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ARTIFICIAL INTELLIGENCE LABORATORY

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A User's Guide to the AI Lab:

Getting Started at Tech Square

by

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Introduction

Welcome to the MIT Artificial Intelligence Laboratory. If you are new to the Lab you will quickly discover that Tech Square is a complex and exciting place. There is typically little formal orientation to the operation or culture of the AI Lab because the number of new graduate students every year is very small (10 to 20), the volume of information to be conveyed is vast, and life may be radically different between one research group and the next. New students are supposed to be taught the ropes by a senior graduate student (usually their officemate or a buddy assigned to them). However, in order to provide a more reliable introduction, this memo attempts to put in writing some of the critical information useful in getting started at Tech Square.

The two main centers for research in computer science at MIT are the Laboratory for Computer Science (LCS) and the Artificial Intelligence Laboratory, both located at 545 Technology Square, MIT Building NE43[1]. LCS and AI are both associated with the Department of Electrical Engineering and Computer Science (EECS)–also know as Course 6–which is headquartered in Building 38. Currently the AI Lab has about 200 members consisting of approximately 20 faculty, 15 academic staff, 35 research and support staff, and 130 graduate students. As well as being a site for key research in computer science, the AI Lab is also closely associated with a number of other departments at MIT.

Although opinions vary about the differences between AI and LCS, it is safe to state that at many of the places where the two meet, the differences appear arbitrary and inconsequential. Currently, LCS occupies the first, second, third, and fifth floors and AI the seventh, eighth, and ninth. The fourth and sixth floors are mixed. Much of the information in this report is equally relevant to all residents at Tech Square. With regard to the administrative structure, however, our focus is on the AI Lab with supplemental information about LCS provided where possible. Also it is important to note that approximately a fourth of the Lab consists of people who are not in EECS but in other departments such as brain and cognitive science or mechanical engineering. The last two sections of this memo regarding Research Groups and Departmental Hurdles are specifically targeted towards CS students; students in other departments should consult their own department for similar information.

Perhaps the most striking feature about MIT–especially if you come from a small school with a strong centralized administration–is that control is very distributed. As at many large research universities, MIT professors are expected to be self-sufficient, meaning that they are responsible for getting the research grants that pay for part of their own salaries and provide support for their graduate students. Consequently the professors have a vast degree of autonomy and responsibility. An important corollary of this structure is that the job of being concerned about the success and welfare of graduate students is largely entrusted to your research advisor, with the department playing a distant role. Generally, it is your research advisor who will worry about how to pay for

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[1] You will quickly find that everything at MIT, from the rooms, to the classes, to the subject areas, has a number. Furthermore, students refer to these items almost exclusively by their number, expressing disdain for those who do not yet speak the dialect.

you, to whom you can complain about needing a better machine, and who will act as your advocate in dealing with the administration or in times of financial trouble.

Therefore, if you come into the Lab not associated with any research group or associated on a tentative basis, getting placed with a group should be your first priority (far above doing a spotless job on your class work). At the AI Lab many graduate students are very fortunate; at other universities incoming students are frequently assigned to a research advisor whom they do not know, are placed on a project that they may not find interesting, and sometimes find it extremely difficult to switch advisors. Here however, graduate students are very often funded completely for the first year, and if they are placed in a research group it is with the understanding–or even the expectation–that they may want to switch to another group during their first year. Hence, the first year should be devoted to examining as many different research avenues as possible in search of the best academic and personal fit. Keep in mind, however, that it is important to have found a group by the end of the first year.

Just in case there is some confusion regarding who your advisor is, it is worth mentioning that at MIT all graduate students have two advisors. The first is your research advisor, described above, who will supervise your thesis work. The second is your graduate counselor (also referred to as your academic advisor), who will be assigned to you by the department before you arrive. Graduate counselors are principally responsible for processing registration material and ensuring that every students' schedule has been gone over by a professor. Many students see their graduate counselor only twice a year (registration day for fall and spring terms), and in general this person may be far less important and involved than your faculty advisor when you were an undergraduate. However, the purpose of having graduate counselors is to provide students with some guidance in the absence of a research advisor at the beginning, and to act as a secondary advocate for the student should problems or tensions arise in the all important relationship with one's thesis supervisor later on. For this reason it is strongly encouraged that a graduate student's academic and research advisors be distinct.

Finally, as the goal of this memo is to provide important orientation information for new graduate students that cannot be obtained elsewhere, several significant topics are not covered here since they are discussed extensively in other documents. Principal among these documents is AI Working Paper 316, "How to do Research At the MIT AI Lab", edited by David Chapman. This is an excellent source of tips or "heuristics that may be useful in picking up the specific skills needed for research (reading, writing, programming) and for understanding and enjoying the process itself (methodology, topic and advisor selection and emotional factors)". This paper is available behind the chalkboard on the eighth floor lounge with the other AI working papers. Second is *How to GAMIT*, which is short for "How to Get Around MIT." This is a book available from the Tech Community Association in the Student Center. It describes many valuable tips about MIT and important resources in Cambridge and Boston. Finally, the LCS report, "Barriers to Equality in Academia: Women in Computer Science at MIT," is an eloquent account of the difficulties women face in computer science and is a document both men and women in the Lab should read. This report is available in the Reading Room on the first floor.

General Facilities

The resources available to you are almost endless. If you need some particular device or product, the Lab can most likely provide it; the challenge is simply to determine who would be able to help you find out about it. Listed below is some information regarding the more commonly used facilities.

Getting Started: Office Space
When you arrive at the Lab the first three things to do are: get an office assignment, electronically request that an AI Lab account be created, and make sure you are on your floor's mailing list *4ai, 6ai, 7ai, 8ai, or 9ai* (these last two items are addressed in the Computational Resources section). Before you arrive at the Lab an office will be assigned to you by Professor Eric Grimson and Laurel Simmons, who are in charge of office allocation. See Marilyn Melithoniotes (807) in order to find out which office, and to get the keys to the office and the building. After you have received your office assignment and Lab account, send your name, office number, phone extension, and username to marilyn@ai.mit.edu, who is in charge of the AI phone directory.

Account Numbers
Each research group has one or more five digit account numbers used to pay for equipment purchases, photocopies, and salaries. If you are associated with a specific research group from the start, you will probably receive an account number within the first few weeks. If you are not connected with a research group and you find the lack of an account number to be a significant hindrance, talk to the administrative officer, Eileen Nielsen (806). Although a small item, the possession of a group's account number and permission to use it often indicates de facto membership in the group.

Making Copies
Xerox machines are located on almost every floor. On the seventh and third floors are the most elaborate machines, capable of reducing, enlarging, collating, stapling, and making two-sided copies. The copier on the seventh floor (744) is generally reserved for AI Lab members and the one on the third floor (362) for LCS; however, if there is congestion at one machine it is generally acceptable to use the other if it is free. On the eighth floor (800D) is a copier that is moderately powerful, but unable to produce two-sided copies. All three of these machines require an account number. Other, smaller copiers which do not require an account number can be found on the fourth, sixth, and seventh floors.

Getting Supplies: The Stock Room
Many newcomers to the Lab consider the discovery of the stock room to be among their biggest surprises. The stock room, located in the basement room 016, is managed by Gerry Brown and functions as a mail room and a small office supply store. It has most of the essential supplies for the Lab such as transparencies, markers for overheads, white-board markers, erasers, notebooks, magnetic tapes for backups, etc. You can go in and take what you need, but your purchases must be billed to an account number. The stock room is open only between 9-11 am and 2-4 pm.

