Sri Lanka Institute of Information Technology

PROJECT REGISTRATION FORM

(This form should be completed and uploaded to the Cloud space on or before XXXXXXXXX)

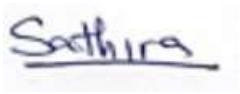
The purpose of this form is to allow final-year students of the B.Sc. (Hon) degree program to enlist in the final-year project group. Enlisting in a project entails specifying the project title and the details of four members in the group, the internal supervisor (compulsory), the external supervisor (may be from the industry), and indicating a brief description of the project. The description of the project entered on this form will not be considered as the formal project proposal. It should however indicate the scope of the project and provide the main potential outcome.

PROJECT TITLE (As per the accepted Topic Assessment Form)	An integrated platform for identification of suitable lands and soil conditions for remunerative crops in Sri Lanka
RESEARCH GROUP (As per the Topic Assessment Form)	Machine Learning and Soft Computing (MLSC)
PROJECT NUMBER	(Will be assigned by the RP Team)

PROJECT GROUP MEMBER DETAILS: (Please start with the group leader's details)

	STUDENT NAME	STUDENT NO.	CONTACT NO.	EMAIL ADDRESS
1	Manchalee R.R.N	IT20096748	0764128865	it20096748@my.sliit.lk
2	Madhushika A.H.D.	IT20122928	0767064120	it20122928@my.sliit.lk
3	Janadeepa W.H.G.	IT19045290	0760171858	it19045290@my.sliit.lk
4	Arachchige P.D.A.M.	IT20121556	0775203263	it20121556@my.sliit.lk

SUPERVISOR, CO_ SUPERVISOR Details

SUPERVISOR Name	**CO-SUPERVISOR Name**
Devanshi Ganegoda	Sathira Hettiarchchi
Signature	**Signature**
	
Name	**Name**

EXTERNAL SUPERVISOR Details (if any, may be from the industry)				
				Attach the email as Appendix 3
Name	Affiliation	Contact Address	Contact Numbers	Signature/Date
K.H.L Sanjeewa	Research and development scientist, Link natural products Pvt. Ltd	Polmandiya Gedara, Aranwela, Beliatta	0702654517	

ACCEPTANCE BY CDAP MEMBER (This part will be filled by the RP team)		
Name	Signature	Date

PROJECT DETAILS

Brief Description of your Research Problem: (extract from the topic assessment form)
The COVID-19 pandemic has brought unprecedented disruption to our agriculture and food systems, increasing pressure on farmers and agribusinesses in our country and around the world. Historically, agriculture has been the most important sector of the Sri Lankan economy. Even though its contribution to the gross domestic product declined substantially during the past three decades (from 30% in 1970 to 7.3% in 2020), it is the most important source of employment for the majority of the Sri Lankan workforce. Sri Lanka is experiencing an economic crisis stemming from an unsustainable debt load and perennial deficits on both the international balance of payments and government budget, resulting in a severe shortage of foreign currency exchange. The Ministry of Agriculture itself has identified issues in Sri Lanka's present agricultural landscape such as Low productivity of crop and animal products for which demand is rising, Inadequate attention to agricultural diversification in favor of crops that have better income prospects and many more. These issues have serious consequences not only on the profitability of Sri Lanka's agricultural industry, but also on national food security. High percentage of land today are unused or underutilized. Bare land indicates the land not covered by vegetation, water, buildings, or roads. There is a high percentage of bare land that is not utilized properly in Sri Lanka which can be used for commercial purposes like agriculture.

Main expected outcomes of the project: (extract from the topic assessment form)
Our research project fundamentally focuses on import and export of commercially demanding crops such as perilla patchouli and saffron. The aim of the project is to develop an integrated platform for identification of suitable lands and soil conditions for remunerative crops in Sri Lanka. Initially, we use GIS technology to identify the bare lands in Sri Lanka listed under LRC (Land reform commission). NPK level (The NPK ratio refers to the three numbers that indicate the percentage of nitrogen, phosphorus, and potassium in an NPK fertilizer.), PH rate(pH stands for "potential of hydrogen", it is a scale used to specify the acidity or basicity of an aqueous solution.), EC(electrical conductivity refers to the degree to which a specified material conducts electricity, calculated as the ratio of the current density in the material to the electric field which causes the flow of current), temperature of the soil is collected using a IOT device. The dataset of commercially viable plants is collected from Gannoruwa department of agrarian development, after the soil is tested, an analysis is done to check if it is suitable to grow the particular crop. Finally, the crop is grown in the bare land and the GIS map is updated. A system to detect for fungus and diseases in the plant is also developed using image processing to ensure healthy growth of plants.

WORKLOAD ALLOCATION (**extract from the topic assessment form after correcting the suggestions given by the topic assessment panel.**)

(Please provide a brief description of the workload allocation)

MEMBER 1 Manchalee R.R.N	Monitor and maintain healthy growth of crops by plant disease detection.

