Opportunity and Significance

As the safeguarding standards for personnel and equipment continue to increase, we looked to come up with a potential workplace solution with improved machine guarding and physical barrier system by simulating the inner workings of a machine-tool cell/robot cell in the automation industry.

Technical Objectives

The purpose of our project is to educate employers and employees about safety concerns that have arisen with the growing use of robotics systems in manufacturing. Industrial robots can be used to perform hazardous tasks but in doing so they can create new hazards for the people in the surrounding areas. With the growing use of robots in industry, it is feared that without adequate guarding, injury rates for employees working with robots may increase.

Related Work and State of Practice

One of the biggest aspects of machinery in today's industry is the safety and well-being of the factory personnel that operate and maintain the machinery (programmers, engineers, line-workers, maintenance). Almost all machinery in this field has a safety fence that is tied to the system and monitors whether the doors are closed, system is active, and if any openings in the fence have been breached.

Technical Approach, Accomplishments and Results

The purpose of our project was to simulate the inner workings of a machine-tool cell/robot cell in the automation industry. The model we built is an employee loads a part on the outside of the safety fence, through the fence onto a conveyor belt. The part is then scanned for its color, moved down a conveyor belt and loaded into appropriate colored bin. Anytime the colored bin is full or if the safety fence doors have been breached the components inside the fence will shut down. There are also additional safety alerts mounted outside/inside the cell to help protect any maintenance workers who may be inside the cell while the machinery is still active.

Flowchart of Inner Workings

Next Steps for Development and Test

Safety remains the top priority for robotic automation developers in the automotive industry, finding ways to continue to improve safety standards with today’s industrial robots that are most widely used for heavy lifting on automotive assembly lines and other industrial manufacturing venues. But with the advent of newer collaborative-type robots that have lately come on the scene, the rules of robotics are being rewritten with new specifications updating how to include robots that can work side-by-side with workers on assembly lines.

Commercialization Plan & Partners

Our primary target with our project was for the automotive industry but other fields such as in weld cells, robotic cells, press break equipment stations, laser cutting operation areas, metal stamping and folding areas, and punching stations would all be fields that would be wise in implementing a safety cell that protects all personnel from potential safety hazards.