The Administrative Hierarchy

In an effort to avoid a complex and top-heavy bureaucracy the AI Lab has attempted to keep the number of administrators to a minimum. The administrative duties of the lab are divided among the Lab Director, Professor Patrick Winston, and the two Associate Directors, Professors Randy Davis and Tomás Lozano-Pérez. Professor Winston has overall responsibility for the Lab while Professor Lozano-Pérez is charged with developing the Lab budget and Professor Davis is responsible for the management of computational infrastructure, relations with DARPA, and certain aspects of external funding.

The AI Lab has only five full-time administrators. Eileen Nielsen (806) is the administrative officer and takes care of budget and contract issues, Marilyn Melithoniotes (807) is the personnel officer and handles general Lab issues (i.e. phone lists, keys & office allocations, etc.), Laurel Simmons (910) is the facilities coordinator and deals with the maintenance contract for all the Lab hardware as well as handling office and machine allocation and building renovations, Bruce Walton (832) is the system administrator and is responsible for keeping the machines up and running, and the fiscal administrative assistant (808) (position currently not filled) coordinates most fiscal aspects of the Lab.

LCS/AI Reading Room

The Reading Room, located on the first floor, is a lab library with a substantial collection of journals, conference proceedings, technical reports, and books. At first glance, the size of the collection may seem small, but it is astonishingly complete and contains almost all of the important CS research articles and books. The staff is readily available, helpful, and very knowledgeable, especially for locating articles or books that the Reading Room does not have.

The Reading Room publishes two monthly bulletins, one which lists the table of contents of recently received journals, books, and proceedings, and one which lists selected technical reports published by other universities as well as technical reports published by LCS. You can place yourself on the distribution list for these bulletins by asking at the desk; they will be delivered to your office when they are released. Many Lab members receive these bulletins, but they tend to be over-distributed and under-read, so you might first like to check whether someone else in your office or group already gets the bulletins and would be willing to share them.

The Reading Room is open 9-8 pm Monday through Thursday and 9-5 pm on Friday during the term, and 9-5 pm Monday through Friday during IAP (January) and summer. Current journals, reference materials, and conference proceedings do not circulate. Back issues of journals and books are lent out for a week, although you may be allowed to keep them until somebody else requests their return. Finally, it is possible to electronically search either the Reading Room collection or the MIT library collection by telneting from your machine to *reading-room.lcs.mit.edu* (login as *reading-room* with no password) or *library.mit.edu*, respectively.

AI Publications Office

The AI Publications Office, managed by Sally Richter (818), is charged with distributing and marketing AI technical memos and technical reports[2]. The Publications Office is located in office 818, just off the playroom on the eighth floor. Outside the office on the shelves are the AI Lab memos, tech reports, and working papers (not for distribution outside the Lab), as well as a complete list of all the publications distributed by the AI Lab and recent major publications of AI Lab members available through other distributors. All the AI memos, tech reports, and working papers are freely available to Lab members. The Publications Office also lends out a limited amount of audio-visual equipment (VCR, overhead project, slide projector, portable PC, etc.). More elaborate equipment is available from MIT Audio-Visual (4-017, x3-2808).

The Ninth Floor: Machine Room, Robotics & Vision Labs, Electronics Supply Room, and Machine Shop

Half of the ninth floor functions as a machine room and contains most of the major file servers for the AI Lab, some of the more powerful shared machines, the Connection Machine, most of the Lab's Lisp Machines, and a large variety of machines that are no longer in use.

In the other half of the floor there are a number of labs used by various research groups. Professors Atkeson, Brooks, Lozano-Pérez, Salisbury and Seering maintain several robotics labs[3], while Professors Grimson and Poggio have students working in the vision labs. If you'd like to know more, stop by any one of the labs and find out what people are doing. Connected with these labs is a full-fledged machine shop (916B) widely used by students in applied projects. Short courses in how to use the equipment in the machine shop are taught periodically and are a requirement for use of the machine shop; for more information see Inaki Garabieta (917), Erik Vaaler (830), or Catherine Anderson (833). Finally, there is an electronics supply room (908), overseen by Ron Wiken (908), where Lab students can get parts for their projects as well as certain miscellaneous items such as terminal cables, bandaids, aspirin, velcro, glue, etc.

Conference Rooms

The principal conference room used by AI Lab members is on the seventh floor (773). There is a calendar outside the room where you can sign up to use it. There are also conference rooms on the second (Susan Hardy 3-0240 or 3-8861), third (sign-up on calendar), fifth (large–Kelly Adamson 3-5851, small–Neena Lyall 3-6019), and sixth floors (Anne McCarthy 3-2629) which can be reserved by anyone in either AI or LCS. The eighth floor playroom can also be booked for public seminars, talks, demos, and other larger events. The schedule for the playroom is on a wall by the coffee machine.

LCS Equivalents

In LCS Gerry Brown is the person in charge of the facilities, including office keys,

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[2] The rear portion of the Reading Room performs a similar service for LCS, although all LCS memos that are taken must be billed to an account number.

[3] Marc Raibert's Leg Lab is located in the basement (006). There is another vision lab on the seventh floor as well.

heating and air conditioning, mail delivery, and the stock room. Also in LCS, the person to see first regarding office assignment is the secretary of your group leader, and if you are not associated with any group you may not be assigned office space. Leora Wenger (leora@hq.lcs.mit.edu) is in charge of the LCS phone list and you should send her mail regarding your status as soon as you are settled in. Any problems with regard to LCS RA checks should be directed to Leora. There is also the monthly distribution of a handout entitled, "The Resources of LCS", which lists all the people and machines in LCS.

MIT and US Mail

The post office delivers the mail to the mail room in LCS, not to MIT, and the staff of the mail room then delivers the mail to the individual offices. If you wish to send something through the MIT mail system you can drop it into the wooden mail boxes in the elevator lobbies. If you wish to send something through US mail and plan to use an account number to pay for postage, you can write the account number in the upper right of the envelope and place it on top, not into, the wooden boxes in the elevator lobbies. Stamped US mail can be deposited on the first floor or dropped down the chutes in the elevator lobbies (beware: things have been know to get caught inside the chutes).

Miscellaneous

Food and Water: On almost every floor are two Poland Springs water coolers which dispense both hot and cold water. Usually nearby is a microwave and refrigerator which are available for public use, and in well stocked areas you can find various forms of teas, instant coffees, and cocoas. On the third and seventh floors are the largest refrigerators and two small kitchens. Munchies and sodas are available through a number of vending machines in the basement. For lunch students and professors frequently visit the food trucks parked near Building 66 or on Main Street outside the Lab, the food court near the Kendall square T stop, the "Newtowne Variety" sub-shop at Windsor Street, or occasionally the Polaroid cafeteria at Tech Square.

Parking: Regular parking assignments are available **only** for faculty and staff although it may be necessary to queue on a waiting list for a brief period. It is permissible, however, for students to park in any free spot in the lot between the Lab and the railroad tracks after 4 pm on weekdays and any time on weekends. It may also be possible to find an unmetered spot on Albany, Main, or Broadway Street if you arrive early in the day.

Lock-up: The doors from the elevator lobby into the main offices on floors two through eight are open during regular business hours but are locked in the evenings and early mornings, and all day on holidays and weekends. The doors from the elevator lobby to the labs on the ninth floor are kept locked at all times. There are door bells on some floors which ring on one side or another of the floor for visitors and the occasional Lab member who forgets her/his keys.

