

A VME/X-WINDOWS BASED CONTROL SYSTEM FOR A CLINICAL NEUTRON MACHINE.

R. Emery, University Of Washington Medical Center; J. Jacky, University Of Washington Medical Center; D. Reid, University Of Washington Medical Center; R. Risler, University Of Washington Medical Center

A control program has been developed for use with an existing radiation therapy machine used to treat cancer patients with neutrons. The system is safety-critical, multitasking, meets real-time deadlines and replaces existing control system hardware and software in use since 1984. The program allows therapists to treat patients in a safe and timely manner. The system controls various wedges, filters, and a collimator that shapes the therapy beam dose distribution. It checks the actual machine state against a database of prescribed machine setups, and records accumulating dose for each patient across multiple treatment sessions, and updates logs used for patient record keeping and machine quality assurance. Development involved both formal and traditional methods, including extensive use of the Z formal specification language. Since the therapy equipment is in daily clinical use with the original control system, access to real machine hardware was very limited. This limited access necessitated the use of portable components such as X windows and ANSI C to allow for most development and testing to be done on a general purpose workstation and operation system. The program was written only in ANSI C using minimal support (X windows, the real time operating system, and ANSI C libraries) to reduce the dependence on other third party products and software. This was done to ensure stability over the lifespan of the the system and for quality control of safety critical functions. Experiences with testing the program and actual clinical use is reported.