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| Student Reference Number: 10898808 |



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| Module Code: **PUSL2021** | Module Name: **Computing Group Project (23/AY/AU/M)** | |
| Coursework Title:  Group B 21 Proposal for Computing Group Project | | |
| Deadline Date: 25/10/2023 | | Member of staff responsible for coursework: Mr.[Pramudya Hashan Tilkaratne](https://dle.plymouth.ac.uk/user/view.php?id=146741&course=71570) |
| Programme: BSc (Hons) Computer Science | | |
| Please note that University Academic Regulations are available under Rules and Regulations on the University website [www.plymouth.ac.uk/studenthandbook](http://www.plymouth.ac.uk/studenthandbook). | | |
| Group work: please list all names of all participants formally associated with this work and state whether the work was undertaken alone or as part of a team. Please note you may be required to identify individual responsibility for component parts.   |  |  |  |  | | --- | --- | --- | --- | | 1. Nisal Liyanage | - | 10898808 | Organization and finalization of the proposal, content writing in project overview and introduction, guiding other parts, defining the time plan, researching, writing the abstract | | 1. Sinhalage Lakmuthu | - | 10898807 | Making the Gannt Chart, researching | | 1. Yogaraja Habishek | - | 10899277 | Content writing in the system features, researching | | 1. Mohomad Nafeel | - | 10899331 | Researching | | 1. Aluthgama Peiris | - | 10899336 | Content writing in the project objectives, writing the acknowledgement | | 1. Kariyawasam Wickramasinghe | - | 10898718 | Content writing in target users, writing the abstract |   I state that the group work was carried out by the collaboration and teamwork of all the team members in the group.  ***We confirm that we have read and understood the Plymouth University regulations relating to Assessment Offences and that we are aware of the possible penalties for any breach of these regulations. We confirm that this is the independent work of the group.***  Signed on behalf of the group: | | |
| Individual assignment: ***I confirm that I have read and understood the Plymouth University regulations relating to Assessment Offences and that I am aware of the possible penalties for any breach of these regulations. I confirm that this is my own independent work.***  Signed : | | |
| Use of translation software: failure to declare that translation software or a similar writing aid has been used will be treated as an assessment offence.  I \*have used~~/not used~~ translation software.  If used, please state name of software…………Google Translate……………………………………………………… | | |
| **Overall mark \_\_\_\_\_% Assessors Initials \_\_\_\_\_\_ Date\_\_\_\_\_\_\_\_\_** | | |

**Execute Summary**

In Sri Lanka, every year plant diseases and pests harm crop production significantly, and result in a huge loss to the country’s economy. The traditional way of identifying pests and diseases in Sri Lanka, had been through the observation of experts, which has many drawbacks. In order to give a solution to this problem we propose the development of a mobile application for disease and pest identification, that also provides tips and recommendations to cure the plants from the recognized disease or pest. The proposed system focuses on classifying and identifying diseases and pests in corn, as it’s an important crop in Sri Lankan agriculture. The proposed system has many objectives entitled to it. The main objective is that the system is capable of effectively and accurately identifying the diseases in an early stage and assisting the user with tips and recommendations to cure the plant from the identified issue, where the process follows a more cost-effective and less time-consuming approach, compared to the traditional approach. The proposed system targets a wide range of users from farmers to agriculture researchers. The proposed system utilizes several features that improve the accuracy of the modal’s predictions and enhance the user experience of the application. The system is estimated to be finished within 5 months from its starting date which is 9th October 2023.

**Acknowledgement**

I would like to express my sincere gratitude to Sir Pramudhya, Miss Hirushi, Miss Nethmi, Sir Anton, and Sir Neamah al naffak, for their invaluable guidance and support throughout the Initialization of our project. Their expertise and insights have been instrumental in shaping our ideas and refining our approach. I thank all those who have supported us directly or indirectly while planning and initializing our project.

I would also like to thank our group leader – Nisal Liyanage, for the exceptional leadership and dedication. His tireless efforts have been critical in keeping the project on track and ensuring that we met our goals.

Finally, I thank our group members- Sinhalage Lakmuthu, Yogaraja Habishek, Mohomad Nafeel, Kariyawasam Wickramasinghe for their hard work and commitment. Each member brought unique skills and perspectives to the project to make it possible.

Thank you.