Institute Phones: All institute phones have a number of the form 25x-xxxx. In order to dial another line within MIT you just dial the last five digits. To

place an outside call dial 9 first. The institute phones are capable of many features such as call forwarding and inter-institute transfer of calls. To get more information about the phone system look at the beginning of either the *MIT Student Directory* or the *MIT Faculty and Staff Directory*.

Long Distance Calls: Some phones are able to make long distance calls, but most phones available to students are not. In order to make a call from an institute phone with a calling card you dial 1-900 followed by the area code and phone number. The phone will ring until you hear a message, "One moment for an operator who can assist you." Immediately following this message there will be a ping after which you can enter your calling card number. Alternatively, you can stay on the line after the ping and give your calling card number to the operator. 800 calls can be made by dialing 9-1-800-xxx-xxxx.

Fax Machine: There is a very nice fax machine (it produces output on regular paper rather than a thermal roll) available for use by AI Lab members in room 800-D. Local faxes are free as are all local calls, long distance faxes involve the above procedure for making long distance calls. The number of the fax machine is 617-253-5060; it is listed on the AI Lab phone directory. There is also a fax modem hooked up to WHEAT-CHEX which allows faxes to be sent and received directly through the computer system.

TV: There is one TV which is hooked up to MIT cable and available for public use in a lounge on the seventh floor. Generally, it does not receive much use, but as part of Lab culture people often watch the evening news (ABC 7 pm), Star Trek (Sat 7 pm, MWF midnight), and the Simpsons (Thur 8 pm).

Showers: There two showers available for use by member of the Tech Square community in the bathrooms on the seventh floor.

Microfiche Reader: There is a microfiche reader in one of the public areas on the seventh floor.

Video Equipment: There is a video editing room in the basement (007) which contains all the equipment for shooting and editing a videotape (see Lukas Ruecker (827) for more information).

Photographic Equipment: The Lab has a 35mm camera which can be obtained from Liz Highleyman (772).

Velo Binder: There is a Velo Binder on the seventh floor. All necessary material to bind reports, theses, papers, etc. are on the shelves nearby.

GNU Offices: The Free Software Foundation (FSF), headed by Richard Stallman (the original author of GNU emacs), produces high quality software for distribution without charge. The AI Lab donates office space on the fourth floor to the FSF.

Mailing Address: If you are in office 803, for example, then your mailing address at the Lab will be:

Artificial Intelligence Laboratory NE43-803
545 Technology Square
Cambridge, MA 02139-3539

Computational Resources

The computational resources available to Lab members from hardware to software are vast, powerful, complex, and constantly in flux. This section attempts the tricky job of distilling the huge volume of rapidly changing information about Lab resources into a handful of pages that contain the key information new students need to know. In LCS the administration of machines and software is handled almost exclusively at the level of the research group rather than the Lab.

I. Machine Maintenance and Lab Politics

If you come from a school with a relatively homogeneous network where any downtime is scheduled and announced at least a week in advance, and where there is a large support staff with a tight hierarchy, then you are in for a radical and at first perhaps frustrating change of pace. Back in the days before reliable/usable operating systems were widely available, members of the AI Lab developed and maintained a homegrown operating system (ITS) which was tailored to meet the needs of Lab members. Since the dawn of networks and operating systems it has been part of the hacker tradition that the software and hardware of the Lab be maintained mostly by talented and devoted graduate students.

Although operating systems have changed considerably since the days of ITS, the desire to keep the Lab as administratively lean as possible and the proud "do it yourself" philosophy have persisted. In addition, a larger staff means less money to sponsor graduate students, and it is very difficult to hire system administrators who are as competent, committed, and knowledgeable as the senior graduate students. Finally, involving people from different areas of the Lab in a common project like hardware and software maintenance tends to produce valuable inter-group ties, and it gives students a sense of ownership and responsibility for the Lab.

Because things are administered by a large and fairly amorphous group there is often no specific person who is firmly responsible for keeping things running. Hence, when hardware/software failures affect you (especially during evenings or weekends) you may be dependent on the good will of whichever graduate students are knowledgeable and present at the time. One way to reduce this dependency is to become knowledgeable yourself.

During regular business hours the situation is usually more stable. There are two full time staff members who are officially in charge of systems administration, Bruce Walton (832, system administrator) and Jonathan Meyer (907, hardware and backups). If you are suffering from hardware or software failures, Bruce is the one to report it to, and he will most likely be able to tell you what the problem is and offer a prognosis for when it may be fixed. Also, if you have specific systems problems or questions that officemates or other available graduate students cannot answer, Bruce should be able to deal with them.

The bottom line is: system maintenance is your responsibility, too. On a practical level, expect the machines to go down more frequently then you may be used to; so don't wait till the last moment to do that homework assignment or finish that conference paper. Save early and often. Furthermore, when the system fails it is usually a selective failure, which means that you and a handful of other people will be completely incapacitated but almost everyone else will be able to continue undisturbed. This can be extremely frustrating, especially when those few people who are affected, trained by years of experience with systems failures, calmly switch to alternative systems and patiently wait for the main system to come back on line. If this bothers you then get involved in maintaining the Lab's machines; there is always a need for more people who are willing to help out. If you know something about managing systems or are just interested, helping out is a good way to get involved in the Lab and to gain some control over the management of the machines and storage facilities you depend on[4]. There are a series of mailing lists in the /com/mailer/ directory including *system-hackers, bug-unix, sun-bugs*, and *hp-bugs*, that you can add yourself to if you are interested. It is important to inform Bruce and/or the system hackers **before** making any changes outside your personal directory.

If you have accidentally lost a file, Jonathan will be able to restore it from backup tapes if the file had been around long enough for a backup to be made (usually a day or two). It might be a good idea to keep a personal backup of current work; this can be done at one of the many SPARCs with 3.5" floppy drives.

II. Hardware Overview

Machines: Suns and HP's
You will find many different kinds of Sun workstations at the Lab including Sun3's, Sun4's, and SPARC stations (the fastest machines, good for computationally demanding jobs). The Lab also has a number of HP Bobcats which, with the Sun3's, are among the Lab's older, slower machines; computationally demanding jobs are therefore often run remotely. HP's run their own version of Unix, and there are occasional issues of compatibility.

Machines: Lisp Machines
HP's and Suns are fairly common machines, but you probably will not have seen a Lisp Machine before arriving at the Lab. The large grayish machines labeled "symbolics" are just the display part of the Lisp Machines; the main CPU's of these machines (about the size of a MicroVax II) are located in the various machine rooms in the Lab. These machines were designed solely to run LISP. Although they still provide an unequaled environment for Lisp programming, Sun workstations often offer more raw computational power. Due to the expense of the maintenance contracts for them, many of the machines are no longer on a service contract and will not be repaired if there is a significant hardware failure.

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[4] In order to start learning about how the network operates examine the Sun OS documentation on the 7th floor.

Other Machines

There is one Macintosh available for general use on the fourth floor, two on the third floor, and a couple in the reading room. There are two HP snakes (HP's latest and fastest Unix workstations (67 MIPS)) in the public areas of the fourth floor, although an account on ZURICH.AI.MIT.EDU[5] is required to use them. The AI Lab also has a Connection Machine (8192 processors) which is widely used by Lab members and which can be accessed through SOGGY-FIBERS or TAYLOR (see Patrick O'Donnell (793) for more information). Occasionally there are tutorials on using C* on the Connection Machine, and manuals are available in the seventh floor TV lounge.

