|  |  |
| --- | --- |
| login | Use Case Name: |
| The user must enter a password and a username so as not to use this system who are not qualified for that | Introduction: |
| Farmer, analyst | Actors: |
| Farmer and analyst must have username and password to enter the system  Famer must be trained to use the system | Preconditions: |
| 1. User inserts his username and password  2. Determine you are farmer or analysts  3.if the user is a farmer  monitor the system by lab\_view and control pump | Normal Flow: |
| If the user is an analyst he can add,access and maintain database (type of the crops,the right amount of water for crops, ...etc) | Alternative Flows: |
| In step 1 in the normal flow: If user enters invalid username and password  1. Transaction is disapproved  2. Message to user to re-enter username and password | Exceptions: |

|  |  |
| --- | --- |
| Modify Database | Use Case Name: |
| It is the database in which all information related to the crop is stored in terms of the type of crop and the amount of water it needs | Introduction: |
| Analyst | Actors |
| the analyst must have sufficient experience about the crop and the appropriate conditions for it | Preconditions: |
| Provide the correct information about the types of crops in the database to build a correct database | Postconditions: |
| 1-search for the crop  2- if the crop is found, you can update the information of the crop or delete it  Else add information for a new crop. | Normal Flow: |
| Modify database case includes system monitoring by labview.  Modify database case includes control by myRio. | Relationship: |
| When there is an error in the database, for example if the amount of water is more than the crop needs, warn the user that this will harm the crop | Exceptions: |

|  |  |
| --- | --- |
| Control by myRIO | Use Case Name: |
| myRIO is the main controller of the system as it is able to make decisions based on the readings taken from the sensors and the information in the database | Introduction: |
| It must be connected to all parts of the system, such as sensors, and receive correct readings from these components | Preconditions: |
| Be able to make the right decisions that are appropriate to the need of the crop | Postconditions: |
| 1. The readings are taken from the sensors in the field 2. The database is checked to find out the appropriate amount of water for the crop based on the readings taken from the sensors 3. it decides how much water is needed 4. It sends orders for motor driver to open the pump and pump water 5. When the crop gets the required amount of water, it gives orders to motor driver to close the pumps | Normal Flow: |
| In the event of receiving a signal from the rain sensor that it is raining, orders must be given to close the pumps | Alternative Flows: |
| 1-control by myRIO includes modify database case.  2-control by myRIO includes sensors process  3- control by myRio includes system monitoring by labview.  4- control by myRio excludes Open and close by motors driver | Relations: |
| If the readings coming from the sensors do not match the readings stored in the database, it gives a message to update the database and add the new readings. | Exceptions: |

|  |  |
| --- | --- |
| System monitoring by labview | Use Case Name: |
| These laboratories are connected to all components of the system, providing the user with comprehensive monitoring of all parts of the system | Introduction: |
| Analyst, farmer | Actors: |
| it must have knowledge of all the components of the system and analyze the readings coming from the sensor, as well as the commands directed to the system and follow up on everything that happens in the system. | Preconditions: |
| The user is able to monitor everything that is happening in the system | Postconditions: |
| Presents a report about the amount of water used on the crops | Normal Flow: |
| 1-system monitoring by lab\_view includes control by myRIO case  2-system monitoring by lab\_view includes modify database case | Relationships: |
| When any error occurs in the system, it gives a warning message to the user | Exceptions: |

|  |  |
| --- | --- |
| Open and close by motors driver | Use Case Name: |
| This motor controls the opening and closing of pumps and sprinklers as it receives these commands from myRIO | Introduction: |
| The motor driver must be connected to the pumps | Preconditions: |
| It can directly control the opening and closing of pumps | Postconditions: |
| 1-Receives orders from my RIO to pump water  22-He opens the pumps and pumps water into the soil  3-When the amount of water required for the crop is pumped, it receives an order from myRIO to stop pumping water into the soil  4-He shuts down the pumps and stops pumping water into the soil | Normal Flow: |
| If no commands are received from myRIO,the motor will continue to turn off the pump | Alternative Flows: |
| 1-open and close by motors driver excludes control by myRIO | Relationships: |

|  |  |
| --- | --- |
| pumping water by pump and sprinklers | Use Case Name: |
| These pumps and sprinklers control the amount of water flowing into the soil by opening and closing them by the motor driver | Introduction: |
| they must be well connected to the motor driver | Preconditions: |
| They are controlled by the motor and are opened and closed according to the system's request | Postconditions: |
| 1-When the system needs to pump water, these pumps and sprinklers are opened by the motor driver  2-When the required amount of water is pumped, these pumps and sprinklers are closed by the motor driver too | Normal Flow: |
| Pumping water by pump and sprinklers excludes open and close by motors driver | Relationships: |

|  |  |
| --- | --- |
| Sensor process | Use Case Name: |
| These sensors are present in the soil and carry out various measurements such as measuring humidity, temperature and rainfall. There are four types in the system (**Soil moisture sensor, Temperature sensor, Rain Sensor and Light sensor**). | Introduction: |
| They must be properly connected on the hardware side | Preconditions: |
| They provide correct readings to control myRIO | Postconditions: |
| 1- Read environmental factors such as soil moisture and temperature  2- It sends the readings to myRIO | Normal Flow: |
| Sensor process case includes controls by myRio case. | Relationship: |