

Unit 1—Introduction to Home Networking Technologies

Preface

As a result of continuing advances in computer networking technologies, American consumers have available to them a rapidly growing array of technology tools. Using technologies like broadband Internet access and wireless networking, among others, consumers are able to deploy technologies in their homes that just a few years ago were state-of-the-art and prohibitively expensive. As the level of technology advances, the business sector continues to develop and bring to market consumer products that meet the growing demand in areas like information access, entertainment, home automation, and security. For the most part, these products are quite affordable today and can be installed and configured without specialized training or advanced skills.

Concepts & Processes

1. Many Americans feel the need to be able to monitor and/or control security, heating and/or air conditioning, appliances, lighting, and other systems in their homes from remote locations.
2. A wide array of affordable, easy-to-use technologies exists to meet consumers' demands for home automation, information access, digital entertainment, and security.
3. The public Internet and widely available broadband networking make it possible to monitor and control a variety of security, home automation, and related technologies from literally anywhere on the planet.

Essential Questions

1. What is *home automation*, and what are its applications?
2. How can the Internet be used to monitor and/or control various systems in my home from remote locations?
3. What are the possible functions and designs for home automation systems?
4. How can the Technological Method of Problem Solving be used to find solutions to everyday problems?

Lessons

1. Introduction and Problem Statement (1 day)
2. Home Automation Web Quest & Presentations (2 days)

Unit Evaluation

- Classroom observation
- Informal student presentations on home automation WebQuest
- Problem and results statements for student projects

Lesson 1.1—Introduction and Problem Statement

Background

In this lesson, students will be introduced to a real world problem of monitoring the temperature in a home from a distance during the winter. No one is available to do the monitoring in person, and the temperature cannot be allowed to fall below 40 degrees. If it does, a repairman must be called to correct the situation before the pipes freeze and eventually burst. A number of solutions are possible, including the use of home automation technologies and the Internet.

Concepts

1. A wide array of affordable, easy-to-use technologies exists that enable consumers to monitor and/or control security, heating and/or air conditioning, appliances, lighting, and other systems in their homes.
2. The public Internet and widely available broadband networking make it possible to monitor and control a variety of home automation, security, and related systems from literally anywhere on the planet.
3. The Technological Method of Problem Solving provides a systematic procedure for solving a variety of problems.

Student Learning Objectives

1. To define *home automation* and related terms, and to discuss a variety of applications of home automation and networking technologies.
2. To list and describe the seven steps of the Technological Method of Problem Solving.

Key Terms

home automation	network	Broadband
X10	smart home	serial port

Activities

1. Introduce temperature monitoring/alert problem.
2. Ask students to brainstorm possible solutions. Depending on the number of students and the time available, this can be done in small groups or as a large group activity.
3. If brainstorming is done in small groups, ask students groups to report out, and record solutions on the board.
4. Discuss feasibility of student solutions.
5. Using a Web site or an actual temperature monitoring system, demonstrate and discuss a possible solution. (See the Temperature Monitoring Sheet document for an example

system that can be used without an Internet connection.

6. Introduce and discuss the Technological Method of Problem Solving (TMPS).
7. Motivate the following day's student Web Quest on home automation.

Supply List

Technological Method of Problem Solving handout

Resources

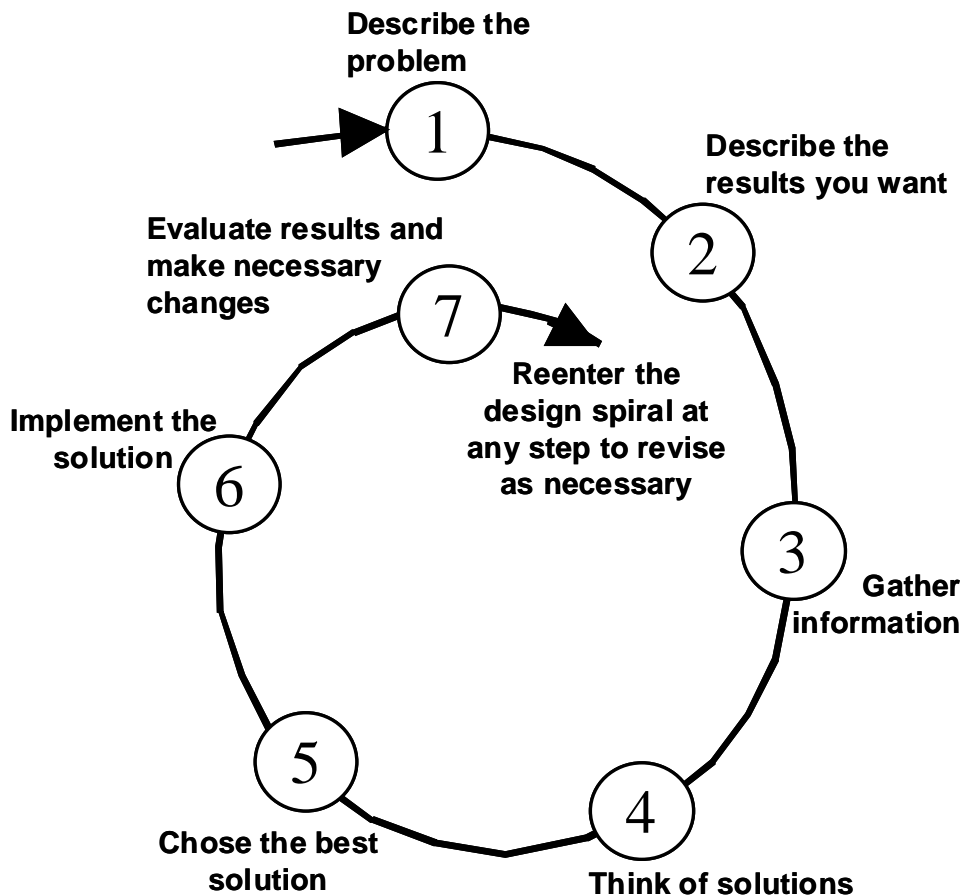
Linux Home Automation: <http://www.linuxha.com/athome/index.html>