Printers, Plotters and Scanners

There are several printers located on every floor, mainly large QMS printers and smaller Apple laserwriters. Most public printers accept only Postscript. To find out about the printers closest to you ask one of your officemates or someone in an office nearby. Also available for public use are a couple of scanners (one, connected to a Sun, is located in the eighth floor printer room (800-D); two others, connected to Macs, are located in the Reading Room and on the third floor) and color plotters and printers.

III. Getting Started on the System

Getting an Account

If you do not have an account yet, you can request one by logging into any of the Suns at the Lab using *account* as the login name and *new* as password. You will be asked a few questions–the information ends up in the *.ai_status* file in your home directory–and an account request will be generated. These requests are usually filled the same day. You can check whether your account has been approved by attempting to login with your own username and password.

When your account is created there are a number of default startup files that will be placed in your home directory. These files are called dot files since their filenames start with a period and will be invisible unless you use the -a option when you execute the ls command. These files define how your Unix environment will behave. The default dot files are meant to provide a reasonable environment for AI Lab users. After you have become more familiar with the system, you may want to adapt these files to your needs.

Getting Help

The easiest way to get help is to ask somebody who knows, which is also a good way to meet new people. However, if you are really stuck and nobody is around, here are a few survival skills: in Unix, use **apropos** *keyword* to do a keyword search of Unix commands and system calls. Choose the most likely candidate for your needs; the **man** *command* will then give you more background information about the command. After entering part of a command, typing "?" at the command line will list the possible completions.

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[5] Although there are a number of people from the AI Lab on the fourth floor, Professors Sussman and Abelson's group is in many ways between LCS and AI. Consequently, their machines and files are separate from the rest of the Lab. To get an account on those machines, see Chris Hanson (436).

On the Lisp Machine, HELP is the only key you will ever really need to know. You can look at a selection of possible command completions and their functions at any time by simply pressing *preamble* HELP. Among the possible preambles are the SELECT, FUNCTION, LOCAL, or SYMBOL keys; or nothing, which will activate an application-specific help function. On-line documentation is available by typing SELECT-d.

Getting Listed: Mailing Lists
The main way information is communicated between groups at the Lab is through mailing lists, and many special interest groups maintain their own lists. All mailing lists are stored in the */com/mailer/* directory. To access these lists, enter Emacs (see below) and type **Meta[6]-x edit-aliases**; this will read in a version of */com/mailer/aliases*, the central mailing list which cross-references all others. The header of the *aliases* file explains, in exhaustive detail, how to add yourself to different mailing lists and more. **As soon as you get an account you should add yourself to the mailing list for your floor (i.e. *8ai,7ai,...*).** To do this add your username to the file */com/mailer/<your floor number>ai*. The main Lab mailing list used for seminars and other important announcements is the *all-ai* mailing list which is defined as the union of *4ai* through *9ai* plus *noneai*. If you wish to have your mail forwarded to a different account, you will have to add a corresponding line to the *aliases* file; using a *.forward* file will have no effect.

IV. Finding a Free Machine

Physical Machine Use
In general there are three kinds of machines in the Lab: workstations that are openly available in machine clusters or corridors, workstations located in individual offices, and special purpose machines. Machines in clusters and corridors are obviously available to anyone who needs them. If you are running a big job and want to make sure that your machine remains undisturbed, run the job overnight (the best thing to do), put up a note telling everyone to not use your machine (the risky thing to do), or put the process at a low priority into the background (the nice thing to do).

Several years ago when computational power was expensive and hard to come by, tradition dictated that people leave their offices open at all times so that anybody who needed access to a machine could get it whenever it was not in use. Nowadays however, with expensive portable equipment present in many offices, the arrival of considerable computing power in the form of a large number of Sun and HP workstations, and a growing number of individual research groups purchasing computational facilities for their own use, people tend to lock their offices and view the computers inside as their own. Hence although the official policy is still that any Lab member has a right to use any general Lab machine that is not in use, it is courteous to ask permission first, and generally if the student who has de facto rights to the machine is not inconvenienced by your using it, there will not be any problem.

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[6] On machines with no META key, the ESCAPE key has the same effect.

Special machines–whether they are general Lab resources or belong to individual research groups–fall into a different category. If they are publicly available and a Lab resource (like the Connection Machine or the high-speed Lisp Machine on the 9th floor), an informal users' group with its own etiquette is likely to exist. So try to talk to the people working on those machines if you want to use them. Most of the special purpose machines are in heavy demand; make sure you use them only when necessary. If an individual research group has a special machine you would like to use such as a high-end Macintosh with special software or hardware you will most likely have to ask for permission first and then work only during low demand hours.

Virtual Machine Use

The previous section dealt with getting at the console access to a machine. This section explains the much more common use of machines over the network. This is especially relevant if you start out with a terminal on your desk and have to find some machine to run large jobs off. There are two general purpose machines in the Lab, RICE-CHEX and WHEAT-CHEX (both Sun3's), which most of the terminals are hooked up to. Although anyone in the Lab is allowed to log in and use these machines, doing anything more computationally intensive than reading mail is strongly discouraged.

Hence, before you run any computationally significant programs, you may have to go out onto the network and look for a free or relatively free machine you can use. The best way to do this is to use the command **qfinger** (read the man page for more info). This command will tell you about machines which are free (meaning there is no one logged into the console) or which have been idle for a long time. From this list, you can then use **finger** @*machine-name* to determine who is logged in and how long they have been idle. Ideally you should log into machines which no one else is using (which is not hard during evenings or weekends) and log out whenever you are done. Alternatively, try to use machines which have been idle for several hours, where chances are the primary user has left the Lab.

Research the machine you plan to use remotely. Find out where the machine is located (**qfinger -L | grep** *machine-name*, or **ypmatch** *machine-name* **ttyloc**), and try to determine what research group uses the machines and who the primary users are. The **last** command will give you information about all the people who have logged in before, when, and for how long, back to a certain date. This will help to avoid logging onto a professor's machine. If a machine has a banner as part of the login message saying this is a private machine for the use of such and such, avoid using the machine or make sure the legitimate users know about you and do not mind your using the machine.

Do not log into ANY machine on the ninth floor or basement you do not know intimately as many of these machines are used to control hardware in real time. Never log into a machine which is a file server as this can make a large number of people very irate in a very short period of time.

V. Essential Software

The Lab has software for essentially all needs. It is virtually impossible to list all software packages available, so instead we will concentrate on a number of applications almost everyone at the Lab uses. It may be advantageous if you familiarize yourself with the basics of each of these applications early on.

Essential Operating System Know-How
Most of the machines at the Lab and at MIT run various versions of the Unix operating system (Suns run a version of Berkeley 4.3, HP's run System V 3.2). In case you are not yet familiar with Unix, the publications office has a little booklet entitled "Learning the Unix Operating System" that will take you through all essential Unix commands in a single session. Make sure you return the booklet once you are done; within a few weeks you will have outgrown the material anyway. Although Berkeley and System V Unix use the same commands for most things, differences exist, and you may fall prey to some of these quirks.

The Lisp Machines have their own operating system and user interface. At all times, several applications run concurrently and a user can switch between these applications or modes. In order to switch to a given application you type SELECT and then a single letter representing the mode. The following is a brief summary of the application modes:

SELECT e	Zmacs (a close relative of GNU Emacs)
SELECT t	Terminal Mode (allows telneting to remote machines)
SELECT l	Lisp Listener (main display, lisp interpreter)
SELECT f	File System Editor (allows standard file operations)
SELECT m	Zmail (reading, writing, & managing email is done here)

Double clicking the rightmost mouse button will bring up the Symbolics' main menu (this is accessible from most applications). See the line at the bottom of the screen for the functions of other mouse buttons.

