Abstract

Head up Display (HUD) is a means of presenting information to the pilot key flight instrument data onto a set of glasses regarded as beam combiner positioned just in front of the pilot's line of sight looking ahead out of the aircraft helping him in key tasks like take off, navigation and landing. It also improves the situational awareness greatly by displaying flight, sensor and instrument data in the pilot's forward field of view. HUD employs a CCD camera mounted right in front of the pilot, that is, between the beam combiner and the pilot for recording the view comprising of the outside world and the HUD symbology as seen by the pilot. This recorded video is sent directly through telemetry to the flight analysis ground station for real time flight data analysis as seen by the pilot as well as to guide the pilot. The recorded video is also used for post flight analysis as well as video source for HUD repeater display used by the pilot occupying rear cockpit seat in case of trainer aircrafts. The inconsistent and improper lighting conditions prevailing during weather conditions such as rain, snow, fog, bright sunny daylight and against the white clouds causes either insufficient or excessive light intensity at different spatial locations falling on the CCD camera sensor head resulting in degraded image quality with very low contrast. The work presented in this paper
attempts to tackle this problem through theoretical study and experimental analysis. A
customized template matching technique is also presented here for enhancement of the video
captured by HUD camera. Added to this, hardware based methods are also suggested which
can be employed for real time video enhancement.

References

- Marconi, U. S. Patent 4,261,647 (1981), Head Up Displays
- S. K. Nayar and V. Branzoi, "Adaptive dynamic range imaging: optical control of
- Michael A. Webster, J. D. Mollon, The influence of contrast adaptation on color
  appearance, Vision Research, Volume 34, Issue 15, August 1994, Pages 1993-2020, ISSN
  0042-6989, 10. 1016/0042-6989(94)90028-0.
- Purves, D. & Lotto, R. B. (2003) Why We See What We Do: An Empirical Theory of
  Vision (Sinauer, Sunderland, MA).
- Mannami, H.; Sagawa, R.; Mukaigawa, Y.; Echigo, T.; Yagi, Y.; , "High Dynamic
- H. Bao, G. Wang, N. Li, "Character Recognition of Instrument Board in Sequent
  Color Image"; IS&T/SPIE's 15th Annual Symposium on Electronic Imaging, Santa
  Clara, California, U. S. A. Jan. 2003
- Qingming Huang, Wen Gao, WenjianCai, Thresholding technique with adaptive window
  selection for uneven lighting image, Pattern Recognition Letters, Volume 26, Issue 6, 1 May
  2005, Pages 801-808.

Index Terms

Computer Science  Pattern Recognition
Keywords

Head Up Display  Ccd Imaging  Simultaneous Contrast  Image Segmentation  Template Matching