**Aluthgama Peiris,**

**A group member (behalf of the team).**



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Table of Contents

[Chapter 01 | Project Overview and Introduction. 6](#_Toc148853977)

[1.1 Background to the problem. 6](#_Toc148853978)

[1.2 Problem that we have identified. 6](#_Toc148853979)

[1.3 Solution that we propose. 6](#_Toc148853980)

[1.4 Emphasized overview of the proposed system. 7](#_Toc148853981)

[Chapter 02 |Objectives of the project. 7](#_Toc148853982)

[Chapter 03 |Target users. 7](#_Toc148853983)

[Chapter 04 |System Features. 8](#_Toc148853984)

[4.1 Automated disease and pest detection. 8](#_Toc148853985)

[4.2 Utilizing Deep Learning for more accurate results. 8](#_Toc148853986)

[4.3 Recommendations and guidance for disease and pest management. 8](#_Toc148853987)

[4.4 User-friendly interface. 8](#_Toc148853988)

[4.5 Easy accessibility. 8](#_Toc148853989)

[4.6 Real-Time user feedback. 9](#_Toc148853990)

[4.7 Multi-Language Support. 9](#_Toc148853991)

[Chapter 05 |Time Plan 9](#_Toc148853992)

[References 10](#_Toc148853993)

# Chapter 01 | Project Overview and Introduction.

## 1.1 Background to the problem.

As a country well renowned for its prosperity and self-sufficiency since the ancient times, Sri Lanka’s economy had been mostly dependent on agriculture before the colonization. Even today, agriculture serves as the backbone of the country’s economy.

Diseases and pests cause significant losses in crops as they can disrupt their normal functioning by interfering with essential processes like photosynthesis, water transport, reproduction (pollination and fertilization), and the early stages of growth (germination) (Ms. Kiran R. Gavhale, An Overview of the Research on Plant Leaves Disease detection using Image Processing Techniques, 2014). These diseases are caused by pathogens, fungi, bacteria, and viruses.

## 1.2 Problem that we have identified.

In practice, the conventional method for identifying and detecting diseases and pests in Sri Lanka has been through visual inspection by experts using the naked eye. Researchers have identified certain drawbacks associated with the traditional approach, which are outlined as follows (Ms. Kiran R. Gavhale, An Overview of the Research on Plant Leaves Disease detection using Image Processing Technique, 2014):

* Time Consuming
* Less Accurate
* Expensive
* Outdated

## 1.3 Solution that we propose.

To address the challenges posed by the traditional approach, we propose the development of a mobile application for plant disease and pest detection using deep learning, that also recommends and guides the farmer with accurate and efficient methods to cure the plant from the affected disease or the infected pest.

All the existing systems that have been made for plant disease or pest identification only focus on identifying the disease or the pest. So, in our project, we have planned to include an additional feature where the system will recommend plant cure tips and guidance, after it identifies the disease or the pest successfully.

## 1.4 Emphasized overview of the proposed system.

In our project, we are planning to focus primarily on corn, an important crop in Sri Lankan agriculture, which experiences a rapid growth in production according to the World Data Atlas. It is considered primarily a dry zone crop and is one of the main crops cultivated in the highlands. Apart from the consumption by the locals, corn is widely used in the livestock sector as poultry feed (N.F.C. Ranaweera, 1988).

In Sri Lankan corn cultivation, the prevalent diseases include Northern Corn Leaf Blight, Gray Leaf Spot, Common Rust, Eyespot, and Helminthosporium Leaf Spot, while common pests comprise Aphids, Ear Borers, Corn Borers, and the Fall Armyworm. (කෘෂිකර්ම දෙපාර්තමේන්තුව, n.d.).

Our proposed system will have the capability to identify some of these diseases and pests in corn based on uploaded leaf or pest images, and it will provide precise recommendations for effectively treating the detected issues.

# Chapter 02 |Objectives of the project.

* Assists farmers in Sri Lanka in identifying specific diseases and pests that commonly affect corn by utilizing the provided leaf or pest images.
* Aids farmers in effective disease and pest management through its capability of providing informative cure tips and guidance, after it successfully classifies the alleged issue.
* Serves as a learning point for agriculturists and agriculture researchers and students to learn about corn diseases and effective disease management.
* Provides more accurate results compared to the traditional approach, where manual methods are used for disease and pest identification.
* Enables users to identify diseases in an early stage compared to the traditional approach, so he can cure the afflicted plant from the disease or pest before it spreads to other plants.
* Offers a cost-effective and time-saving alternative to traditional methods, sparing farmers from the need to hire agricultural experts for crop examination, which helps farmers to save their time and money.
* Offers a user-friendly platform accessible to the users, so that it can be practically and easily used by people with less technological knowledge.

# Chapter 03 |Target users.

The following are the main users that we have identified in the proposed system:

**1. Farmers.** – Farmers can use this application to detect leaf diseases of corn in an early stage and treat the plants as for the suggested solutions by the system to cure the plant.

**2. Agriculturalists** – Agriculturalists can use this application to learn and research about corn leaf diseases and effective corn leaf disease management and to provide remote diagnostics and recommendations to clients.