Emacs
The standard text editor of the Lab is Emacs. Emacs comes in a number of flavors, some of them, like GNU Emacs, written by the FSF. There is a list of essential GNU Emacs commands floating around; just check your office or surrounding offices for a copy. Alternatively, type CONTROL-h then "t" for a tutorial introduction to Emacs within Emacs. A small number of commands combined with Emacs' internal help function describes virtually everything you need to know from everyday use all the way to writing your own macros for Emacs to make your text editing, programming, and whatever else even easier. If you need to know more about Emacs, check the GNU Emacs Manual available at the Publications Office (check first whether there is one in your office/research group already).

Rmail
The Rmail software, which is part of Emacs, is the most common application used to read electronic mail. Since you may not be familiar with this program, the following is

some simple information to get you started right away; for more information consult the GNU Emacs manual. In order to run Rmail, start up Emacs and enter **Meta-x rmail**. You can move between messages by typing "n" for next and "p" for previous. To delete a message type "d", to quit type "q", to transfer a message to another Rmail file hit "o", to see a summary of your messages enter "h", and to run Rmail on a different Rmail file type "i". Finally, CONTROL-o will send a plain text version of the mail message to a file which you specify.

LATEX

The standard text-formatting program of the lab is TEX and its derivatives LATEX and YTEX[7]. TEX is a very advanced text-formatter that allows you to specify everything conceivable about a piece of text; it is correspondingly intricate and difficult to use. LATEX and YTEX are packages of macros on top of TEX that simplify text-formatting considerably. TEX applications are not WYSIWYG; you will need to process a text file (generated in Emacs) using the TEX, LATEX, or YTEX command. The Lab has many pre-written macros for theses, conference papers that require specific formats, journal papers, letters, etc. in TEX, LATEX, and YTEX. These macros make life much easier when you need to get something done fast; they can be found in files with a *.sty* suffix in the */usr/local/lib/tex/macros* directory. Again, every office should already have LATEX and TEX manuals; if not, pick one up at the Publications Office.

The X-Window System

The most commonly used window interface at the Lab–and at MIT–is the X-Window System. To start X-Windows on Suns, type x; HP's use X-Windows as default; to get a remote UNIX machine to open up an X-Window on your Lisp Machines, use the following series of commands:[8]

1. On the Lisp Machine type SELECT ❑ (this key is located on the top middle of the keyboard) to get to the X-server.
2. Click on "Start Server" (it will take several minutes for this operation to finish; wait till there are no more flashing bars at the bottom).
3. Return to the lisp listener (SELECT l) and tell a remote UNIX machine to open an X-terminal on your machine by entering the command **:Execute Command** *remote-machine-name* **"xterm -display** *lisp-machine-name***:0.0 &"** . (After the process has been spawned you will have to hit CONTROL ABORT to return to the top level of the lisp listener).
4. Return to the X-server by typing SELECT ❑. Click on "Switch" (this toggles between X-windows mode and Lisp Machine mode). Your X-terminal should appear in the upper left hand corner. (You will probably want to start a window manager by entering, for example, **twm &** in the root window).
5. Pressing "NETWORK" will return you to Lisp Machine mode.

Finally, it is possible to have a remote machine open X-windows on your machine (type **xhost** *remote-machine-name* on your machine, then login remotely and do **setenv DISPLAY** *your-machine-name***:0.0** followed by **xterm &**). However, this is a considerable

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[7] YTEX, although still in use by some people, is fast fading from the scene; newcomers are strongly advised to focus on LATEX.

[8] Unfortunately, this procedure is not 100% reliable and results may vary from machine to machine and between different versions of the operating system.

drain on the remote machine, so be considerate.

VI. Miscellaneous Items of Interest

Finding Out About Other People
To get essential information about another MIT person (name, home address, office address, telephone number), you can use **finger** *firstname_lastname*@**mit.edu** or just **finger** *lastname*@**mit.edu**. If you need info about another Lab member, you can look into their *.ai_status* file in their home directory, which you can get to by **cd** *~username*. You can use **finger @reagan** to find out who the currently active users in the Lab are.

If you would like to match a name to a face, you can use the command **:whois** *username* on the Lisp Machines or **xmug** *username* in Unix, which gives you a picture of any user whose picture is on file (look for an opportunity to have yours taken at one of the first few GSL's). In Unix, the **faces** command opens up a window which displays a miniature picture of all the people from whom you have unread mail.

Documentation
If you need on-line documentation, use **man** in Unix or the documentation browser on the Lisp Machines (SELECT-d). There are many manuals for Suns, HP's, and Lisp Machines around, the seventh floor TV lounge contains several. If you need documentation for one of the many software packages in the Lab, find the research group that originally purchased the software or that is currently the main user. They will usually have a copy of the manual. Laurel Simmons (910) may also know were certain document is located. Some documentation such as Steele's *Common Lisp* and Horn and Winston's *Lisp* as well as LATEX and TEX Manuals can be obtained from the publications office if needed. If you can show that you need certain other pieces of documentation for your work, the Lab or your research advisor will most likely pick up the tab. Talk to Sally Richter, Eileen Nielsen, or your supervisor before making any purchases, however.

Athena
The MIT-wide computer network is called Athena. Started over ten years ago as an experiment in integrating computers into an everyday university environment, it now boasts an impressively large number of workstations in a campus-wide network. Athena's main purpose is to provide computational support for a number of classes; indeed, assignments for most computer science classes–undergraduate and graduate–are installed and run on Athena. As a registered MIT student, you can open an Athena account anytime by walking up to an Athena workstation and clicking on *New User Account* instead of logging in.

The official policy of the Lab is that Lab machines are primarily for research purposes and use of Lab machines to do class work is discouraged. However, when others will not be inconvenienced by your non-research use of a machine, it is not uncommon for people to do class work using AI Lab accounts. If you need to transfer files between accounts on AI and Athena you can use ftp (you can only ftp from, never into Athena).

The address for telneting into Athena is *athena.dialup.mit.edu*.

Athena is well supported and is a computer world worth exploring. There are a thousand-and-one neat systems available. If you end up TA-ing it will most likely involve the use of Athena facilities, so it is a good idea to familiarize yourself early on. Also, Athena provides a nice alternative in case the machines in the Lab are down for one reason or another, although there is a somewhat restrictive disk quota on all regular accounts.

Dialing In

There are three ways to dial into the Lab. There is a modem hooked up to RICE-CHEX which can be reached at 258-8261. This gets you directly into the Lab, although RICE-CHEX is sometimes down or the line is busy. The LCS dial in is to TERMINUS at 258-7111, from which you can telnet to anywhere on the internet, although this machine is intended to connections only to other LCS machines. Finally, you can dial into Athena at 258-7000, log into an Athena machine, and then rlogin into an AI Lab machine.

Bulletin Boards, Wire Service

You can read news, which is essentially a huge internet-wide bulletin board, by typing **rn** or **Meta-x gnus** in Emacs on the Sun workstations. News covers pretty much every topic you can imagine, it is extremely low density, and has the potential of being a major time sink, so beware. There is also a bulletin board for AI/LCS people which you can get on by adding your username to the list in the file */com/mailer/bboard.*

LCS offers a wire service that allows you to preview articles in the New York Times before they are released. You will have to contact LCS, sign a few forms declaring that you will not misuse the service, and the service will start a few days later. You can specify a number of filters to receive only the news that interest you.

