Design and Implementation of the LEGO Factory

Overview
The team was challenged with designing a LEGO car factory that utilizes automation in the production of LEGO cars. This LEGO prototype is designed with the idea of the Industry 4.0 concept where the entire system is automated and run through sensors rather than human controls. Beyond purely the physical LEGO system, we were tasked with modeling the system in SIMIO so that our system could be optimized to reduce product cycle times.

Objectives
A fully functioning factory built entirely of LEGO products was built that utilized sensors to coordinate motion further down the factory system. It was also modeled in SIMIO and based upon the results, we manipulated parameters to increase throughput.

Approach
- We started by analyzing a few videos sent to us by our sponsors to get an idea of the type of concept that we would be working with.
- Once we decided that our car would have three different pieces that would need to be placed together, we knew that our assembly line would need to accommodate that with three different sections.
- We created a bill of materials and a project proposal that laid out a detailed description of how we would tackle this issue and then immediately began ordering the needed parts.
- We completed all three mechanical arms and built the first conveyer section and then realized that we would need to reorder specific parts from around the world.
- Once we had an idea how to build the first section, we were then able to replicate the design throughout the system.
- Finally, we built and perfected the compressor in the last two conveyer sections.
- Much of our time was spent perfecting the settings and making small adjustments to our design and the layout so that we could better accomplish our end goal.
- As we were waiting for our products to arrive to continue production of our prototype, we modeled the system in SIMIO and inputted our process run times.

Outcomes
- The project provided a working prototype for the sponsor to continue to improve in future semesters.
- A simulation model is also included so that the system can be improved upon in more detail.
- Project management was also a key aspect to this project because of the need to constantly order parts from around the world.