**Trimester: 2**

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| Project Name: | Real time two stage Image Classification Model |
| Background Information | *Generally, for any Object detection or classification we use Deep Learning models which are heavy both in terms of training and deployment. Self -Driving cars require lot of training as they are supposed to move in real time traffic whereas Autonomous vehicle is supposed to move in a constrained path (Manufacturing Plant, University).* |
| Statement of the Problem | Build a two-stage image detection and classification model which can be used in Autonomous Vehicles |
| Proposed Solution | Streaming video from a monocular camera which is converted into frames  Select frames at a fixed interval or fixed distance or both and perform background subtraction with reference image  If there is any object identified which is not present in the reference image, then classification model is used to identify at distance X whether the object is human or not  Output from the model is used for Steering control of the vehicle |
| Detailed Scope of Work: | Scope:  Data is collected from single source i.e., Monocular Camera fixed on the vehicle. Only daytime images are considered in the scope. Frames (Images) will be selected and processed based on distance (as it is constrained path) of every 2mtrs or for every 2 seconds or both.  This model when implemented in an autonomous vehicle can help detect objects presence and slow down the speed of the vehicle based on object Classification.  Flow Diagram |
| Support needed from Program office | Infrastructure support and Data collection support  Preferred Mentor: JB Simha |
| References | 1. Smart Suitcase Implementation Using Fuzzy Logic and Deep Learning:   KIM TIEN LY, School of Computer Science, University of Nottingham, UNITED KINGDOM,  3rd UK-RAS Conference for PhD Students & Early Career Researchers, Hosted virtually by University of Lincoln, April 2020   1. I. Setitra and S. Larabi, “Background subtraction algorithms with post-processing: A review,” *Proc. - Int. Conf. Pattern Recognit.*, pp. 2436–2441, 2014, doi: 10.1109/ICPR.2014.421. 2. Z. Wang, A. C. Bovik, H. R. Sheikh, and E. P. Simoncelli, “Image quality assessment: From error visibility to structural similarity,” *IEEE Trans. Image Process.*, vol. 13, no. 4, pp. 600–612, 2004, doi: 10.1109/TIP.2003.819861 3. iRobot. Brandon Rohrer, “How to Convert an RGB Image to Grayscale.” https://www.kdnuggets.com/2019/12/convert-rgb-image-grayscale.html |