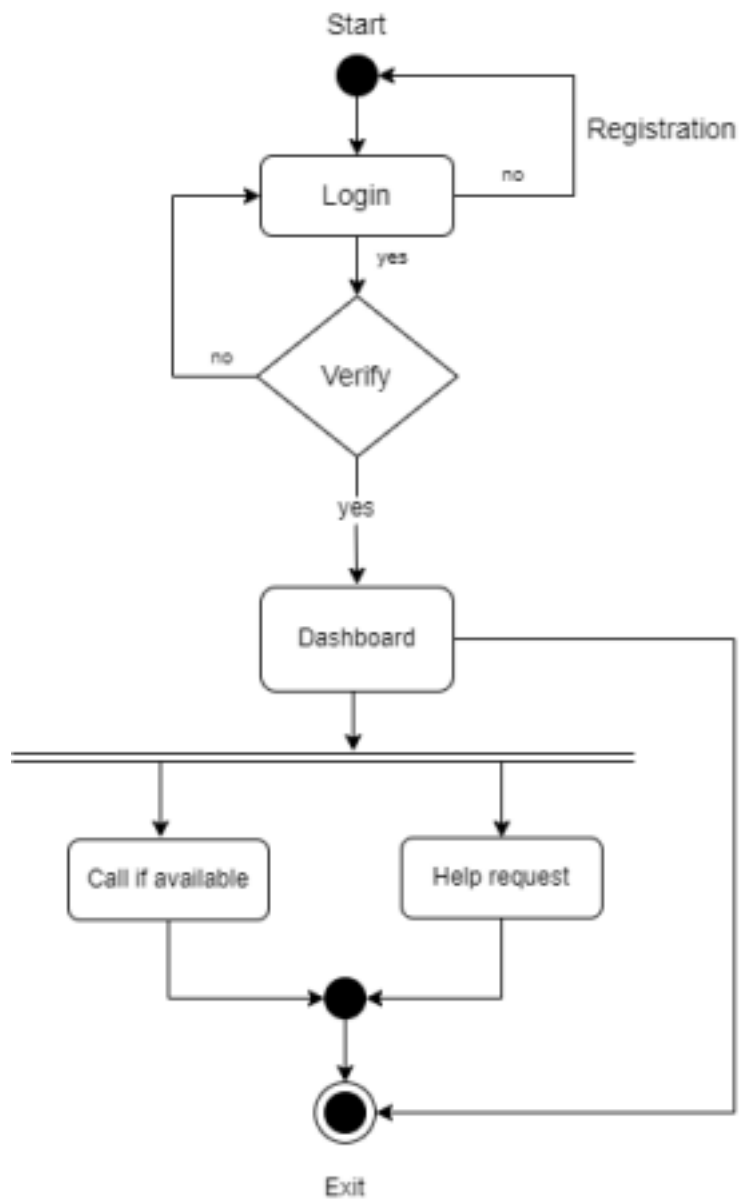
CHAPTER 3: WORKFLOW

3.1 Activity Diagram
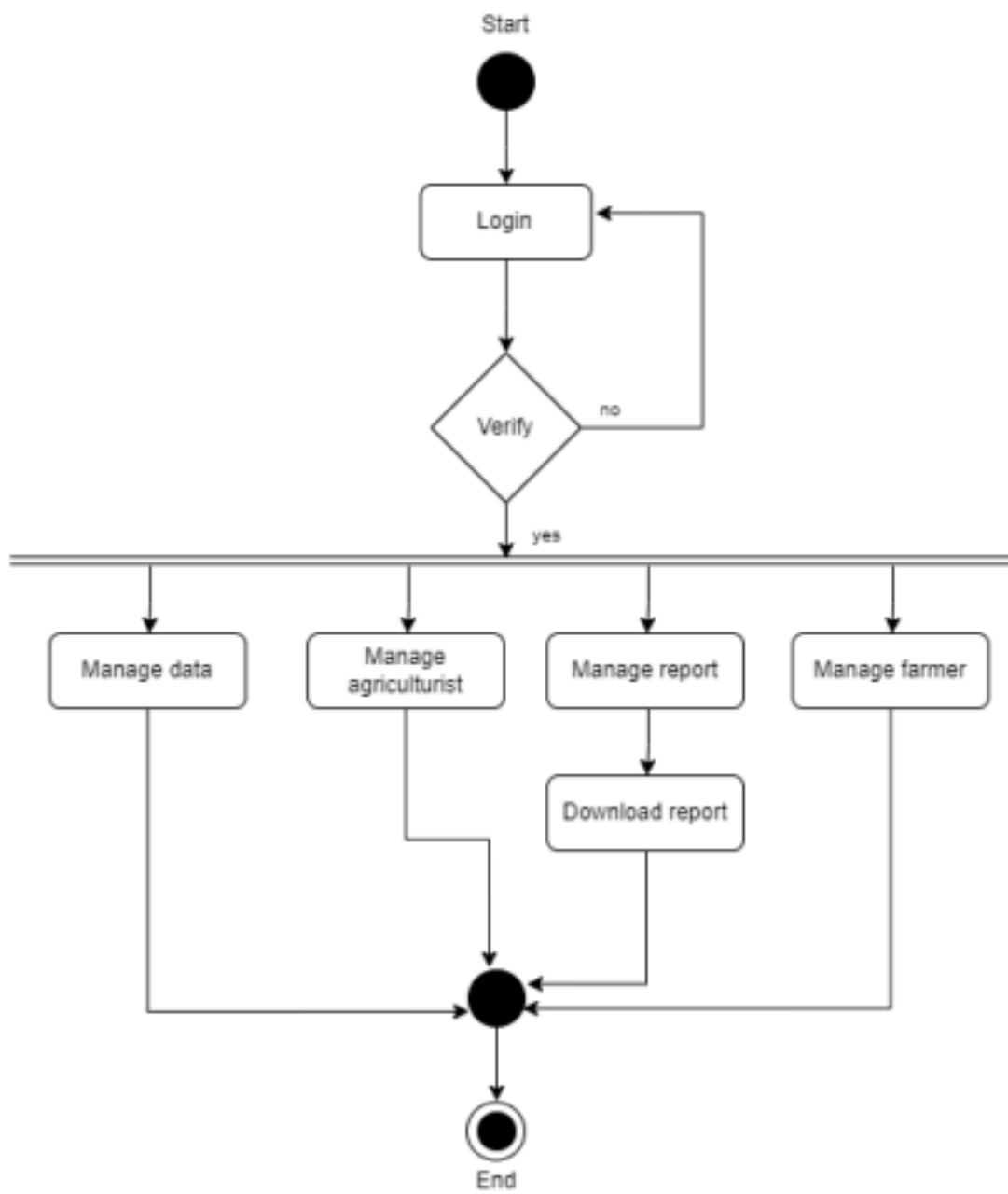
Farmer & agriculturist registration

Start

Login/Registration page

Registered / Not registered

Enter Registration data& Device code

Enter login data

Verification code

Confirm

Dashboard

End

Farmer

Start

Registration

no

Login

yes

no

Verify

yes

Dashboard

Crops

Cultivation

Help center

Crops update

Sell update

Agriculturist

Exit

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Agriculturist

Admin

CHAPTER 4: DISSEMINATION

Agriculture plays a vital role in our economy. In order to enrich our economy we should develop our agricultural sector. This device and mobile app will be a very good tool to improve our agriculture. The device will measure soil pH level, water holding capacity, soil temperature, atmospheric humidity, rainfall and evapotranspiration. Based on these data farmers will be able to know about the time and frequency of irrigation, proper fertilization, necessity of liming and crop growth update. All of which will help farmers to take necessary steps whenever needed. Humidity sensor, temperature sensor, air sensor, soil sensor, pH sensor will be used to develop the device. The said mobile app will help the farmers to solve their problems quickly with the suggestions of the respective experts. The mobile app will keep the farmers updated about the market price of their product. After necessary research work, this device and mobile app will be expected to hand over the agricultural expertise of selected regions for distribution to selected farmers free of cost for trial basis. After successful trials the device will be marketed to farmers at a nominal price. Daffodil International University, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Rangamati Science & Technology University will be the location for preliminary trials of the device. When working with the device we will get agriculture related data. Then, we will use data mining steps and machine learning models for data analysis.