

# **KidniFy - Chronic Kidney Disease Patient Care Application**

Marasinghe M.M.K.L – IT20154226

PROJECT ID: TMP-2023-032

## **LOGBOOK**



B.Sc. (Hons) Degree in Information Technology specializing in

Information Technology

Department of Information Technology

Sri Lanka Institute of Information Technology

Sri Lanka


October 2023

# DECLARATION

## Declaration of the Candidate

I declare that this is my own work, and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Name	Student ID	Signature
Marasinghe M.M.K.L	IT20154226	

## Declaration of the Supervisor

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

Name of the supervisor: Ms. Wishalya Tissera

.....  
Signature of the supervisor

.....  
Date

Name of the co-supervisor: Mr. Samadhi Rathnayake

.....  
Signature of the co-supervisor

.....  
Date

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## 1. Weekly Logs of the Project

NOVEMBER 2022	
Date/Week	Details and notes of work carried out
WEEK 1	<ul style="list-style-type: none"><li>• Created a WhatsApp group for group members.</li><li>• Took the first group meeting online.</li><li>• Discussed how to balance our academics, internships, and the research project within the next few months.</li></ul>
WEEK 2	<ul style="list-style-type: none"><li>• Attended the brainstorming session held by CDAP.</li><li>• Discussed the RP milestones with the group members.</li><li>• Began searching for research topics suitable for a fourth-year research project.</li><li>• Referred to research papers published by SLIIT to identify the research that has been done before.</li></ul>
WEEK 3	<ul style="list-style-type: none"><li>• Held a few online meetings to brainstorm ideas for a research problem and topic.</li><li>• Referred to additional research papers and discussed with fellow senior students about the research topic.</li></ul>
WEEK 4	<ul style="list-style-type: none"><li>• Identified multiple research areas.</li><li>• Checked for feasible hardware and software solutions available for those research areas.</li><li>• Tried to identify technology stacks for those solutions.</li><li>• Checked for the novelty of the components by comparing them with previous research.</li><li>• Completed the Logbook.</li></ul>

## DECEMBER 2022

Date/Week	Details and notes of work carried out
WEEK 1	<ul style="list-style-type: none"><li>• Had our first in-person meeting at the university.</li><li>• Selected a preliminary research area and topic: developing a mobile application for kidney patients.</li></ul>
WEEK 2	<ul style="list-style-type: none"><li>• Discussed about who to choose as a supervisor and co-supervisor for the research.</li><li>• Finalized our research area and topic: developing a mobile application for kidney patients.</li><li>• Created a second WhatsApp group, adding all group members, co-supervisor, and supervisor.</li></ul>
WEEK 3	<ul style="list-style-type: none"><li>• Gained insights about the topic and got some ideas about other interesting research areas.</li><li>• Discussed what topic to choose and decided to stick with the previously selected preliminary topic.</li></ul>
WEEK 4	<ul style="list-style-type: none"><li>• Search through the research topic referring to research papers, articles on the internet and through healthcare professionals and medical students.</li><li>• Understanding the scope of the research topic we are going to cover in our research project.</li><li>• Identified the components we can develop for the selected topic.</li><li>• Start to write the Logbook.</li></ul>

## JANUARY 2023

Date/Week	Details and notes of work carried out
WEEK 1	<ul style="list-style-type: none"><li>• Explored more on the research topic.</li><li>• Understanding the scope of the research topic we are going to cover in our research project.</li><li>• Find whether there are datasets available in order to continue the project.</li><li>• Identified the components we can develop for the selected topic.</li><li>• Discussed our progress with the supervisors through online meetings.</li></ul>
WEEK 2	<ul style="list-style-type: none"><li>• Finalized the four components for the project.</li><li>• Started searching about the tools and technologies we must use during the project.</li></ul>
WEEK 3	<ul style="list-style-type: none"><li>• Started working on topic evaluation form.</li><li>• Discussed our progress with the supervisors through online meetings.</li></ul>
WEEK 4	<ul style="list-style-type: none"><li>• Referred to more research papers related to the research area and my component.</li><li>• Contacted a few healthcare professionals to work with us as an external supervisor.</li><li>• Completed the Logbook.</li></ul>

