**Abstract**

Over the past years, several approaches for automatic map creation have emerged since map creation by hand is quite tedious, with SLAM-approach being one of the most popular at the moment. SLAM is short for Simultaneous Localization and Mapping and aggregates a number of approaches of automated map generation without any additional knowledge apart from sensor information. It is a technique used by robots and autonomous vehicles to build up a map within an unknown environment, or to update a map within a known environment, while at the same time keeping track of their current location. Monocular SLAM is an application which applies SLAM methodology from mobile robotics to the pure vision domain using a single camera. The basic application of building maps using a single camera, in our case, can be correlated to the concept of building a map by an intelligent wheel chair navigating in a built environment that would facilitate navigation for people with visual and motion impairment.

In order to map a closed unknown rectilinear area such as rooms or corridors we can use a single monocular camera placed inside the rectilinear area and proceed by calculating the distances of landmarks present on the walls of the rectilinear area via triangulation. By exploiting results from computational geometry we arrive at the dimensions of the rectangular area thereby mapping the unknown area.

We present Geometric SLAM -a Monocular SLAM algorithm which can map a closed unknown rectilinear area using a single monocular camera. We have transformed the problem into the domain of computational geometry to ease the process of deriving a feasible solution to our problem. In the domain of computational geometry the problem has been solved and an algorithm proposed, we map the unknown rectilinear area to a rectilinear of unknown dimensions and the single monocular camera is mapped to a single point which is located inside the region. In this work, we have proposed a theorem that leads us to find the corners of the rectilinear area and thereby the dimensions of the unknown rectilinear region. This is achieved by using a single monocular camera placed inside the rectilinear region.

We also perform an experimental simulation of the algorithm Geometric SLAM to map a rectangular room with landmarks present on the walls. The depths of the landmarks are measured via triangulation and image matching is done using ASIFT algorithm which finally leads to the determination of the corners thereby mapping the area.