# Android application for 360 image creation

## Team members


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## Purpose

The purpose of this document is to clarify the understanding of the project from first meeting and to present the roadmap developed after conducting research.

## Problem statement

A 2D image cannot capture all sides of an object in one picture. When all sides are combined in a single picture, it does not provide a true representation of the object. While there are 3D cameras available to capture images, they are expensive solutions.

## Solution

Develop an Android application that can capture images of all sides of an object and use them to generate a 3D image. The application will support two modes of providing 2D images: one where a single device captures images from all sides of the object, and another where multiple client devices cover all sides of the object and send the images to a central device for 3D image creation.

To preview the resulting 3D image, please visit the following links.

- https://3dmodels.org/360-view/?id=205082
- https://3dmodels.org/360-view/?id=217957

## Road map

The project will proceed in the following sequence of steps.

1. Learn that how images of different types (binary, gray-scale, color image) are stored.
2. Learn numpy library for manipulation and working on images.
3. Take some data points of images to perform operations on these.
4. Perform preprocessing of input images. Preprocessing includes:
    - Resize all input images to same size
    - Denoising images

    - Removing background and detecting area of interest
    - Translation and transformation of images
    - Perform morphological operations (opening, closing, gradient)
5. Perform image stitching to seamlessly merge overlapping areas and fill in any missing regions.
6. Learn that how can we store and display 3D images.
7. Development of application GUI.
8. Add the feature of taking 2D images using a single device.
9. Add a feature to organize taken images in the application.
10. Add a feature to connect multiple client devices with a central device.
11. Add feature of taking 2D images using multiple devices and sending these images to the central device.
12. Add the feature to rotate 3D image to look at it from any angle.

Following two tasks will be performed simultaneously.

- Learning and development of android app
- Learning and development of image processing module

## Technologies

The following technologies will be used in the project.

- XML, Jetpack Compose, and Kotlin will be used for front end and backend of the Android app
- OpenCV and numpy libraries will be used for image processing.