## FEBRUARY 2023

Date/Week	Details and notes of work carried out
WEEK 1	<ul style="list-style-type: none"> <li>• Finalized the first draft of the TAF document.</li> <li>• Dr.Ranjan Kumara Mallawaarachchi joined with us as our medical consultant and as our adviser from the medical point of view.</li> <li>• Met with supervisors to discuss about the components in the project.</li> <li>• Made some changes in the TAF document after discussing with supervisors.</li> </ul>
WEEK 2	<ul style="list-style-type: none"> <li>• Finalized the TAF document.</li> <li>• Submitted the TAF document.</li> <li>• Had an online meeting with Dr. Ranjan to discuss our topic.</li> </ul>
WEEK 3	<ul style="list-style-type: none"> <li>• Searched through the internet to find similar projects that have done before.</li> <li>• Identified the defects in the already available projects and systems.</li> </ul>
WEEK 4	<ul style="list-style-type: none"> <li>• Discussed with the group members all the information we gathered on each topic.</li> <li>• Identified the technical aspects and what are the new tools and technologies to learn while doing the project.</li> <li>• Completed the Logbook.</li> </ul>

## MARCH 2023

Date/Week	Details and notes of work carried out
WEEK 1	<ul style="list-style-type: none"> <li>• Our TAF document was evaluated, and the results were published on the course web. One of the components was rejected and the others were accepted.</li> <li>• Discussed with team members about what options do we have, in order to replace the rejected component.</li> <li>• Had back-to-back brainstorming sessions to finalize the new component.</li> <li>• Had meetings with our supervisors as well as Dr. Ranjan to discuss about this.</li> </ul>
WEEK 2	<ul style="list-style-type: none"> <li>• Finalized the new component.</li> <li>• Add some novelties to the other components as well even if they were already accepted.</li> <li>• Resubmitted the TAF document.</li> </ul>
WEEK 3	<ul style="list-style-type: none"> <li>• Started working on the proposal report draft.</li> <li>• Referred more research papers as we do the literature survey for the research proposal.</li> <li>• Discussed what software methodologies we should use during the project.</li> <li>• Created an estimated budget for the whole research project for each member.</li> <li>• Designed a Gantt chart to plan our workflow from start till the end of the project.</li> <li>• Started working on the proposal presentation slides.</li> </ul>
WEEK 4	<ul style="list-style-type: none"> <li>• Submitted the proposal report draft to the supervisors.</li> <li>• Submitted the project charter confirmation form.</li> <li>• Discussed with the supervisors what needed to be changed in the proposal draft.</li> <li>• Discussed with Dr. Ranjan what needed to be changed in the proposal draft.</li> <li>• Made some little changes in the components and designed the presentation slides.</li> </ul>



## APRIL 2023

Date/Week	Details and notes of work carried out
WEEK 1	<ul style="list-style-type: none"><li>• Practiced for the individual component in the presentation.</li><li>• Had a few rehearsals before the proposal presentation.</li><li>• Met with supervisors before the proposal presentation date to get some final insights.</li><li>• Did the proposal presentation successfully.</li><li>• Noted the key things pointed out by the assessment panel.</li></ul>
WEEK 2	<ul style="list-style-type: none"><li>• Submitted the project charter document.</li><li>• We contacted several organizations to schedule field visits and collect the necessary information for the datasets we need to gather.</li><li>• We contacted a consultant nephrologist at the Kurunegala Hospital for support through Dr. Ranjan Mallawaarachchi.</li></ul>
WEEK 3	<ul style="list-style-type: none"><li>• Started to work on Python and machine learning knowledge since we need those skills heavily in the project.</li><li>• Setting up the environment and development software.</li><li>• Started doing some demo projects that use python and machine learning to learn it more effectively.</li></ul>
WEEK 4	<ul style="list-style-type: none"><li>• Continue working on demo projects.</li><li>• Met with supervisors to update the progress.</li><li>• Gathered over 7000 kidney CT scan images from hospital in Sri Lanka between 2019-2022, with equal numbers of CKD positive and healthy cases. Sourced from multiple CT scanner models.</li><li>• Completed the Logbook.</li></ul>

