**SOFTWARE DEFINED CAMERA**

**Funding Required: Rs. 85,850**

**Proposal submitted in connection with the**

**NEDAASC FYP Funding 2021-22**

**Batch: 2018-19**

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**Abstract/Summary**

All the computer vision algorithms that perform image analysis and processing require high quality images. The conventional cameras are not programmable; hence can’t provide a constant and standard image quality in different scenarios. If the environment diverges from normal, more computationally intensive & time-consuming algorithms will be required to generate clean and clear images before using them in computer vision applications. This forwards us towards software-defined camera; where imaging sensor inside camera is adaptive to respond environment by processing the images directly on the camera. The strategy is to make camera smart enough so that it can sense its surroundings and noise, adjusts its internal hardware and select most suitable parameters for the situation even before the image is captured.

**Project Synopsis**

Computer vision applications are widely used nowadays which need to analyze and process a large number of images and video streams in real-time. This real-time constraint can be handled if the live camera feed is preprocessed right at the edge device i.e. an FPGA. The FPGA coupled with an image sensor is used to develop a camera that is adaptive and can preprocess the incoming live camera feed using high-level synthesis. Thus, this approach proposes to define a Software-Defined Camera that utilizes the software-hardware co-design functionality of the Zynq-7000 FPGA

**Objectives**

• To study and determine exact parameters which can be manipulated to produce high quality images.  
• To integrate different models of the environment for an efficient solution.  
• To exploit the internal architecture of the image sensor.  
• To develop image pre-processing IP cores and implement a solution that will integrate all the cores.  
• To test the software-defined camera for outdoor surveillance applications under various environmental  
conditions.

**Methodology**

Our project’s aim is to make camera smart enough, such that it produces high quality images in varying environment. The methodology we will use to achieve our target comprise of:

A. Environmental Profiling:Conventional cameras will be used for capturing images in different environments at regular  
intervals. These images help in determining the most varying parameters.  
B. Image Sensor Integration:PCAM 5C module will be connected to the FPGA board and a set of open-source Vivado IP cores  
will be used for its configuration in software.  
C. Image Processing Cores using Vivado HLS:Vivado High Level Synthesis will be used for generation of different soft IP cores.

**Cost Breakdown**

List the items and their description (if needed). Add or delete the rows accordingly.

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| **S.No** | **Items/Testing/Service etc.** | **Amount in Rupees** |
| 1 | FPGA Development Board | Rs. 62,950 |
| 2 | Imaging Sensor | Rs. 12,900 |
| 3 | Miscellaneous | Rs. 10,000 |
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|  | **TOTAL AMOUNT** | **Rs. 85,850** |