There are two main contributions in this research. Firstly, a geodesic curvature flow based geodesic computation scheme is presented for acquiring length measurements for modelling cloth. Due to the fast growing demand on usage of high resolution character model in animation production as well as the increasing number of characters need to be handled simultaneously, the efficiency of modelling cloth for multiple high resolution character is very important. In order to improve the efficiency of measuring character for cloth fitting, a fast geodesic algorithm that has linear time complexity with a small bounded error is also presented. Secondly, a cloth pattern adjusting genetic algorithm is developed for automatic cloth fitting and retargeting. Due to the variety of body shapes and proportions in character design, fitting and transferring cloth to different character is a challenging task. This thesis considers the cloth fitting process as an optimization procedure. It optimizes both the shape and size of each cloth pattern automatically, the integrity, design and size of each cloth pattern are evaluated in order to create 3D cloth for any character body shapes and proportions while preserve the original cloth design.

By automating the cloth modelling process, it empowers the creativity of animation artists and improves their productivity by allowing them to use a large amount of existing cloth design patterns in the fashion industry to create various clothes and to transfer same design cloth to characters with different body shapes and proportions with ease.