Design and Development of an Optical System for 3D Direct Detection of Dental Arch Model From the Patient's Mouth

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This paper describes a 3D scanning system based on an active vision method using structured light in order to obtain the CAD model of a dental arch. Presently, dental prosthesization requires long times in between detecting the shape of the dental arch, plaster model generation, scanning of it, prosthesis preparation, and implant. The situation is even worse when use of dental implants is required, while early loading of the implants is considered a positive solution. For this reason many devices are actually presented for the intra oral determination of the shape of dental prostheses and inserts. These devices however are able to detect limited portions of the dental arch, since they must be hand held by the doctor. This work presents a new device able to detect with high precision the entire dental arch.

Disinfection of Male Luer Style Connectors for Prevention of Catheter Related Bloodstream Infections Using an Isopropyl Alcohol Dispensing Cap

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Catheter Connections

Bacterial colonization of needleless injection sites (NISs) frequently results in catheter related bloodstream infections (CRBSIs). Hospitals have instituted protocols aimed at disinfecting NIS prior to access. Furthermore, several manufactures have developed devices that facilitate disinfection of NIS. Despite these steps, the incidence of CRBSI is still alarmingly high. Currently, there is no protocol or device intended to disinfect male luer connectors such as those found on IV tubing that are commonly coupled and decoupled from the NISs. Since these IV tubing connectors directly contact the NIS (which have been repeatedly shown to have varying levels of bacterial colonization), it is highly likely that they, too, will have varying levels of contamination. In order for disinfection of the NIS to be effective, the IV tubing connector must also be disinfected. Our design goal was to develop a device that could be used to disinfect a male luer style connector without allowing antiseptic into the inner lumen of the male luer. We designed a three component system that utilizes a silicone sealing cone to seal the male luer, a reservoir foam that holds 70% isopropyl alcohol (IPA), and a reaction force foam that increases the seal pressure of the sealing cone while the reservoir foam is compressed delivering the IPA to the outside surface of the male luer post. Sealing cone geometry was optimized using a custom built seal pressure test apparatus. Reservoir and reaction force foam functional parameters were assessed using an Instron test apparatus. A two phase compression stroke was designed into the device to allow for sealing and dispensing of IPA. An IPA transfer test was used to assess the transfer of disinfectant from the reservoir foam to a liquid filled male luer connector (modeling an IV tubing connector). No disinfectant was found to be transferred from the device to the inner lumen of the IV tubing connector model (n=30). To test the efficacy of the device on reducing bacterial count on the male luer, a disinfection study was performed using the optimized device. Male luers were immersed in bacterial suspensions of S. aureus, S. epidermis, P. aerginosa, and *E. coli*. A 4 log reduction compared with a positive control was found in each sample treated with our disinfection cap (n =120). In conclusion, we developed a device that effectively delivers an antiseptic to a male luer style connector without leaking any antiseptic to the inner lumen of the luer post