A useful MIT-internal bulletin board can be accessed by telneting into *techinfo.mit.edu.* It will give you updates on seminars, major events at the institute, and other topics of interest.

Research Groups and Breaking In[9]

At the end of the first year you should be firmly associated with one of the many research groups in the Lab. The principal reason for this, as mentioned before, is that your research supervisor is the person who will fund you for the years to come. This section attempts to provide some guidelines for the process of finding and breaking into a research group which will be home to you for your many years at MIT. For suggestions about how to actually do research, David Chapman's AI Working Paper 316 is an invaluable guide.

Paradigm Shift

If you were accepted to MIT CS directly from college you were probably among the top few students in almost all your undergraduate classes. However, in graduate school success is no longer measured by GPA; success is determined by the quality of your research, which is judged by how your publications are viewed by other members in the field. Although this is easy to listen to and accept on an intellectual level, those of us trained in the relentless pursuit of A's by eight years of high school and college often find a true change of heart much harder to achieve. It is critically important to start looking **early** for a research group/advisor/topic. There are no problem sets, no deadlines, no supervision, and most importantly no grade for your research progress. However, the invisible grade for your research is far more important than any grade that is entered on your transcript. You must try to ignore the howling cry of the imperfect problem set (whose appeasement has brought you so much success for so many years), and **make** time to read papers, visit group meetings, and talk to people about their work and your ideas.

Choose Carefully

The average time spent from BA to Ph.D. for AI Lab students in CS is about seven years. The vast majority of this time will be spent working in the same group with the same people, and often on just one major project. Furthermore, many late nights reading papers, cranking through manuals, or debugging code will be unbearable if you do not have, or develop, a strong interest in the area you are researching. Although it is possible and quite acceptable to switch advisors between the master's and the Ph.D., the ease and convenience of staying with the same professor means that the vast majority of students do not switch. Therefore, you should consider the decision you make in your first year with some care; your research group will be your "family" at MIT, but this time you have a choice.

Many incoming graduate students get involved with the first research group/project that they look into. While this works out in many cases, senior graduate students often feel that they specialized too early and wished they had gotten a broader perspective at the start. Therefore, try to avoid this mistake and examine as many research groups as possible; attend the group meetings of **at least** three or four, read their progress reports, and talk to the students and the professor. Sometimes the groups are small and the

members may have been working together closely for many years, hence your presence as a newcomer may stand out, but do your best to keep this from deterring you from visiting the groups.

Taking a Closer Look

After taking a surface look at four or five groups (visiting group meetings if the professor has them, asking the professor to suggest some readings in the area, etc.), you will probably want to narrow and intensify your examination to two or three areas. This involves taking about two months to become familiar with the major problems in the area, studying carefully the work of the professor and her/his students, and preferably working on some specific problem to get a real feel for the area. You should probably be well into this stage by the beginning of the second semester.

There are two basic ways to approach this second stage. The first, and perhaps most common, is to go and talk to the professor, telling her/him you are interested in the area and asking for suggestions on topics to investigate. The response to this approach varies widely from professor to professor. Some professors give their students free rein to develop a thesis, with the flip side being that the student must be prepared to read a lot up front and come up with an idea–very much on her/his own–that the professor would be interested in seeing investigated. Others provide much closer supervision, are more likely to have well defined projects they are interested in having their students pursue, and may be less interested in sponsoring student-formulated projects. On your second or third meeting the latter group may suggest a mini-project to get you acclimated to the research area. This project can involve working on some kind of implementation, hacking a specific problem, or reading papers and doing a presentation of the material to the group. These projects are often open-ended and frequently lead to a thesis topic.

The other approach to this stage is to go out on your own for a month or so and do some reading and perhaps some small project in a domain that interests you. Then when you think you have come up with some interesting ideas, go and talk to the professors who you think would be most interested in the area and discuss it with them. As will be apparent this is a higher stakes approach. Although is quite common to go to a professor and simply state an interest in the group and ask broad questions about the group's work, you can make more of a splash by having a couple of interesting ideas to discuss during the first meeting. Furthermore, the philosophy of the Lab is such that if you have a hot topic you are really interested in pursuing, then the appropriate professor in the area, no matter how busy or over-budget, very likely will be willing to sponsor a promising graduate student. Thus if you win, you win big, especially since there are some professors who will not be enticed by a simple statement of interest. However, whenever you work without careful supervision you risk taking a false lead or missing significant articles in the field. Also, people who start research on their own sometimes end up getting so involved with it that they spend a year or two developing an idea all by themselves; this is especially true for those with their own funding (i.e. NSF, ONR, etc.). Consequently, when their funding runs out or the project is finished they discover that they have serious problems finding a professor to sponsor them.

The actual process of finding a research group rarely has the discrete nature detailed above (i.e. neatly defined stages, two distinct camps of advisors, and two clearly labeled paths to follow in starting research). Although the importance of finding a research group and the need to look carefully before committing should be evident, your own personal style and the style of the professors will make your experiences quite unique; don't be concerned if they differ in important aspects from the scenario described above.

Professors Must be Sold

David McAllester describes the process by which new students become associated with professors as containing many intricate and involved "dating" rituals. Part of this is that professors are often as cautious when confronted by a new graduate student as you should be when examining them. A new student in a group means a long-term commitment to provide financial support, computational facilities, office space, and most importantly time. Do not expect professors to seek you out no matter how impressive your previous undergraduate work has been. You should be well prepared when you go and talk to a professor about joining her/his research group. Having done your (research) homework helps make a good first impression. Furthermore, it is not unusual for professors to want a prospective group member to do some form of research project over a period of several months before being willing to commit.

Occupy Your Office[10]

Sometimes the placement of new students in offices is not ideal. The computing power you have at home may be better than that on your desk. You may not know any people yet and your officemates may be too busy on their own projects to notice you. In short, there may not seem to be much point in coming in to work in your office. **This is an easy trap to fall into: try to avoid it! Plan to spend at least 40 visible hours in the Lab a week!** One of the key factors in being successful in the Lab and in research is getting connected to people; many people who are off on their own tend to drift off into their own little world, and when things don't go well neither students nor professors know about it and are less likely to help.

Meeting other students is as important–if not considerably more–as meeting professors. Older students will provide you with guidance, warn you about pitfalls, and give you critical inside information for finding and dealing with all forms of difficulties. The process of getting connected takes considerable effort and is very slow; you should not be surprised if it takes two or three years for the average Lab person to recognize you. The first step involves being seen–in your office, in the halls, at seminars–so that when you get an opportunity to talk to someone new their reaction will be, "I've seen you around recently..."

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[10] If you find your office situation to be difficult or unpleasant talk to Laurel Simmons; switching offices is often possible.

Departmental Hurdles in Brief

There are a number of requirements that need to be fulfilled to get a Ph.D. in computer Science. Dave Chapman's working paper on "How to Do Research at the MIT AI Lab" deals with the master's and Ph.D. thesis and thesis research at great length, so here we will concentrate on the other major academic requirements: the oral exam, the area exam, and the five core classes AI, Architecture, Theory, Programming Languages, and Algorithms. We also describe a few guidelines about teaching assistantships in computer science.

The Exams

The oral exam is usually taken shortly after completing the master's, and is the only true exam on the path to get a Ph.D.. The exam is scheduled for two hours, with the first hour being devoted to a presentation of some significant piece of research work, usually your master's thesis, and the second hour to questions about computer science in general (focussing on the core classes you have taken). Although opinions vary widely about the difficulty and best approach to this exam, it is safe to say that although the general part of the exam is important, if your research presentation goes badly there is little chance of passing, while with good research it is possible to survive a poor performance on the general part. Therefore, it is important to have a solid piece of research in place and to have presented it and gotten feedback from many different groups of people.

