CSCI 5980 Special Topics (2017S):
Multiview 3D Geometry in Computer Vision

Figure 1: We will study 3D reconstruction given a set of multiview images. The figure illustrates a usage of 3D reconstruction, using wearable cameras (GoPro cameras) to reconstruct human body motion in 3D.

Course Description

Multiple cameras are continually capturing our daily events involving social and physical interactions in a form of first person camera (e.g., google glass), cellphone camera, and surveillance camera. Multiview geometry is a core branch in computer vision that studies the 3D spatial relationship between cameras and scenes. This technology is used to localize and plan robots, reconstruct a city, e.g. Rome, from internet photos, and understand human behaviors using body-worn cameras. In this course, we will focus on 1) fundamentals of projective camera geometry; 2) implementation of 3D reconstruction algorithm; and 3) research paper review. The desired outcome of the course is for each student to have his/her own 3D reconstruction algorithm called “structure from motion”. This will cover core mathematics of camera multiview geometry including perspective projection, epipolar geometry, point triangulation, camera re-sectioning, and bundle adjustment. This geometric concept will be then, in parallel, implemented to directly apply to domain specific research such as robot localization.

Course Information

Instructor: Hyun Soo Park (hspark@umn.edu)
Textbook: Not required but the following book will be frequently referred.

Multiple View Geometry in Computer Vision, R. Hartley and A. Zisserman

Time: 4:00pm - 5:15pm, Tuesday and Thursday
Location: Folwell Hall 28
Prerequisite: Background knowledge on Linear Algebra and Computer Vision (5561)