Start date : 08-June-2022

Final deadline : 08-August-2022

Week 1 – Literature survey (08-June to 15-June) :

* Goal : To narrow down a problem statement and begin learning the theory behind approaching the same
* **Determined PS : Classifying pedestrian obstruction probabilities using fuzzy logic states (using 2D cameras)**
* Threat level factors considered : object orientation & angle, relative speed & displacement of the obstacle, (maybe the likelihood of erratic behaviour)
* The algorithm for classification poses the largest challenge in the detection of orientation angle.
* Initially experimented with the usage of stereo cameras to measure depth of the object and use that data to calculate angle of orientation.
* Currently exploring the usage of quaternions to directly extract angle of orientation from a rotation matrix obtained by processing pedestrian body landmarks (identified using mediapipe at the moment) due to latency issues in the usage of two simultaneously active cameras.

Week 2 – Algorithm development (16-June to 22-June) :

* Goal : To implement an algorithm in python to capture angle of orientation of a human, a script to calculate the depth of a point from a pair of stereo images and a function to take the depth, two successive images & fps to give the speed and direction of the obstruction.
* Efforts to eliminate the usage of a second camera are desired here, which will influence future goals
* A hackathon may be necessary for this

Week 3 –Algorithm accumulation (23-June to 30-June) :

* Goal : To write a program to identify multiple pedestrian obstacles and record orientation & speed data for each. From this, the expectation of collision must be classified into fuzzy logic states (adjust the thresholds for angle of orientation)
* A hackathon may be necessary for this

Week 4 – Hardware building + optimization + buffer (01-July to 08-July) :

* Goal 1 : To record all findings, course corrections and implementation of the project in paper format
* Goal 2 : To construct a test bed and test the algorithms developed previously.
  + Expected components : 2 cmos cameras, dual camera adapter, jetson nano/pi 4, 4 wheels, 4 motors, motor drivers, chassis, mounting adapters for cameras, wires, power bank
  + Record scene videos using phone camera.
  + Write paper based on algorithms tested on video.
  + Optimize simultaneous to paper writing.
* Goal 3 : To optimize the previously tested algorithms to reduce latency to below 50ms (ideal case, industry standard is 300ms)
  + This may involve implementing the previous algorithms in C++
  + CUDA & multithreading optimization can be looked into for processing multiple image streams

Week 5 – Buffer week (09-July to 16-July) :

Week 6 – Buffer week (17-July to 24-July)

Week 7 – Buffer week (25-July to 01-August) :

Week 8 – Buffer week (01-August to )