## MAY 2023

Date/Week	Details and notes of work carried out
WEEK 1	<ul style="list-style-type: none"> <li>Went field visits to NIFS Kandy, Kurunegala Teaching Hospital and Anuradhapura teaching hospital to collect data.</li> <li>Talked with the medical professionals there about our research project and got valuable ideas from them.</li> <li>Successfully collected data from NIFS and Kurunegala Teaching Hospital.</li> <li>Unable to collect data from Anuradhapura teaching hospital because we didn't have the ethical clearance form from SLIIT.</li> <li>Submitted proposal report.</li> </ul>
WEEK 2	<ul style="list-style-type: none"> <li>Started to make the status 1 document for the submission.</li> <li>We contacted Dr. Ranjan Mallawaarachchi and discusses some key points that should be add into our mobile application.</li> <li>Build a Convolutional Neural Network model</li> <li>Started to design the user interfaces for our KidniFy mobile application.</li> </ul>
WEEK 3	<ul style="list-style-type: none"> <li>Started to study Flask and improved our machine learning knowledge since we need those skills heavily in our project.</li> <li>Continued the model developments.</li> <li>Start the front-end development of the mobile application using NodeJs.</li> <li>Had an online meeting with our co supervisor Mr. Samadhi Chathuranga</li> <li>Submit the status 1 document.</li> <li>Completed the Logbook.</li> </ul>
WEEK 4	<ul style="list-style-type: none"> <li>Practiced for the individual component in the presentation.</li> <li>Had a few rehearsals before the progress presentation 1.</li> <li>Met with supervisors before the progress presentation 1 date to get some final insights.</li> <li>Did the progress presentation 1 successfully.</li> <li>Noted the key things pointed out by the assessment panel.</li> </ul>

JUNE 2023	
Date/Week	Details and notes of work carried out
WEEK 1	<ul style="list-style-type: none"> <li>Studied AWS, mongoDB and improved our machine learning knowledge since we need those skills heavily in our project project.</li> <li>Continued the model developments.</li> <li>Started write to research paper.</li> <li>Continued the front-end development of the mobile application.</li> <li>Extracted axial slices centered on kidneys, converted to JPEG format, resampled to 128x128 pixels, anonymized, partitioned into train/validation/test splits.</li> </ul>
WEEK 2	<ul style="list-style-type: none"> <li>Went field visits to the Anuradhapura Teaching hospital to collect data.</li> <li>Successfully collected data from Anuradhapura Teaching Hospital.</li> <li>Training and validation sets manually labeled by radiologists as CKD positive or normal based on clinical diagnosis. Test set kept unlabeled.</li> <li>Again, we must go the NIFS for more information collecting</li> </ul>
WEEK 3	<ul style="list-style-type: none"> <li>Continued the research paper writing.</li> <li>Read more research papers to get more ideas about the writing patterns.</li> </ul>
WEEK 4	<ul style="list-style-type: none"> <li>Continue the front-end development of the mobile application using Nodejs.</li> <li>Had an online meeting with our co supervisor Mr. Samadhi Chathuranga.</li> <li>Completed the Logbook.</li> </ul>

## JULY 2023

Date/Week	Details and notes of work carried out
WEEK 1	<ul style="list-style-type: none"> <li>• Learn to use TensorFlow, Introduction to TensorFlow, Neural Networks in TensorFlow.</li> <li>• Studied how to use TensorFlow for Natural Language Processing and how to implement a code.</li> <li>• Learned and get idea of how connect backend using TensorFlow.</li> </ul>
WEEK 2	<ul style="list-style-type: none"> <li>• Start implementing using TensorFlow got understand it need deep learning models.</li> <li>• Studied to use pickle files.</li> <li>• Went field visits to KDU hospital Borelsgamuwa to collect data.</li> </ul>
WEEK 3	<ul style="list-style-type: none"> <li>• Try to complete research paper</li> <li>• Read other research papers and get more ideas.</li> <li>• Continue the front-end development of the mobile application using Nodejs.</li> </ul>
WEEK 4	<ul style="list-style-type: none"> <li>• Discussed with the supervisors what needed to be changed in the research papers.</li> <li>• Fill in the logbook.</li> <li>• Finalized the research papers.</li> </ul>

