



Stereo Vision Based Navigation for Humanoid Robot

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Research and development in humanoid robots have been widely studied. In the past, robot could walk on even terrain or a small slope surface. For a rough terrain, step terrain or obstacle-filled environments, the robot could not walk through such environments. Currently, the researchers have focused on a guided motion of the robot by using a vision system.

In this research, the guided motion of a humanoid robot, constructed at FIBO, is performed by stereo vision system. This system can compute the distance between the robot and the environmental obstacle, and compute a shape and an area of a sensing object. Therefore, the gait parameters of the robot, such as the step length, the step height, can be defined to walk the robot across or avoid the obstacle.

The image guided motion procedure consists of 3 processes as shown in Figure 1.

1. Disparity Estimation

This process rejects the environmental noises from the image signals, which capture from the cameras, and then computes the depth between the sensing object and the robot.

2. Object's Plane Surface Generation

This process computes the area of the sensing object or obstacle to generate the object's plane surface.

3. Foot-Step Planning

This process computes the foot-step planning by considering whether the object's plane surface is big enough for the foot placement or not. If it is big enough, the robot is able to step on such obstacle plane. If it's not, the robot has to walk across the obstacle.

After finishing above processes, we can defined the foot placement of the robot. The gait parameters, step length, step height, and walking velocity, will be sent to the low level controller to modify the walking pattern of the robot for crossing or avoiding the obstacle in its environment.

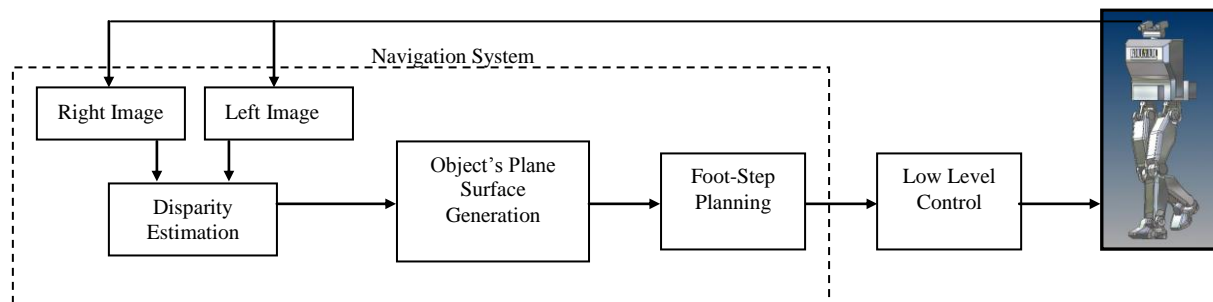


Figure 1. The image guided system by using the stereo vision