Sri Lanka Institute of Information Technology

PROJECT REGISTRATION FORM

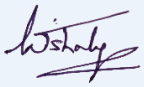
The purpose of this form is to allow final year students of the B.Sc. (Hon) degree program to enlist in the final year project group. Enlisting in a project entail specifying the project title and the details of four members in the group, the internal supervisor (compulsory), external supervisor (may 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 accepted topic assessment form)**	KidniFy – Elevating Chronic Kidney Disease Management with Machine Learning and IoT Through a Mobile Application
RESEARCH GROUP **(As per accepted topic assessment form)**	Machine Learning and Soft Computing
PROJECT NUMBER	2023-032

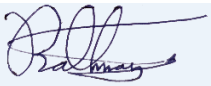
PROJECT GROUP MEMBER DETAILS:

	STUDENT NAME	STUDENT NO.	CONTACT NO.	EMAIL ADDRESS
1	Marasinghe M.M.K.L.	IT20154226	0713037712	it20154226@my.sliit.lk
2	Isurika W.B.M.A.	IT20785192	0701484570	it20785192@my.sliit.lk
3	Perera J.P.M.L.	IT20226596	0776035479	it20226596@my.sliit.lk
4	Samarawila J.P.M.L.	IT20235260	0712421580	it20235260@my.sliit.lk

SUPERVISOR Details

Ms. Wishalya Tissera		01-04-2023
Name	Signature	Date

CO-SUPERVISOR Details

Mr. Samadhi Rathnayake		01-04-2023
Name	Signature	Date

EXTERNAL SUPERVISOR Details

Name	Affiliation	Contact Address	Contact Numbers	Signature/Date

ACCEPTANCE BY CDAP MEMBER

Name	Signature	Date

PROJECT DETAILS

Brief Description of Your Research Problem:

Chronic kidney disease, often known as CKD, is a significant public health concern in Sri Lanka and worldwide. Chronic kidney disease, also known as chronic renal disease or CKD, is characterized by a gradual loss of kidney function over time. The kidneys are in charge of filtering waste and excess fluids from the body and controlling various other vital activities. When they fail, the consequences can be severe and life-threatening.

CKD is becoming an increasingly severe public health issue in Sri Lanka, with thousands of people dying yearly. According to studies, kidney illness deaths have increased by more than 50% in the last decade, highlighting the importance of raising awareness and early detection initiatives.

CKD can occur because of several reasons. In Sri Lanka, CKD is prevalent in the north-central region, and the most affected communities are involved in paddy farming. The prevalence of the disease in this region ranges from 6% to 15%. Similar environmental, socioeconomic, and occupational risk factors for CKD are prevalent in other areas of Sri Lanka, specifically among the sugarcane and paddy-farming communities in the southeastern dry zone. Nevertheless, these populations have yet to be a common focus of epidemiological studies on CKD. Diabetes is the leading cause of kidney disease. However, heart disease and obesity can also contribute to the damage that causes kidney failure. Long-term functional decline can also be caused by urinary tract disorders and inflammation in various kidney regions. Aside from these factors, genetics, certain drugs, and an improper diet can all contribute to the development of CKD. Another factor that can raise the chance of having this condition is a sedentary lifestyle. Individuals must be aware of their kidney health and seek frequent check-ups to maintain their fitness to solve this critical public health issue. The importance of early detection and management in limiting disease progression and minimizing the risk of associated health concerns cannot be overstated. To lower the chance of getting CKD, people must recognize the necessity of obtaining early treatment and practicing healthy practices.

In conclusion, chronic kidney disease is a severe and widespread condition that affects millions of people around the world. In Sri Lanka, it is a significant public health issue affecting an increasing number of people. To address this issue, individuals must be aware of their kidney health and seek regular check-ups to maintain their health. Early detection and management are critical in preventing the progression of the disease and lowering the risk of associated health problems. People must understand the importance of seeking early treatment and maintaining good health habits to reduce the risk of developing CKD.

Main expected outcomes of the project:
Our solution aims to provide an application that allows people control over their health and lowers their risk of getting kidney diseases. This is accomplished by the application of advanced technologies and data analysis. The application diagnoses patients by asking pertinent questions and evaluating lab data and radiological images using machine learning techniques such as deep learning and image processing. In addition to the diagnostic capabilities of the application, an IoT device is used to check the quality of water consumed by the user. This is because contaminated water is a leading contributor to kidney illness. By using our application, users can monitor the quality of water they consume, and take measures to avoid contaminated water, thus reducing the risk of kidney diseases. The application provides an interactive and user-friendly interface to users. Users can log in and create a profile, then check the given tests and get an accurate prediction based on the information provided. Users can log in and create a profile, and then check the given tests and get an accurate prediction based on the given information. This application aims to provide accurate and readily available forecasts of the risk of kidney diseases to aid in the prevention and treatment of the problem. Our solution aims to empower individuals to maintain their health and make informed decisions about their healthcare. By using the application, users can take control of their health and lower their chances of developing kidney diseases. This solution has the potential to revolutionize the way people manage their health and reduce the burden of kidney diseases.