## AUGUST 2023

Date/Week	Details and notes of work carried out
WEEK 1	<ul style="list-style-type: none"> <li>Studied Flask and improved our machine learning knowledge since we need those skills heavily in our project.</li> <li>Started to do the backend implementations.</li> <li>Make some changes in our research paper.</li> </ul>
WEEK 2	<ul style="list-style-type: none"> <li>Had an online meeting with our co supervisor Mr. Samadhi Chathuranga</li> <li>Started to make the status 2 document for the submission.</li> <li>Calculated accuracy, precision, recall, F1-score, AUC-ROC on test set. Generated confusion matrices. Compared model performance.</li> </ul>
WEEK 3	<ul style="list-style-type: none"> <li>Continued the work on the backend implementations of our mobile application.</li> <li>Implemented and trained Mobile Net, Efficient Net, Exception, ResNet50 CNNs using TensorFlow/Keras.</li> <li>Initialized with ImageNet weights then fine-tuned end-to-end on CT data.</li> <li>Chose Mobile Net as best performing model based on accuracy and AUC-ROC.</li> </ul>
WEEK 4	<ul style="list-style-type: none"> <li>Started to write the group and individual final thesis.</li> <li>Completed the Logbook.</li> </ul>

## SEPTEMBER 2023

Date/Week	Details and notes of work carried out
WEEK 1	<ul style="list-style-type: none"> <li>• Practiced for the individual component in the presentation.</li> <li>• Had a few rehearsals before the progress presentation 2.</li> <li>• Met with supervisors before the progress presentation 2 date to get some final insights.</li> <li>• Did the progress presentation 2 successfully.</li> <li>• Noted the key things pointed out by the assessment panel.</li> </ul>
WEEK 2	<ul style="list-style-type: none"> <li>• Make some changes in our research paper according to the panel comments.</li> <li>• Had a physical meeting with our supervisor Ms. Wishalya Thisera.</li> <li>• Research paper submission</li> </ul>
WEEK 3	<ul style="list-style-type: none"> <li>• Continued to work on the backend implementations of our mobile application.</li> <li>• Continued to write the group and individual final thesis.</li> </ul>
WEEK 4	<ul style="list-style-type: none"> <li>• Continue working on the backend of our mobile application.</li> <li>• Built Flask REST API server for user management, inference serving, and care recommendations.</li> <li>• Met with supervisors to update the progress.</li> </ul>