Apart from these main users, we can point out that the following parties may also benefited from the proposed system:

1. Home Gardeners
2. Agricultural Researchers and Scientists
3. Students and Educators
4. Government Agricultural Departments
5. Plant Disease and Pest Consultants

# Chapter 04 |System Features.

## 4.1 Automated disease and pest detection.

The proposed system can automatically classify and identify diseases and pests using the given pest or leaf images.

## 4.2 Utilizing Deep Learning for more accurate results.

In our proposed system, for image classification we have planned to use deep learning, as for the research we have done on similar projects, Deep Learning has the highest accuracy in plant disease identification, compared to other Machine Learning and Image- processing techniques (SAPNA NIGAM, 2020). Furthermore, as the DL model architecture, we are going to use CNN (Convolution Neural Network), because CNNs are well suited for image classification tasks.

## 4.3 Recommendations and guidance for disease and pest management.

After identifying the disease through the DL modal, the proposed system provides the users with in-detail and accurate recommendations and guidance to cure the plant from the afflicted issue.

## 4.4 User-friendly interface.

The proposed system has a user-friendly interface that improves usability and user experience, thanks to its visually appealing UI and design.

## 4.5 Easy accessibility.

The proposed system is a mobile application which can be accessible on a simple smartphone at anytime and anywhere.

## 4.6 Real-Time user feedback.

The proposed system allows the users to provide feedback and suggestions regarding their experience with the system, that results in effective future improvements and enhancements to the system.

## 4.7 Multi-Language Support.

The proposed system supports both English and Sinhala language.

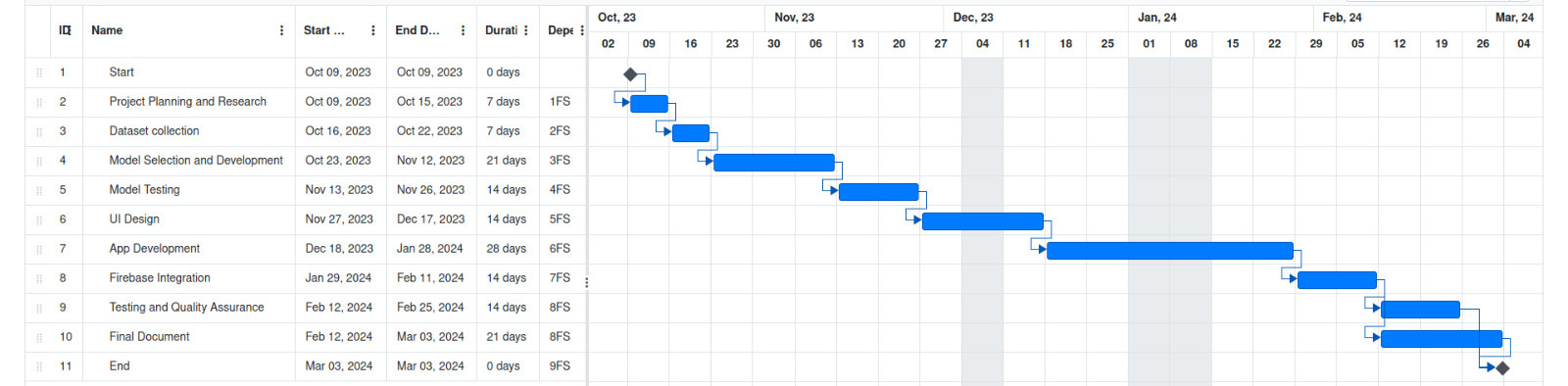
# Chapter 05 |Time Plan

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ID** | **Task** | **Predecessor** | **Duration(weeks)** | **Start Date** | **End Date** |
| 1 | Start | null | 0 | 9th Oct | 9th Oct |
| 2 | Project Planning and Research | 1 | 1 | 9th Oct | 15th Oct |
| 3 | Dataset collection | 2 | 1 | 16th Oct | 22nd Oct |
| 4 | Model Selection and Development | 3 | 3 | 23rd Oct | 12th Nov |
| 5 | Model Testing | 4 | 2 | 13th Nov | 26th Nov |
| 6 | UI Design | 5 | 2 | 27th Nov | 17th Dec |
| 7 | App Development | 6 | 4 | 18th Dec | 28th Jan |
| 8 | Firebase Integration | 7 | 2 | 29th Jan | 11th Feb |
| 9 | Testing and Quality Assurance | 8 | 2 | 12th Feb | 25th Feb |
| 10 | Final Documentation | 8 | 3 | 12th Feb | 3rd March |
| 11 | End | 10 | 0 | 3rd March | 3rd March |



**Starting date:** 9th October 2023

**Estimated finishing date:** 3rd March 2024

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# References

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