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Professional Practice Paper

Safety in an Automated Workplace

Over the years, factories and warehouse have incorporated more and more automated devices. These devices can be capable of completing tasks that humans could not complete or they are capable of doing it safely. Improving production speed in an environment such as a factory is an important task as the more a factory can produce, the more that the company can sell. Although the increase in revenue is important, adding in autonomous devices may bring unwanted safety concerns or other complications that can either harm or benefit a company. When factories use autonomous robots, they increase the amount of products that can be manufactured in a single day. The safety of employee has to be the main priority of the company as autonomous devices used in today's factory environment still require maintenance and repair at some point. For devices such as these, a proper way to turn the power off when a problem occurs is necessary as well as having the ability to turn off automatically when something goes wrong.

A popular device that is used in automated warehouses and factories is an automated guided vehicle or AGV. This device is a mobile robot that is used mostly in industrial applications or to move materials around the warehouse. AGVs are devices that use sensors to make decisions for selecting a path. There are three modes that are popular among AGVs. The Frequency select mode can be implemented by having a wire through the floor that emits frequencies that contain instructions for the vehicles. The second method is called the path select mode which involves the paths that the vehicle will take being programmed in and will make all decisions based off a program that is located on the devices controller. The third mode is called the magnetic tape mode which involves having a magnetic strip underneath the floor that gives information to the device such as telling it to change lanes, speed and direction. This is a portion of how these vehicles maneuver through an environment. For these systems, the number of vehicles being controlled greatly increases the need for some form of traffic control so that the devices do not run into each other.

Zone control is a method of traffic control that is used in many environments that use AGVs. This method uses a wireless transmitter that will send a signal that contains location information of the AGV in a particular zone. As an AGV enters a zone the transmitter emits a “stop” signal to all other AGVs in the system that try to move into that zone. As the AGV leaves that zone, the transmitter will emit a “clear” signal that will allow other AGVs to enter the zone. A problem with this method is that if one zone goes down then all other AGVs have the potential to run into the downed AGV. This method can be further improved by adding some form of forward sensing control. This gives AGVs the ability to use collision avoidance algorithms. One type of sensor that is used in this technology is the sonic sensor. This sensor essentially acts like a radar system. Another sensor that can be used in collision avoidance technology is the infrared sensor which emits an infrared signal and checks to see the time it takes for the signal to come back. The other popular sensor that is used in AGVs is the contact sensor, which is used to detect if the vehicle has physically bumped into anything. An issue that occurs with these sensors is that they can only protect the devices from so many sides.

As these vehicles tend to be quite large, they can be dangerous if someone were to enter the warehouse environment. As factories use more and more automated systems, they must consider any repercussions that utilizing that system may have. Considering not only the direct safety precautions but also the indirect effects is needed when making the jump to an automated system. People need jobs in order to survive. Automation can completely change how a work place operates. Companies want to replace their employees with robots because they do not have the same flaws that humans have. They were specifically designed for a set of tasks and will only complete that task. They do not need breaks and will not require pay for their work. After they are purchased and installed, the factory does not need employees for the same task anymore. This however opens an opportunity for new employees to make sure that each device is maintained and is in full operation continuously. This would still not leave much room for the creation of jobs. Some studies have shown that approximately forty-seven percent of US

jobs will be taken by robots or autonomous systems. This means that many newer jobs must be created to account for the major deficit.

This subject was chosen because it closely resembles a senior robotics project. An automated delivery system designed for a warehouse setting could potentially decrease the number of employee required to run the warehouse successfully. From the point of view of the warehouse owner, replacing employees with autonomous devices that can continually do their job in the most efficient manner possible would be a great thing. However the employees that would be replaced would not like to lose their jobs. Safety of employee that would take care of maintenance of these devices is critical. Many safety devices such as collision detection and other sensors of this kind protect those that are there to repair. Although employees feel that they are being replaced, they still have opportunities to learn new skills and acquire work elsewhere doing something new. Automation in a workplace can benefit the company, but can severely harm the employees even if it is indirectly.