How to Choose a Home Automation System: <http://hometoys.com/article.php4?displayid=762>

The Technological Method of Problem Solving

Solving a problem is faster, easier and has better results if you follow a procedure. But we must also remember that problem solving may require you to go back and forth between these steps, they are not always followed in order.

The procedure below shows the seven steps of the problem solving spiral. We will use these as we solve our problem.



Lesson 1.2—Home Automation Web Quest & Presentations

Background

The combination of readily-available and inexpensive hardware components, Open Source software, and the Internet has produced a fairly robust hobbyist community around home automation. In addition to a large number of commercial sites where hardware components can be purchased, even a cursory Web search yields dozens of home automation tutorials, software project sites, product reviews, and other information. In this lesson, students will complete a Web Quest on home automation projects. The objective is to identify home automation ideas they find particularly appealing. The projects students identify and report on in this exercise will serve as inspiration for students' projects, to be completed in the final unit of this curriculum.

Concepts

1. A wide array of affordable, easy-to-use technologies exists that enable consumers to monitor and/or control security, heating and/or air conditioning, appliances, lighting, and other systems in their homes.
2. The Open Source software community contributes a large number of software programs that can be used to monitor and/or control home automation systems.
3. The World Wide Web contains a large number of sites created by and for home automation hobbyists and enthusiasts. These sites can serve as a source of inspiration for student projects.

Student Learning Objectives

1. To list and discuss a variety of applications of home automation and networking technologies.
2. To describe, in detail, the operation of one home automation system.
3. To write an informal but clear problem statement for their projects and concise descriptions of acceptable solutions (Steps 1 & 2 of the Technological Method of Problem Solving).

Activities

First day

1. Distribute Home Automation Web Quest handouts.
2. Briefly discuss Web Quest activity and answer questions.
3. Monitor student searches in the computer lab.
4. Wrap up activity and motivate the following day's report activity.

Second day

- Students report on their Web Quests, respond to questions, and discuss.
- Instructor works with students to form project teams by areas of interest.
- Instructor reviews with students the early steps of the Technological Method of Problem Solving (TMPS).

- Students begin work on the first two steps of the TMPS, to frame their projects in terms of a problem-solving activity:
 1. Describe the problem.
 2. Describe the results you want.

Supply List

Home Automation Web Quest handout.

Resources

See Home Automation Web Quest handout.

Notes

- Students keyboarding skills may vary greatly and some may not realize that URLs are often case sensitive.
- Some students may be confused or lack the Web research experience necessary to drill down through multiple levels of links to the material they seek. It may prove more beneficial to shorten their search paths by posting the links for the WebQuest on a Web page for this lesson, rather than requiring students to enter them.

Name_____

Date_____

Activity: Home Automation Web Quest

Purpose

The World Wide Web contains a large number of sites with information on home automation products and ideas. During this activity, you will work with a partner to research and select a home automation system you consider to be the most useful.

Procedure

Working with a partner, search for and record information on home automation products and ideas. Keep a list of the sites you visit on the attached sheet as you search for the one home automation system you find most useful. When you have found that system, record your responses to the report questions below. You will report on and discuss your findings during our next class meeting.

Resources

Home Automation Links.html

Report Questions

I think the most useful home automation system on the Web is:

Describe what the system does and how it works.

Can the system be controlled by computer and/or the Internet?

List the hardware components that make up this system.

What software programs, if any, are available for this project? How much do they cost?

List the Web addresses where you found information on this system.

In the space below, list the other sites you visited during your search.

Home Automation Links

[Motion Webcam Sites](#)

[Ekiga Voice over IP](#)

[Mister House](#)

[James Lipsit's Home Automation page](#)

[The Adaptive House](#)

[How to Choose a Home Automation System](#)

[One-wire weather](#)

[Digital video recorder](#)