CS 480 Senior Project in Computer Science
Project Proposal

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Description:

I want to make an automatically aligning antenna system for my senior project. This
system will autonomously align two directional antennas for an optimal link between
them. It will show my abilities with robotics, networking and programming. This system
is composed of eight pieces of hardware, two alignment systems, two directional yagi
antennas, two 802.11b wireless ethernet cards, and two laptop computers. Each alignment
system will be composed of two stepper or servo motors, one to control the azimuth and
the other to control the elevation of the antenna. The laptops will be running Linux
because the design of the operating system allows for easy access to the wireless
statistics. The control program will keep track of the azimuth, elevation, signal to noise
ratio, link speed, link quality, and relay this information to the other computer. Based on
this information the computers will determine the optimal alignment for the antennas.

Grading Guidelines:

Grade	Task	Description
D	Basic hardware and software integration	Working hardware and non-autonomous software control of the hardware.
C	Networking, link and hardware information, orientation of one antenna	Working peer-to-peer network with the software able to print azimuth, elevation, signal to noise ratio, link speed, and link quality to the screen. A minimal user interface allowing user to initiate at least one, basic algorithm (i.e., a method of moving one of the antennas using information from both peers, via a simple protocol, in order to achieve a demonstrable improvement in one or more signal characteristics).
B	Orientation of both antennas.	Software can orient both antenna systems for true autonomous alignment. The software moves both antennas based on the information from both systems.
A	Experimentation with multiple algorithms	Implement one or more additional algorithms (other than the one used for a "C" grade, above), which move one or both antenna to improve performance. Demonstrate the effectiveness of the algorithms by either (1) documenting some experiments or (2) add the ability to test each algorithm to the user interface.

Documentation: A technical report dealing with various aspects of the system, e.g. use of the system, problems encountered during implementation, hardware construction, and computer/hardware integration details. A web site with links to this proposal, the tech. report, hardware manufacturers' web pages, and other sources of information on the technology and techniques involved (e.g., 802.11b background, 2.4 GHz antenna characteristics).