

ABSTRACT

Driver Assistance System (DAS) is an embedded device on a vehicle to assist the driver in controlling the vehicle. One application of the Driver Assistance System is Advanced Warning System. This device will alert the driver when the accident risk is detected while driving. It is intended that the driver is always watchful for various driving situations and will not do the wrong control while driving.

This Final Project discuss about the design and implementation of Advance Warning System in microcontroller based on embedded system. Sensor that used in this system is a stereo camera. The implementation of multi-ocular devices intended in the system to obtain representation of a real object (3D) independently. Eventually, the movement of detected object became the basis of process to estimate motion perception. The visual motion processing is computed by using binocular ego-motion estimation method. The principle of this method is obtaining motion perception by finding motion of static objects that detected in front of the camera, which is the representation of it's movement. This is a motion in six degrees of freedom (6DOF). After acquired the self motion and the position of objects in front of the system, then the system will estimate the direction and limitation speed of system so the motion does not collide with the objects or provide a warning when the possibility of collisions was detected.

Processing stages that applied in this final project are features detection, coordinate transformation, computation of absolute orientation, estimation of motion perception, and user interfacing. The method presented in this final project have been tested and analyzed every stage of it's processing accuracy. The experimental results have shown the error value of coordinate transformation is only $\pm 2\text{cm}$ and error value of absolute orientation proccess is also on the range of coordinate transformation error. However, the processing time is still too long. It takes an average of 5.111 seconds to process a single frame image. The processing time causing movement speed limits tolerated by the system is only 6cm/s.

Key Word: Warning, Stereo Camera, Microcontroller, Estimation