



Please make a copy of this document and include this in your GitHub repository for your submission, using the tag #AndroidDevChallenge

Tell us what your idea is.

Describe in 250 words what the feature or service will do and how you'll use Machine Learning to push the bar:

This project is an extension to the TB-Test project which has developed a mobile enabled plasmonic ELISA based TB antigen-specific antibodies detection scheme using Android smartphones with the integration of machine learning techniques. Using a robust image processing technique comprised of clustering and object detection, our system can detect samples (wells) without any guide or virtual plate. The decision components facilitated selection of the right cluster among the multiple number of clusters, detection of wells and transcending the samples from noise. Therefore, unlike the existing literature, the system does not require the user to provide seed points, perform cropping or using extra hardware attachment. Moreover, the system is capable of reading multiple samples and classifying them as positive or negative in real time.

The proposed app idea is to extend the TB-Test mobile app to serve as a smart ELISA plate reader with the following features:

- Read any plate size or type using images and analyse any colour of plasmonic nanoparticles to the presence or absence of any analyte (target protein).
- Multi-step filtering to reduce the problem of smearing by neighbours if the wells are filled within a close neighbourhood.
- Smart image capturing filter to automatically adjust distance, angle of image taking and detect shadow in images based on a trained machine learning model.

Link to the research paper: [An intelligent mobile-enabled expert system for tuberculosis disease diagnosis in real time.](#)

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Tell us how you plan on bringing it to life.

Describe where your project is, how you could use Google's help in the endeavor, and how you plan on using On-Device ML technology to bring the concept to life. The best submissions have a great idea combined with a concrete path of where you plan on going, which should include:

- (1) any potential sample code you've already written,
 - (2) a list of the ways you could use Google's help,
 - (3) as well as the timeline on how you plan on bringing it to life by May 1, 2020.
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- (1) I've shared with you the code of the TB-Test project I've developed to read the ELISA plate using image processing and detect the absence or presence of the TB antigen-specific antibodies based on colours (full code under the copyright of the TB-Test project).
 - (2) Google Photo or any app that utilise image processing techniques would be of great help to the proposed idea to ease challenges encountered during the development of the TH-Test project.
 - (3) Our Plan will be as:
 - January: Collect more data as required to train the model on the new types and sizes of the ELISA plates.
 - February: Enhance the multi-step filter to reduce the effect of smearing by neighbour wells as mentioned in the previous section.
 - March: Develop the smart image capturing tool that detect distance required, angle, and reduce shadow in the image.
 - April: Test and maintain the software.

Tell us about you.

A great idea is just one part of the equation; we also want to learn a bit more about you. Share with us some of your other projects so we can get an idea of how we can assist you with your project.

I am Dr Antesar Shabut, a lecturer in Computer Science at Leeds Trinity University. I was a research fellow at Anglia Ruskin University where I developed the TB-Test app. We are here at Leeds Trinity University, computing department form a small team who work together using agile and scrum methods to deliver excellent teaching and research. We have expertise in research as well as software development best practices. We would like to deliver this project as a team at Leeds Trinity University Smart Lab.

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[http://research.leedstrinity.ac.uk/en/persons/sorrel-harriet\(69046ddf-1bfc-47ef-98a7-736f58012bbb\).html](http://research.leedstrinity.ac.uk/en/persons/sorrel-harriet(69046ddf-1bfc-47ef-98a7-736f58012bbb).html)

Next steps.

- Be sure to include this cover letter in your GitHub repository
- Your GitHub repository should be tagged #AndroidDevChallenge
- Don't forget to include other items in your GitHub repository to help us evaluate your submission; you can include prior projects you've worked on, sample code you've already built for this project, or anything else you think could be helpful in evaluating your concept and your ability to build it
- **The final step is to fill out this form to officially submit your proposal.**