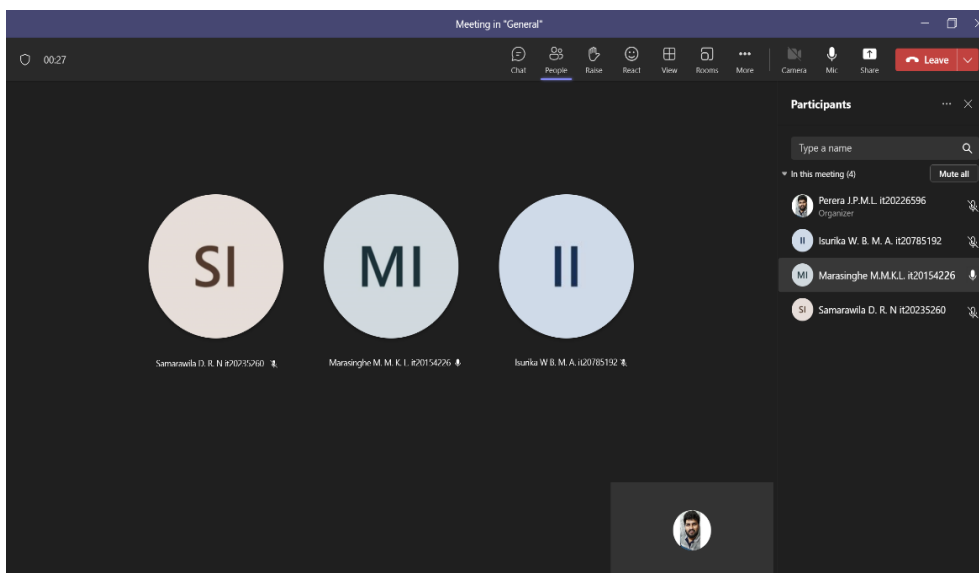
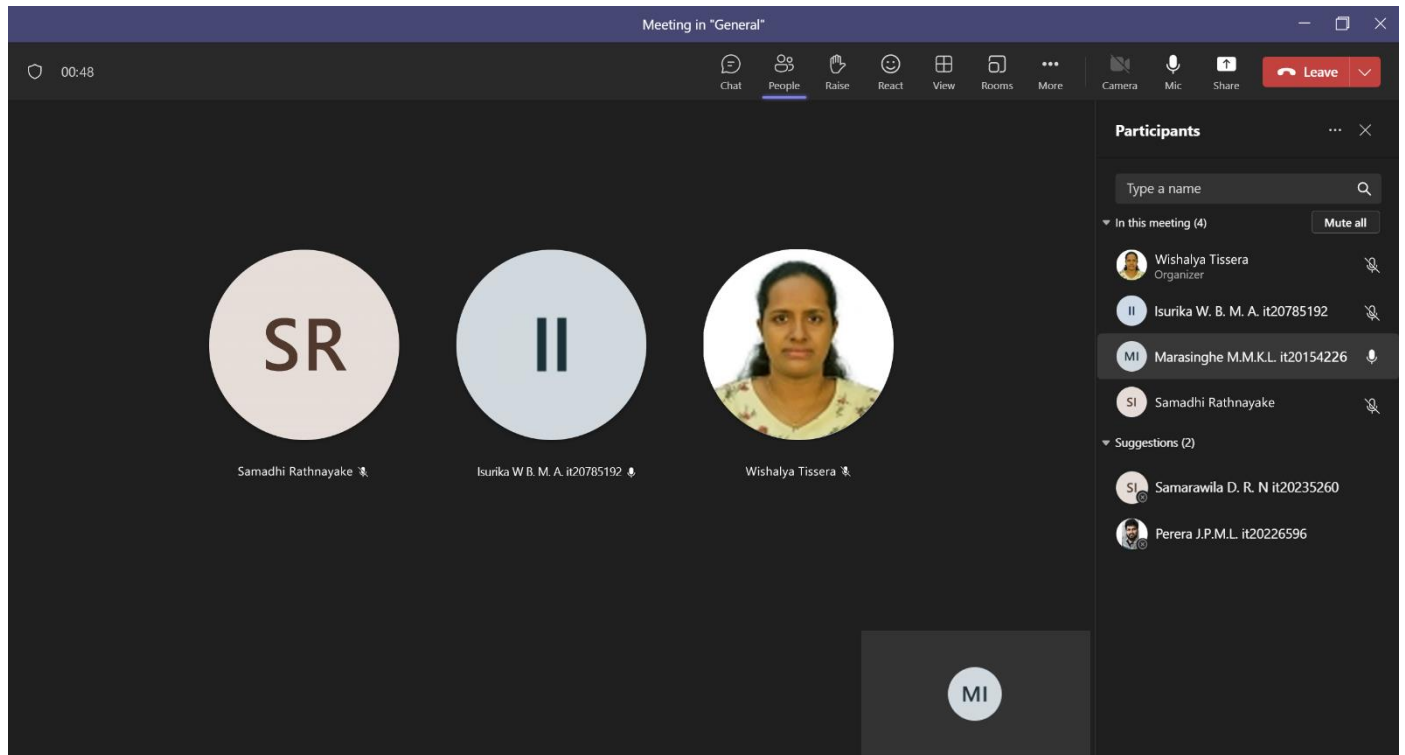
## OCTOBER 2022

Date/Week	Details and notes of work carried out
WEEK 1	<ul style="list-style-type: none"> <li>Started to make the status 2 document for the submission.</li> <li>Completed the Final thesis.</li> <li>Developed React Native mobile app with image upload, CKD prediction, and tracking features.</li> <li>Had an online meeting with our co supervisor Mr. Samadhi Chathuranga</li> </ul>
WEEK 2	<ul style="list-style-type: none"> <li>Completed the integration of both frontend and backend.</li> <li>Validated end-to-end user flows on emulators and physical devices. Profiled models for optimizations.</li> <li>Started to create the website for our research project.</li> </ul>
WEEK 3	<ul style="list-style-type: none"> <li>Completed the Logbook.</li> <li>Continued to create the website for our research project.</li> <li>Finalized the final documents.</li> </ul>
WEEK 4	<ul style="list-style-type: none"> <li>Practiced for the individual component for the Final presentation and viva.</li> <li>Had a few rehearsals before the Final presentation.</li> <li>Met with supervisors before the Final presentation to get some final insights.</li> <li>Did the Final presentation and viva successfully.</li> </ul>

## 2. Supervisor's & Co-Supervisor's Meetings

### 1. Teams meetings

#### a. Screenshots of meetings of calls





### 3. Group Meetings

Most of the meetings we got on campus.



## 4. Git Commit History