1. Identify plant diseases: The first step is to acquire images of the plant parts that might be infected by a disease or fungus. This can be done using digital cameras or smartphones with high-resolution cameras.

2. Preprocessing: The acquired images need to be preprocessed to enhance the quality of the image and to remove any noise or unwanted features. This includes adjusting the brightness, contrast, and color balance of the image, and removing any background noise.

3. Segmentation: Segmentation involves separating the plant parts from the background and isolating the region of interest.

4. Feature Extraction: Once the region of interest has been identified, features need to be extracted from the image. These features may include color, texture, shape, or any other relevant features that can help distinguish between healthy and diseased plants.

5. Train dataset model: The extracted features are then used to classify the plant as either healthy or diseased. This involves using machine learning algorithms to train a model that can accurately predict the presence of disease in a given plant.

6. Visualization: Finally, the results are visualized to provide a clear and concise output to the user. This may include highlighting the infected area in the image or providing a diagnosis of the disease based on the classification result.

MEMBER 2	Prediction and analysis to determine whether the selected can be grown in given soil condition.

1. Collect dataset from Gannoruwa department of agrarian development - The main plants that we selected are perilla, pachouli and saffron. We need to collect dataset of the temperature, NPK, PH, EC suitable for the growth of the plants.
2. Analyze the dataset and the measured soil conditions of land. -
 • Identify the soil type: Different types of plants require different types of soil. Some plants prefer sandy soil, while others prefer clay or loam. Therefore, it is important to determine the type of soil present in the area where the plant will be grown.
• Determine the soil pH: The pH of the soil is a measure of its acidity or alkalinity. Different plants thrive in different pH ranges. For example, blueberries require acidic soil, while vegetables such as tomatoes and peppers prefer slightly acidic to neutral soil. Soil pH can be determined by using a pH meter or a soil test kit.
• Test soil nutrient levels: Soil nutrient levels are essential for plant growth and development. A soil test can provide information about the levels of essential nutrients such as nitrogen, phosphorus, and potassium. Based on the results, it can be determined whether the soil has sufficient nutrients to support the growth of the selected plant.
 • Assess soil moisture: The amount of moisture in the soil can impact plant growth. Some plants require well-draining soil, while others thrive in moist soil. It is important to assess the moisture level of the soil and determine whether it is suitable for the selected plant.
 • Based on the above factors, a prediction and analysis can be made about whether the selected plant can be grown in the given soil condition. If the soil type, pH, nutrient levels, moisture content, and texture are suitable for the plant, then it is likely that the plant will grow well. However, if the soil condition is not suitable, then it may be necessary to amend the soil or select a different plant that is better suited for the soil condition.
3. Find the best remunerative crop to grow in land.

MEMBER 3	Soil testing and identification of soil conditions using IOT device.

1. Build IOT device: The first step is to design and build an IOT device that can measure soil conditions such as moisture, temperature, pH level, and nutrient content. The device can be designed using sensors, microcontrollers, and wireless communication modules.
2. Measure soil conditions: Once the IOT device is built, it can be deployed in the soil to measure the soil conditions continuously. The sensors on the device can collect data on soil moisture, temperature, pH level, and nutrient content at regular intervals.
3. Test the accuracy of the data by lab testing: To ensure the accuracy of the data collected by the IOT device, samples of the soil can be collected and tested in a laboratory using standard soil testing procedures. The laboratory testing can provide a reference for comparing the accuracy of the data collected by the IOT device.
4. Store data in cloud storage: The data collected by the IOT device can be transmitted wirelessly to cloud storage for storage and analysis. Cloud storage provides a secure and scalable solution for storing large amounts of data collected over time.
5. Get those data into a dashboard and visualization: The data stored in the cloud can be accessed through a dashboard and visualized using graphs and charts. The dashboard can provide real-time information on soil conditions, trends over time, and alerts for any critical values. This information can be used to make datadriven decisions regarding irrigation, fertilization, and other management practices to optimize crop yields and soil health. Additionally, machine learning algorithms can be applied to the data to predict future soil conditions and provide recommendations for crop management.

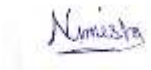
MEMBER 4	Identification of bare lands using GIS map and remote sensing approach.

1. Select a specific area as pilot: The first step is to identify a specific area of interest to be studied. This could be a region with significant agricultural activity,
2. Classify satellite image and identify land cover: Once the pilot area has been selected, the next step is to obtain high resolution satellite images for the area. These images can be obtained from various sources such as Landsat, Sentinel or MODIS. Once the satellite images have been obtained, they are processed using Geographic Information Systems (GIS) software to create a land cover map. The land cover map is created by identifying and classifying different types of land cover, such as forests, grasslands, water bodies, and barren lands. The classification process involves using a combination of spectral bands, indices, and algorithms to distinguish between different land cover types.
3. Select bare land and verify if it is bare land or not: After the land cover map has been created, the next step is to identify and select the areas that are classified as barren or bare lands. These areas could be identified based on their spectral reflectance, which is a measure of the amount of light reflected by the earth's surface at different wavelengths. Once the barren lands have been identified, ground truthing can be done to verify if the areas are indeed bare lands. Ground truthing involves physically visiting the area and verifying the land cover type using visual observations, field measurements, and other relevant data. The ground truthing data is then used to validate the remote sensing classification results.

