1. Title of the Proposal: Automatic Classification of Images for Defects (ACID)

2. TDP Mentors from ISRO:

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3. Objective

Automatic Classification of Images for Defects (ACID) is an Artificial Intelligence (AI) based Software which targets at classifying defects found on wafers in a Semiconductor Industry. It helps in finding the root cause of the defect via continuous feedback loop based training on the AI model. It automates the classification process which currently consumes a huge amount of precious time of the assigned Scientists/Engineers. All the Integrated Chips (ICs) are manufactured in a Semiconductor Fabrication facility and this is a major problem faced in solving the defect related issues to maximize the device yield in the end product.

4. Scope
   - Automatically classify the defect images using advanced neural networks.
   - Alerts sent to the concerned Fab engineer for the respective defects.
   - List down the probable causes for the defects generated on wafers.

5. Scientific / Technical Need Aspect / Relevance with Indian Space Programme

   - ACID helps in faster device manufacturing in a Semiconductor Fab resulting in speedy delivery of ISRO related ICs like Vikram processor, NAVIC, etc.

6. Product / Service Marketability

   - The ACID product needs all the defect images an input to train the AI model.
   - The ACID also needs the Fab employees' email ids to send defect generated alerts for the corresponding process.
   - The ACID also needs an efficient computing server/cloud for Artificial Intelligence (AI) models in order to train the defect images.

7. Brief Outline of the Project

ACID is aimed at providing state-of-the-art technology for automating wafer level defect classification. It reduces the production time in the Fabrication line by reducing the time taken in finding the actual root cause for low device yield. The current method of classification and its analysis report is done manually by

Scientists/Engineers. Hence, it is very much needed to automate the manual activity, so that the Scientists/Engineers is able to use the time in doing research studies & add the advanced level defect detection types & methods into the deployed neural network technique. The defect is not just generated during wafer fabrication, but also in design layouts for designers and in many other fields. Therefore, based on this project's success, other fields in ISRO/DOS centres can be explored for automatic type classification.

**8.** Expected Results / Deliverables

- A desktop/mobile based application as an end product with modern UI/UX.
- A powerful & robust designed Deep Learning (DL) model for huge set of defect images data.

**9.** Business potential of Outcomes/ product/ Prototype

- ACID can be provided to any other Semiconductor Fab globally. This can be distributed as services based on a per year license fee.
- ACID can further be extended to defects getting generated & in finding the root causes in other areas like Layout design, Space vehicle faulty parts, etc.