To provide novel measurements of particle sinking rates, marine snow fluxes and particle densities, the minion stereo-camera system is proposed. The stereo camera system consists of two raspberry-pi cameras, lights and raspberry-pi zero control boards which are mounted in pressure housings on the outside of the minion float system. The system will be capable of taking stereo images of marine particle fields for the purpose of stereo-measurement. Stereo-measurements of these particle fields will allow for the determination of particle sizes and densities. Because the system is mounted on an isopychnal float, the camera system will also be able to take videos (at low frame rates) to determine the sinking rates of the particles.

Low cost and ease of manufacture of the camera system is required to allow for the construction of multiple units at low cost. To accomplish both a low cost and ease of manufacture, the use of rapid manufacturing technologies and low-cost, open-source hardware for the camera system will be used. More specifically, raspberry-pi cameras and resin printed pressure housings will allow for a low cost per camera system and the ability to manufacture components using widely available resin printing machines. The resin printed housings will form-fit the exact components, and will be pressure-compensated through resin filling. Ports for the lights and cameras are constructed from acrylic disks, and fitted into the acrylic housings using a simple retaining-ring design. The lights used are Cree-XPLamp LEDs, which provide high output power at ~630nm for a given current. The system is powered using a separate arduino board and two 2000mah batteries, which control the power-cycling for the boards, and provides power for the lights. The cameras, lenses and all control boards can be purchased off-the-shelf for a cost of less than $300 for all the hardware components.

The stereo-camera system will be mounted on the exterior of the minion float system using a flexible, 3D printed mounting system. The system allows for the flexible movement of the cameras and lights around the cylindrical body of the minion, and also uses hinge joints to vary the angles between the cameras and lights. The flexible mounting system will allow for the determination of the correct stereo-separation between cameras through measurements.