



# **DCRUST HACK**

## **IDEA SUBMISSION FORM**

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<b>Name of the Idea</b>	<b>AR Labs</b>			
<b>Theme</b>	<b>SMART UNIVERSITY</b>			
<b>Problem Description</b>	<p>The Covid - 19 pandemic has forced everyone into their homes, thus affecting education as online learning limits the students to theoretical knowledge. But when it comes to understanding topics and implementing the concepts, practical knowledge is mandatory. Branches like EE, ECE, ME and Civil whose entire curriculum revolves around practical knowledge are at a disadvantage due to unaccessibility of the physical labs.</p>			
<b>Solution Description</b>	<p>AR Labs is a virtual laboratory app using Augmented Reality technology, where students can have access to lab environment and gain hands-on practical knowledge about the subject from their homes.</p> <p>In the app, students can view the lab apparatus in 3D and play with them. It would provide the students with the sensation of performing the experiments in their university laboratories. The components of the app are as follows:</p> <ol style="list-style-type: none"> <li>1. An Apparatus Screen, where the apparatus of the selected experiment will show in 3D using marker-less triggers like floor, bed, table etc. (similar to Snapchat AR technology). The apparatus can be zoomed, rotated or played with.</li> </ol> <p>The screen will have 4 buttons- Run, Test, Exp and Wire.</p> <ul style="list-style-type: none"> <li>• Run button will run the apparatus and will provide the output to the student.</li> </ul>			

	<ul style="list-style-type: none"> <li>• Test button will check whether the changes made by the student on the apparatus are right/wrong and will point out the corrections to be done.</li> <li>• Wire button will be used for experiments where wiring is required. Clicking on it and then selecting the points to be joined on the apparatus, a wire will be generated between those points.</li> <li>• Exp button will open an experiment sheet pop-up which the student can access any time during the experiment.</li> </ul> <ol style="list-style-type: none"> <li>2. A small video screen, where the teacher/lab instructor will come live on video call during practical class, as in live video theory classes. He will describe the experiment and guide students while they perform it.</li> <li>3. A chat box where students can clear their doubts with the teacher like in online classes.</li> </ol>
<b>Goal of solution</b>	<p>Augmented Reality is the futuristic approach to the educational improvement. The goal of AR Labs is to stretch the limits of online education so that practical knowledge can also come under the roof. With AR Labs, student will have hands-on access to their practicals. This will help them grasp the concepts deeply and apply them more effectively. Students will be able to understand the internal functioning of machinery used in the experiment, its working and internal connections and will also be able to perform experiment on their own. Individual hands-on approach will result in better performance during practical examination.</p>
<b>Feasibility of the solution</b>	<p>AR Labs allows the students to perform the experiment by producing 3D experiment apparatus on their smartphones with the help of marker-less triggers (table, bed, floor etc.) like in Snapchat bitmoji AR technology. It can also be used in physical laboratories for experiments whose apparatus is either not available or damaged.</p> <p>AR Labs is economically feasible and environmental friendly as it only requires a touch screen device (smartphone, tablet etc.) having Android version 7.0 and above (works better for versions above 8.0) or iOS 11, and an internet. These facilities are available with almost all university students. Also, the app development cost is minimum, as popular AR platform Unity is a free and open source software which contains Vuforia engine for high-level AR app development. Only the licence key for Vuforia Engine needs to be purchased which has a one-time cost of \$499 (Rs. 37,398). Knowledge of C# or Java is required for app development.</p>
<b>Applicability of the solution</b>	
<b>Benefits of the solution</b>	<ul style="list-style-type: none"> <li>• Allows students to perform lab experiments from anywhere and at anytime.</li> <li>• Can be used in physical laboratories for experiments whose apparatus is either costly or damaged.</li> <li>• Due to less number of apparatus and time constraint, very few students are able to perform the experiment while others look on. Using this app,</li> </ul>

	<p>students get hands-on access to lab apparatus individually at the same time as their fellow classmates.</p> <ul style="list-style-type: none"> <li>• The visual and interactive nature of the app affect learners on a cognitive level and stimulate imagination, therefore enabling students to process the information faster.</li> </ul>
<b>Uniqueness of the idea</b>	<p>Augmented Reality till now has only been used at primary level in school education, where 3D objects are triggered using marker- based triggers like images in books. AR Labs uses marker-less triggers which saves student's money from buying any special books for practical work.</p> <p>In recent years, educational institutions have increased the usage of SmartClass where students learn visually in 2D format using projectors. But this is not enough as interactivensess further enhance the ability of students to remember what they've learned and lead to faster acquisition of information and skills which can be achieved using AR technology at a decent price.</p>