As applications for shape memory polymers (SMPs) become more advanced, it is necessary to have the ability to monitor both the actuation and thermal properties of structures made of such materials. In this paper, a method of using three stereo pairs of webcams and a single thermal camera is studied for the purposes of both tracking three dimensional motion of shape memory polymers, as well as the temperature of points of interest within the SMP structure. The method used includes a stereo camera calibration with integrated local minimum tracking algorithms to locate points of interest on the material and measure their temperature through interpolation techniques. The importance of the proposed method is that it allows a means to cost effectively monitor the surface temperature of a shape memory polymer structure without having to place intrusive sensors on the samples, which would limit the performance of the shape memory effect. The ability to monitor the surface temperatures of a SMP structure allows for more complex configurations to be created while increasing the performance and durability of the material. Additionally, as compared to the previous version, both the functionalities of the testbed and the user interface have been significantly improved.

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The public is welcome to attend.