WORKLOAD ALLOCATION

MEMBER 1	**Samarawila D.R.N.**
This component involves collecting real-time data from kidney patients suffering from various types and stages of kidney diseases in Sri Lanka. The primary objective is to increase people's awareness of this problem and assist them in taking a simple yet effective kidney test that can provide them with an accurate prediction. The data will be collected through field visits to the nephrology hospitals in Sri Lanka. The collected data will be pre-processed, which includes tasks such as data cleaning, normalization, and feature selection to prepare it for machine learning. A machine learning model is then trained using the pre-processed data to recognize and categorize different types of kidney diseases. The trained model is deployed on a web application to predict the specific type of kidney disease based on the pre-processed data. The system will ask the patient about the medical tests to determine the patient's kidney function and overall health. Tests may include Creatinine blood and urine tests, Albumin urine test, and other relevant tests. Based on the prediction, the patient is recommended a series of tests and steps that need to be taken for proper diagnosis and treatment. These recommendations will also be suggested by a trained data model. Finally, the patient is given a list of nearby facilities they can visit for medical care. Also, the patient will be advised on how to mitigate the factors that could cause kidney diseases in longevity.	

MEMBER 2	**Marasinghe M.M.K.L.**

This component will use image processing techniques to diagnose kidney patients by analyzing medical images, such as CT scans. These images could be collected by the research facilities and the nephrology hospitals in Sri Lanka with permission from patients to use their medical images for research purposes. Also, we hope to obtain de-identified medical images from publicly available datasets, such as those provided by the National Institutes of Health (NIH) or other research institutions. So, this step includes collecting a large and diverse dataset of medical images representing various kidney conditions. Next, the images are pre-processed by resizing, normalizing, and transforming them to be suitable for input into a deep-learning model. Image segmentation then isolates the kidney regions from the images and separates them from other organs and tissues. By analyzing the extracted features, such as the size, shape, texture, and contrast enhancement of the kidney tissue, deep learning models can be trained to diagnose the patient's kidney status and identify specific types of kidney diseases or disorders. In conclusion, this component effectively provides kidney patients with informative and understandable information about their condition and necessary actions.

MEMBER 3	**Perera J.P.M.L.**

It is a known fact that in Sri Lanka, contaminated water is one of the causes that cause kidney diseases. So, in this component, we need to research the components and composition of drinking water and their impact on kidney diseases. We aim to build an IoT device to measure the relevant parameters in drinking water, such as pH, TDS, conductivity, heavy metals (lead, cadmium, mercury, and arsenic), Nitrates, Chlorine, Pesticides, herbicides, and temperature. These could damage the renal tubules, leading to kidney dysfunction, and cause methemoglobinemia, a condition impairing kidney function, and many other kidney dysfunctions. This IoT device will be built using Arduino or Raspberry pi and several other sensors, such as a pH sensor, dissolved oxygen sensor, conductivity sensor, turbidity sensor, heavy metal sensor, etc. The device will be connected to the application via Wi-Fi and the results will be displayed through a dashboard that is developed within the application. Those results would be what the parameters measured from the device are and how they could lead to kidney dysfunctions. Then, the patient will be informed what long-term and short-term actions he must take if he has consummated contaminated water. This project seeks to combine research and technology with improving health outcomes by closely monitoring drinking water quality.

MEMBER 4	**Isurika W.B.M.A.**

This component includes gather information about the patient, such as their age, sex, weight, height, medical history, medications they are taking, and any other relevant health information. Then we analyze the details mentioned above components and the GFR value from a blood test to determine the patient's current kidney health and their zone - Safe, Cautious, or Danger. Then the machine learning algorithms can analyze all the data we provide and categorize patients into appropriate zones. Based on the patient's test results, the system will advise them on the most suitable diet, exercises, and other lifestyle changes to improve their kidney health. This could include recommendations on reducing salt and protein intake, engaging in regular physical activity, and quitting smoking. Provide an estimated cost for medical help in Sri Lanka if the patient falls into the Cautious or Danger zones. This information can help patients understand the financial implications of their health condition and make informed decisions about their treatment options. If the patient is suggested to do dialysis or a transplant, educate them on each option's benefits, risks, and costs. All these automated processes will be utilized using machine learning algorithms. And many patients suffering from these diseases are unaware of the expenses and information they should be familiar with. So, this information can help patients make informed decisions about their treatment and understand what to expect. Eventually, this will enhance people's education not only about kidney diseases, but also about other significant factors they need to be knowledgeable about.

DECLARATION

"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
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