Part of what makes the oral exam so variable is that your oral's committee consists of two CS professors and a professor from electrical engineering chosen at large from the department, hence the same committee is rarely seen more than once. It is important to press the faculty to find out what their personal philosophies about the various parts of the oral exam are as this will heavily influence the exam. People regularly spend a semester focussed solely on preparing for the oral exam; however many professors feel that it should not take this long. Although the failure rate is relatively low (one in five), there is a non-trivial chance that you will have to retake the exam.

The area exam is done toward the end of the Ph.D. process and requires preparing and presenting a paper comparing three articles in an area that you have some familiarity with but which is not directly related to your thesis. After the papers have been decided upon, you have four weeks to write a 15-30 page paper and then an additional week to prepare a 45 minute presentation. Failures on the area exam are very rare although this does not imply the exam can be taken lightly. Perhaps the best way to view it is as a five week long take-home exam. More information on these exams can be obtained from Rebecca Bisbee (402).

Core Classes

AI, Programming Languages and Theory are taught during the fall, Architecture and Algorithms are offered in the spring. Again, approaches vary as to how to deal with taking the core classes, although it is common for senior graduate students to feel that there was no need to rush to get them all done. Taking only one core class a semester is generally quite an acceptable speed.

The theory and algorithms courses are the more structured and standard courses. The theory course uses the Hopcroft and Ullman text and is probably the easiest of the core classes, although this class can be very challenging if you have little theory or math background. The algorithms course taught by Rivest uses a new textbook by Corman, Leiserson, and Rivest. Needless to say, the course follows the text very closely. It is well taught and gives you the feeling of having a firm hold on an important and well established part of the field. It is however, among the more time consuming core classes (around 20 hrs. a week).

AI and Architecture are probably the most difficult of the core classes to take (and to teach). There is no general consensus in computer science about what artificial intelligence really is, much less what to teach in a graduate course on that topic. The AI class is influenced by the interest and views of the professor. Currently taught by Professor McAllester, the class focuses on technical aspects of AI, such as search, planning, games, logical inference, and Montague semantics for natural language. Architecture (alternately taught by Professors Dally and Arvind) is a multi-level investigation from transistors through architecture, compilers, and operating systems. It usually requires a lot of work, and you may need to have some architecture experience before taking the class.

Programming Languages taught by Professor Gifford is a fairly middle-of-the-road class. Although there is no text, the class notes that are handed out cover the material well. The time required for this course is light–at least relative to other core classes–and the class typically provides students with a good understanding of denotational and operational semantics. The TA's for this course are also among the most involved and visible of the TA's you will have for the core classes.

Every semester the Beta Theta Chapter of the Eta Kappa Nu fraternity provides a summary of student evaluations of all the computer science courses called *The Underground Guide to Course VI*. This provides an invaluably honest appraisal of CS courses and at worst makes for very entertaining reading. Unfortunately, they are produced at the end of the semester rather than the beginning; however you should be able to get a look at back copies from officemates.

If you are concerned about your grades in these classes, don't worry; how you are doing in finding a research group/topic/advisor is much more important. In general, if your raw score is above the median you will get an A, otherwise you will probably get a B. Doing all the homeworks well virtually guarantees getting a B or better. C's, which mean you will have to retake the class, are reserved for those who do not demonstrate a rough understanding of the material.

Study groups are a staple of MIT classes. This is where an important piece of your general education occurs. A large percentage of students in any given core class are probably working closely with at least one other student on their problem sets. You should make an effort to find people with whom to compare your problem sets as this will enrich the learning process, make life much easier, and help you make contacts in the Lab. This practice is often encouraged by professors and TA's so long as people

give proper credit to others when appropriate. You should check the guidelines on collaboration for every individual class at the beginning of the term; there are a few classes that do not permit students to work together on problem sets.

Teaching

As part of your education, you should plan to be a teaching assistant for at least one term, preferably early during your stay at MIT. The teaching experience varies greatly from class to class and instructor to instructor. Many people find the undergraduate core classes–the 00-classes–very hard and time-consuming to TA, but they appreciate the structured and consistent nature of these classes. TA-ing other undergraduate and graduate level can be anywhere from straightforward to very difficult depending principally on the nature of the subject matter, the maturity of the class (i.e. how often it has been taught before), the range of responsibility given to you, and your familiarity with the material.

Being a TA requires maintaining a delicate balance between class work, teaching, and research. This is especially important during your first year at the Lab, when you should be looking around for the research group best suited to your needs. Trying to meet both goals satisfactorily may require minimizing additional commitments. Many TAs, for instance, will not register for more than one class when they are teaching. As a general rule, nobody expects a TA to get considerable amounts of research done, but that varies from advisor to advisor and depends heavily on how far along you are on your master's or Ph.D.

If you arrive at MIT with a teaching assistantship covering the first year, expect to work as a TA for both semesters. Although it is theoretically possible to switch from a TA to an RA for the second term, professors are generally reluctant to give an RA to someone who already has funding. Finally, although it is important to do a competent job as a TA you should keep in mind that even if you win the department's highest award for teaching, it will not supply an research assistantship for the next semester.

Acknowledgements

Appendix A: Noteworthy AI Lab Events

There are several events that a part of and contribute to the lab culture. Some of the regularly occurring events during the term are:

• **Revolving Seminars**—Tuesday, Thursday, 4pm, 8th Floor Playroom

A seminar series organized by senior graduate students in which students, professors, and visitors talk about research in AI. An excellent opportunity to find out what everybody in the Lab and elsewhere is doing. Food is served 15 min. before the presentation. There are other special interest seminars such as the vision seminars on Monday and the parsing seminars on Wednesdays. You will receive announcements for all lab-wide seminars on *all-ai*.

• **7-AI Lunch**—Daily, noon-2pm

Students and faculty meet daily for lunch in the 7th floor playroom. Times and attendance vary greatly.

• **GSL**—Fridays, noon, 8th Floor Playroom

Graduate students prepare lunch for other graduate students. People (usually 3-4) volunteer for a particular week and cook/prepare whatever they feel like. The lunch is paid for by the Lab and is a great opportunity to socialize. Volunteering for GSL is a good thing to do.

• **GSB**—Fridays, 5pm, 7th Floor Playroom

Another opportunity to socialize with other graduate students and staff and to relax before the weekend. Drinks and munchies are served.

• **AI Olympics–IAP** (January)

The AI Olympics, organized by an AI Lab student, are a series of sport and fun events in which teams of Lab members battle each other for olympic gold. An excellent way to get involved and to get to know your professors and friends in an informal setting.

• **AI Lab Intramural Teams**

The Lab has a number of teams that compete at different levels of competence in the many intramural sports at MIT. In the past, we have had teams for softball, volleyball, soccer, frisbee, and other sports, as well as a running group for the marathon. If you are interested, teams form at the beginning of the term; to sign up, check the mailing lists and add yourself to the sport that interests you.

• **Special Events**

There are a number of special events every year. They include the annual Faculty-Student Softball game at the beginning of the fall term (usually during the first week), the annual Lab Christmas Party, the AI Olympics Award Celebration, and a summer event at the end of spring term (usually a Lab picnic).

