**2022年英特尔杯大学生电子设计竞赛嵌入式系统专题邀请赛**

**参赛队作品简介**

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| **作品题目****（中英文对照）** | iGuard：一种危险工作环境下的智能风险预警系统iGuard: An Intelligent Risk Early Warning System in Dangerous Working Environment |
| **作品****简介****（中****英文****对照****，中****文限****500字以****内）** | 《中华人民共和国2021年国民经济和社会发展统计公报》指出，全年各类生产安全事故共死亡26307人。每年在危险环境下由于操作不当造成的生产事故数居高不下。因此，各类安全检测技术应运而生，包括穿戴检查、工作人员疲劳检测、电子围栏、红外光幕、数控设备等技术。但这些技术主要着眼于静态安全检查，使得人机交互不便，且泛用性较差。尤其是对于敞开式作业的机床，人不得不与机器进行密切交互，而危险往往发生在这个交互过程中。本项目针对这种情况设计了iGuard系统，把人和机器共同放到数字世界中，对人机交互的过程进行动态监控，并对风险进行实时预警，来保障人的安全。我们使用骨架提取技术，通过深感摄像头的画面提取3D人体骨架。然后用3D仿真技术实时模拟人与设备的交互过程。在整个人和机器的交互过程中，iGuard会对是否触及或将要触及危险区、是否遗漏关键步骤、是否动作不规范、是否违规穿戴四个方面进行及时地预警。 According to the statistical bulletin of the people's Republic of China on national economic and social development in 2021, a total of 26307 people died in various production safety accidents throughout the year. The number of production accidents caused by improper operation in dangerous environment remains high every year. Therefore, various safety detection technologies came into being, including wearing inspection, staff fatigue detection, electronic fence, infrared barrier, numerical control equipment and other technologies. However, these technologies mainly focus on static security inspection, which makes human-machine interaction inconvenient and poor versatility. Especially for machine tools with open operation, people have to interact closely with machines, and the danger often occurs in this interaction process.In this project, iGuard system is designed to put people and machines into the digital world to dynamically monitor the process of human-machine interaction, and carry out real-time risk early warning, so as to ensure human safety.We use the skeleton extraction technology to extract the 3D human skeleton from the camera image. Then 3D simulation technology is used to simulate the interaction process between human and equipment in real time. During the whole interaction between human and machine, iGuard will give timely warning in four aspects: whether the operator touches or will touch the dangerous area, whether the operator misses key steps, whether the operator acts irregularly, and whether the operator wears illegally. |

