An industrial robot is isolated into work cells making the operation of industrial robots rigid and inflexible. The robot requires tremendous amount of time and resources should a new task or change is required in the workcell. This stigma and the reality of owning an industrial robot hinder the confidence of small and medium-sized enterprises (SMEs) to adopt industrial robot technology. This thesis attempts to democratize robot technology and automation to the SMEs by introducing an inexpensive, flexible, and safe robotic technology. This thesis intends to show the feasibility of constructing a robot manipulator with obstacle avoidance motion planning. Therefore, a six-axis (6R) manipulator as a prototype is developed to investigate the planning and motion control of the manipulator in a dynamic environment. The prototype replicates the typical 6R industrial robot design. Rapidly-exploring random tree (RRT) is chosen to plan and control the motion of the manipulator in the dynamic environment. A physic engine simulator simulates the manipulator and the obstacle avoidance planning. A 3D obstacle is introduced into the simulation environment and moves periodically from an initial point to a goal point in the form of sinusoidal motion described by $A + B\sin(2\pi tC)$. The motion planning is validated with the prototype hardware. However, the moving obstacle is augmented by the simulation environment to maintain safe experimentation and the preservation of the prototype. Consequently, RTAB-Map is used to facilitate an encoder-less context of the manipulator. Although RTAB-Map provides the confident state estimation of the robot task space and, consequently, the joint-space configuration of the manipulator, the estimation is intermittent. It is recommended that a new pipeline, capable of splining between the state estimation and the planning trajectories, is implemented for motion planning in the dynamic environment using SLAM solutions under the encoderless context.