ECE4007 Project Summary

Project Title	Autonomous Tracking Robot
Team Members (names and majors)	Chris Gurley (Comp E) An Duong Nate Klein (Comp E) Wink Barnes (Comp E)
Advisor / Section	Keezer, L04
Semester	2009 Spring Final
Project Abstract (250-300 words)	The autonomous robotic tank will demonstrate target acquisition, following, targeting, and firing capabilities. The tank will use a combination of IR motion sensors, an ultrasonic proximity sensor, and a webcam to autonomously track and fire at a human target. The IR sensors will recognize a target has approached the robot, and will be responsible for course alignment. The webcam will be linked with a color tracking program running on the eBox2300 which will enable the tank to track a moving target from side to side. The ultrasonic proximity sensor will be used to attain the distance between the target and the robot, controlling when the robot should move forward. Before a full scale prototype is built, it is useful to build a small scale model to show the technology's capability. It would be expensive to acquire an actual military tank to test the capability of the listed technologies in achieving full autonomy. The final unit including all engineering and production costs is estimated to be about $3,000. The expected outcome of the project is that the robot will successfully align itself, follow the target, aim the turret, and fire a projectile.

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List **codes** and **standards** that significantly affect your project. Briefly describe how they influenced your design.	The purpose of the autonomous tank is to demonstrate that the underlying technology behind autonomous vehicles can be effectively applied to full scale tanks; thus, it is a custom-built product with no intention of mass production and has no standards imposed upon it. The full scale tank, however, would have to be standardized for mass production and would have other specifications determined by the military.
List at least two significant **realistic design constraints** that applied to your project. Briefly describe how they affected your design.	1. Because the cost constraints determined the size of the tank, size constraints were placed on the rest of the parts as they are to be mounted on the tank. The German Tiger tank was chosen as it had the largest space behind the turret to mount the Ebox. 2. If the target can move faster than the tank can turn, then the tank may not be able to reliably track it. When the tank is tracking using motion sensors, it will have a slower ability to track as it will have to stop to take in sensor readings.
Briefly explain two **significant trade-offs** considered in your design, including options considered and the solution chosen.	1. Used a tank instead of helicopter due to cost constraints (minimum cost for helicopter alone was $4000). 2. Using color tracking algorithm for tracking a target instead of purely heat sensors, due to lack of availability and high cost of infrared technologies.
Briefly describe the **computing aspects** of your projects, specifically identifying **hardware-software** tradeoffs, interfaces, and/or interactions. *Complete if applicable; required if team includes CmpE majors.*	There is an embedded computer that controls the motion of the autonomous tank. It sends signals to a dual channel H-Bridge which will control all directional motion. It is also taking input from sensors to make motion decisions based on live data in real time.