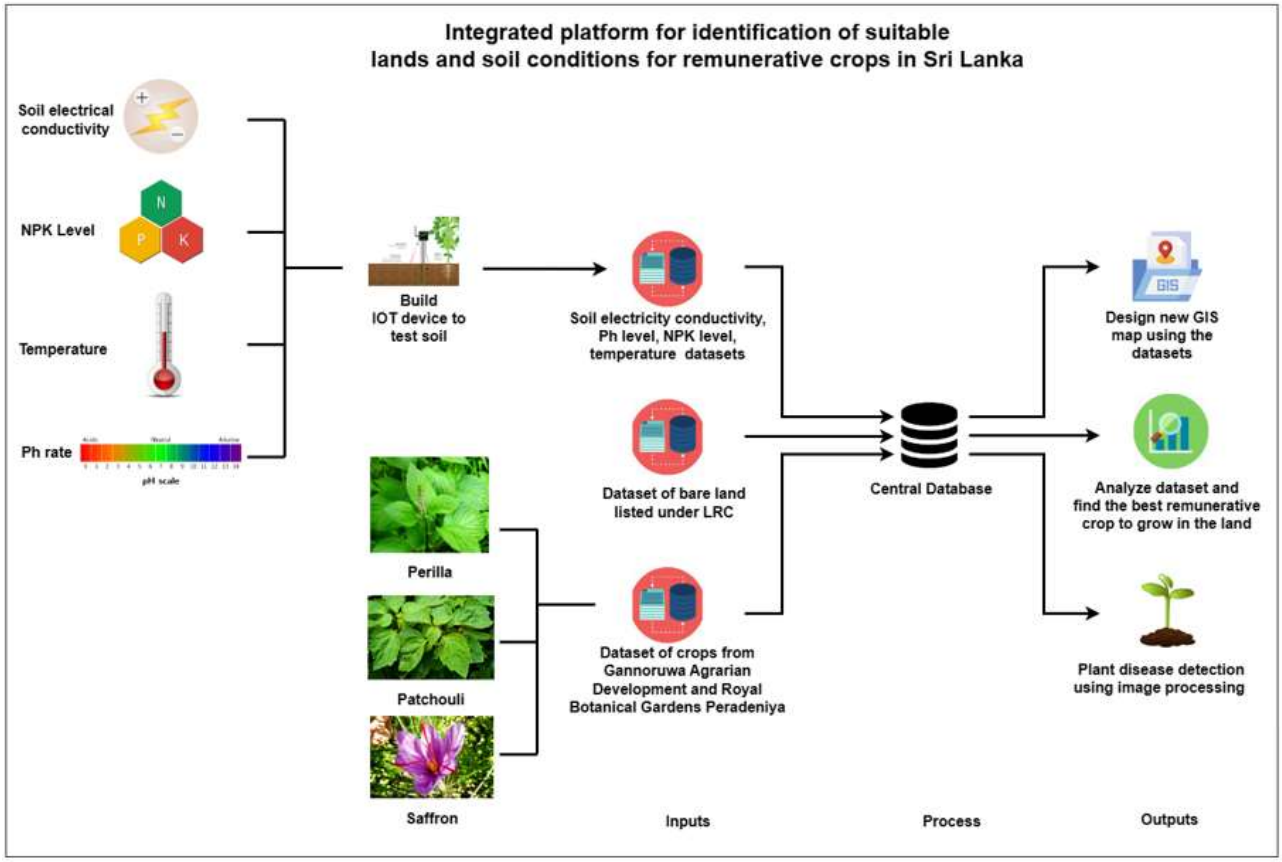
DECLARATION (Students should add the Digital Signature)

"We declare that the project would involve material prepared by the Group members and that it would not fully or partially incorporate any material prepared by other persons for a fee or free of charge or that it would include material previously submitted by a candidate for a Degree or Diploma in any other University or Institute of Higher Learning and that, to the best of our knowledge and belief, it would not incorporate any material previously published or written by another person in relation to another project except with prior written approval from the supervisor and/or the coordinator of such project and that such unauthorized reproductions will construe offences punishable under the SLIIT Regulations.

We are aware, that if we are found guilty for the above mentioned offences or any project related plagiarism, the SLIIT has right to suspend the project at any time and or to suspend us from the examination and or from the Institution for minimum period of one year".

	STUDENT NAME	**STUDENT NO.**	**Signature**
1	Manchalee R.R.N	IT20096748	
2	Madhushika A.H.D.	IT20122928	
3	Janadeepa W.H.G.	IT19045290	
4	Arachchige P.D.A.M.	IT20121556	

Appendix 1 :



Appendix 2 :

Appendix 3: