# Swarm Robotics Cheer Team for Robotic Football

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Robotic Football Dance Team: An Engineering-Fine Arts Interdisciplinary Learning Experience

As part of the ongoing Valparaiso University robotics efforts based in the College of Engineering, an adjunct effort to the primary focus - Robotic Football is currently being pursued. As an analog to the traditional cheer or pep squad seen in collegiate and professional American football, the Activity bots will be used to generate crowd enthusiasm through a variety of synchronized movements. The Activity bots are equipped with hardware that can relay signals between themselves to communicate timing as well as position during their routine. The Activity bots are also equipped with hardware to play music, provided to the team by a current student of the Valparaiso University's College of Arts and Sciences. The project has a focus of combining both arts and engineering into an aesthetically pleasing as well functional product. The Swarm Robotic Cheer Team is heavily involved in both the arts and engineering in order to create a half time show equivalent to that of one for an American Football game, but on a much smaller and robotic scale. Through this research the team has learned about how to communicate between persons of different professions who have varying views and ideas on how or what the finished item is supposed to look or do. The goal of this project was not just for an aesthetically pleasing pep squad, but also for students to hone their communication skills and practice their chosen profession.
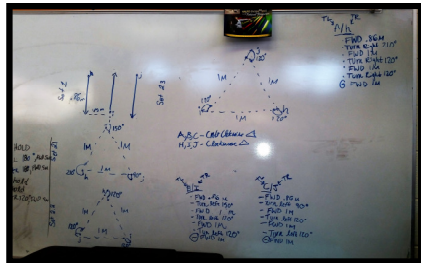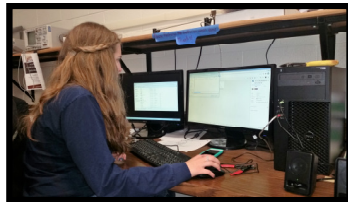
Purpose: To create a robotic cheer team that will mimic the traditional cheer or pep squad seen in collegiate and professional American football, and generate crowd enthusiasm through a variety of synchronized movements.

Procedure
- Choose a robot that has the functions necessary to complete the goal of the project.
- Devise a routine on paper that meets the requirements set by the Notre Dame Robotic Football League.
- Develop software and troubleshoot.
- Identify a musician who can choose which musical arrangement to use with the routine.
- Run multiple tests and change code for more predictable movement.
- Attend the Robotic Football Competitions and Entertain the guests during half time.

Materials
- Activity Bot from Parallax-The robot used to demonstrate the routine and entertain the guests.
- SimpleIDE from Parallax –The software used to program the robots.
- Xbee from Parallax-Used to communicate between the robots.
- Arena to test the code and routine in each of its segments.

Background Information:
The idea for the Swarm Cheer team originated with Professor Sami Khorbotly, who identified the need for entertainment during the half time break. The participants would tend to their robots and the field would be empty for the entire break. As the fan base grew, with nothing to do but wait for the game to resume, fans would lose interest by the second half of the game. Professor Khorbotly decided that waiting for the game to start again was not a good way to pass the time. It was determined that the Robotic Football games would be more fun if they were more like normal American Football with a marching band or cheer team playing their show during half time.

A team was created for the purpose of developing and designing a cheer team for the Robotic Football Competition.
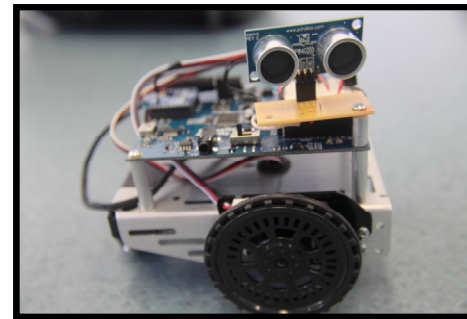
Future Directions?

We would like to be able to include more autonomous actions and features to the robots. These include, autonomous set up and distance sensors or IR sensors for better accuracy. A goal that we have for our next routine is to make it longer and more intricate. We would like to better capture the movement of a marching band or cheer team typical to that of an American Football halftime show.
To eliminate some error due to friction of different surfaces, we would like to add the use of a tarp to our routine. We might also like to add 'line following' procedure to our routine. This would allow us to change the routine many times, without having to change the code. Currently our robots cannot emit complex sound, we would like to develop a way to create complex sounds with our Activitybot's.

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