• **TV Viewing** Network news daily, 7pm, 7th Floor TV Lounge

  Star Trek: The Next Generation , Saturday, 7pm, 7th Floor TV Lounge

Appendix B: Human Resources

This appendix contains a list of numbers and organizations for minority groups and various support services if you need to talk to someone about a personal problem, discrimination, harassment, or academic difficulties. Trustworthy student peers, your academic advisor, your research advisor, the lab directors, or the department heads can also be helpful. CS students will find Marilyn Pierce (38-444, 3-4648) to be a valuable resource person regarding questions or problems with department requirements or procedures.

MIT Facilities

- **Student Assistance Services, 253-4861, 5-106**
  You can talk with a counseling dean, international student advisor, or the assistant for women students. Special assistants Mary Rowe (253-5921, 10-213) and Clarence Williams (253-5446, 3-221) handle problems concerning discrimination and harassment.
- **Office of Minority Education, 253-5010, 7-143**
- **International Students' Office, 253-3795, 5-106**
- **Office of the Dean for Student Affairs, 253-6776, 7-133**
- **Office of the Dean of the Graduate School, 253-4860, 3-140**
- **Office for Child Care, 253-1592, 4-144**

Student Groups

- **Nightline, 253-8800**
  Student peer-run hotline from 7pm to 7 am. A very good contact if you have problems or any other question that needs answering. (A male and female staffer are available at all times)
- **Defeat Discrimination at MIT (DDAMIT)}, 253-5038 (David Halperin)**
- **Association for Women Students, 225-6620**
- **Black Student Union (BSU), 253-2072**
- **MIT Hillel, 253-2982**
- **Club Latino, 253-5958 (M Velez)**
- **MIT Gay and Lesbian Graduate Student Coffeehouse,253-3463 (Doug Kline).**
- **Gays, Lesbians, Bisexuals, and Friends at MIT (GAMIT), 253-5440**
- **AIDS Response at MIT (ARMIT), 253-1316**

There are many other minority and religious groups on campus. For a more complete listing, check the MIT Student Directory (available from the Communications Office, 253-1705, 4-237) or call Student Assistance Services.

Appendix C: AI Lab Support Staff

The following is a partial list of AI Lab support staff and what to consult them for:

Eileen Nielson, Administrative Officer (eileen@ai.mit.edu)   806, 3-3491
> Problems with account numbers, budget issues, and contract issues.

Financial Administrative Assistant (position currently not filled)   808, 3-6756
> Questions regarding requisitions, purchase orders, requests for payment, travel expense vouchers, accounts payable and receivable, and general questions about money. AI stationary and file folders are kept in this office for everyone to use.

Marilyn Melithoniotes , Personnel Officer (marilyn@ai.mit.edu)   807, 3-0072
> Keys, Lab phone directory, telecommunications problems, or personnel issues.

Laurel Simmons, Facilities Coordinator (laurel@ai.mit.edu)   910, 3-6703
> Problems with a broken piece of Lab hardware from HP's to printers to refrigerators. Ordering various stuff through MIT or finding out where the best prices are available. Changing office assignments.

Bruce Walton System Administrator (bruce@ai.mit.edu)   832, 3-9667
> General hardware or software problems if officemates and friends do not know; permission to make changes to world-readable aspects of the network.

Sally Richter, Publications Office (spr@ai.mit.edu)   818, 3-6773
> Obtaining multiple copies of AI memos or technical reports, or borrowing audio visual equipment from the publication office.

Jonathan Meyer (jonathan@ai.mit.edu)   907, 3-1729
> Wiring changes to accommodate a rearrangement of hardware or installation of new machines. Restoring of a file off a backup tape or changes in shelving in your office.

Kathy LaFrance (kathy@ai.mit.edu)   801, 3-8919
> Problems with your office or the building in general, i.e. air quality, office temperature, lighting problems, etc.

Appendix D: Essentials for Mechanical Engineers[11]

This document may have given you the impression that the AI Lab is dominated by Course 6 individuals. Sadly, this is true. However, a small but vocal minority of students and professors are part of the Department of Mechanical Engineering, primarily doing research in robotics and design theory.

Advisors

ME graduate students also have an academic and a research advisor, although the role of the former is reduced to involvement in special cases. Professor Ain Sonin (3-256, x3-2247) is the academic advisor in charge of all ME graduate students; however, your research advisor signs all of your class forms, so in practice you may never him. Sonin is available to mediate for you if there are any problems between you and your research advisor. Leslie Regan (1-106, x3-2291) handles most of the administrative work; on registration day you go see her to pick up your registration materials.

Getting Started on Research

ME graduate students are rarely given general funding for their first year of study, and teaching assistantships are very hard to come by. As such, it is essential that you find a research group within a month of entering MIT. Nevertheless, it pays to look around: there are a number of groups at the Lab that can use and support a student with a background in mechanical engineering. Professors Seering, Ulrich, Slotine, and Salisbury are directly affiliated with the ME department and have research groups working on topics ranging from robotics to design theory. Professors Raibert, Atkeson, Brooks, Winston, Shrobe, Lozano-Pérez, Grimson, Davis, and Horn are not affiliated with the ME department but do research in areas which could match the goals of an ME graduate student.

There are benefits and pitfalls to being closely associated with a research group very early on. You will get much more support from your research group than your CS counterparts, and you will probably settle in much faster. However, given that your background and class requirements differ from students in CS, it may be even harder for you to meet other students outside your research group or field. Ways to avoid isolation are to attend Lab activities (seminars, GSL's, etc.) and to become involved with other Lab groups through lab-wide projects like system maintenance.

It is a good idea to discuss your research ideas with other people (CS) in the Lab; they may look at it from an entirely different perspective and can help you broaden your views. It is a similarly good idea to pay close attention to current issues in AI. Mutually beneficial cross-fertilization and interdisciplinary work combining new ideas in AI with more traditional ideas in ME–and vice versa–are the rule rather than the exception at the Lab.

In Course~2, it takes on the average three to four semesters to receive a Master's degree (summers included) and an additional six to eight semesters for a Ph.D. Most people switch thesis topics between Master's and Ph.D., and some switch research advisors as well.

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[11] Suggested and written by Andy Christian, edited by the authors.

Appendix E: Checklist of First Things to Do

The following is a list of all the important things that everyone should do during their first few days at the lab:

☐ Get your office assignment and keys from Marilyn Melithoniotes.

☐ Take a look around the Lab. Make sure you see the Reading Room, the labs and machine rooms on the ninth floor, the AI lab publications outside the Publications Office, the seventh and eighth floor playrooms, and the copying machines.

☐ Get an AI Lab account. You can do this by logging into a Lab Sun using *account* as the login name and *new* as the password. If you have any problems, talk to Bruce Walton.

☐ Make sure you are on your floor's electronic mailing list. This guarantees you will get important mail messages that are sent to all members of the lab.

☐ Pick up copies of "The Artificial Intelligence Laboratory - From the President's Report", "Excerpts from Artificial Intelligence At MIT - Expanding Frontiers", and "How to do Research at the MIT AI Lab", Working Paper 316; all are available at the publications office and provide an excellent overview of on-going research at the Lab.[12]

☐ As soon as you are settled in, send your office number, phone extension, and user name to marilyn@ai.mit.edu for inclusion in the AI Lab phone directory.

☐ Make sure to have your mugshot[13] taken at the first opportunity (usually during one of the first GSL's).

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[12] The LCS Progress Report is available in the Reading Room and contains a good summary of the work going on in LCS.

[13] Used to display peoples' pictures for the commands xmug and :whois on Suns and Lisp Machines.