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The Guide to Mechatronics Project Work

REVISION HISTORY

Date	Description	Author	Comments
22-Feb 2008	Draft Doc	Adrian Keating	
18 Mar 2008	Update	Adrian Keating	Define 1st week deliverable. Add Unit Grading
28 Mar 2008	Update	Adam Wittek	Major revisions based on A.K. updated draft and previous year guideline: Technical diary, project definition document, differences between MS and MD marks …
17 June 2008	Update	Adam Wittek	1st week weekly report. Project allocation. Number of hours per week.
25 June 2009	Update	Adam Wittek	Major Revision for 2009
8 July	Update	Adrian Keating	Changes to assessment weighting, timetable removed from document
11 July	Minor Update	Adam Wittek	Spelling and omissions corrected. Sentence about Microsoft Project deleted from Appendix 6.

Scope: This document provides information to Mechatronic Systems and Design students regarding their Project work. The list of project is available on the Mechatronics Wiki at:

http://wiki.mech.uwa.edu.au/index.php/Mechatronics:Visit_the_Mechatronics_Project_Wiki

PREAMBLE

The project work is the core of this course. Working in teams on projects prepares you for professional work in any engineering discipline. Within the project, students need to gain and demonstrate that they have attained and applied *new knowledge*, not just applied *existing* knowledge.

The most important unpredictable factor that affects nearly all engineering work is human behaviour, particularly behaviour within an engineering team. Learning how to manage this factor is the key to a successful engineering career. This unit helps you with necessary practical experience in team skills.

Second year students will most likely be junior team members. Senior team members will coordinate work to some extent. As a third year student you are expected to take more of a leadership role. You will carry more responsibility for effective teamwork, and this will be reflected in your assessment.

The project participation and reporting will be 50% of the entire unit mark for Mechatronics Design students, and 45% of the unit mark for the Mechatronics Systems students. Therefore, Mechatronics Design students are expected to spend at least 6 hours a week, and Mechatronics Systems students 4.5 hours a week, investigating or pursuing some aspects of the projects.

Project Outcome

Project outcome does not need to be a finished product. The outcome can be a sub-system, part of the over system. The sub-system must fit within a larger system. However all documentation, designs and safety issues need to be completed and archived within this project.

Key Requirements

- Preparing documentation to permit next years Mechatronics students to build on the system
- Conducting weekly project meetings and fortnightly reporting of the project progress to the MCTX3420 or MCTX2420 coordinator and project supervisor.

SUMMARY

You will be assigned to a team through the OLCR system, and most of your team members will be assigned as well. In addition to OLCR your team needs to submit a project allocation form requesting your desired project. Please ensure your timetable allows you to spend time working with your fellow team members during the semester.

The aim of the projects is to help students develop an appreciation for mechatronics system issues and to improve engineering skills. In particular, Mechatronics Design students need to demonstrate some aspect of design. Therefore, you will need to demonstrate an understanding of your own specific sub-system investigation as well as the sub-systems being investigated by the other team members. Core to this is the need for student to gain and demonstrate that they have attained *new knowledge*. It is expected that projects will span *several years*. As such, the final system is not the key output, especially for students in the first few years of a new project. You need to focus on system definition, integration, interconnection, inter-operability (for future years) and sub-system development.

Your project work will be assessed from the work you do in the semester, judged from your fortnightly reports and the technical working diary you will be expected to write. A successful demonstration (including documentation) of the project outcome will also be an important component of the assessment.

You must write a technical diary (using a dedicated notebook) while you are working on your projects. This can be requested at any time, and will be assesses at the final demonstration. You must record all meeting, expert/vendor contacts, and times you work on your project in your diary

PROJECT ASSESSMENT

The marks for project participation and reporting will be made up as in the table below.

	*MS	*MD
fortnightly reports	10%	10%
Scoping report (previously Interim progress report)	10%	15%
Project final report Total mark for the Final project report is 20%, made up from… • Main (group) report, including the initial specification, design process, testing, test results, final specification and documentation of finished design, and including final progress report, records of time spent etc. • Separately submitted, individual report on your contributions to the project, time spent, your experience, and what you learned from the project. (4 pages)	15% 5%	15% 5%
Project demonstration or presentation Made up from… • Demonstration of each function point specified. • Evidence of systematic design approach and testing of design/code related to the specified system functions • Answers to questions	5%	5%
Total	45%	50%

*MS means Mechatronics Systems and MD means Mechatronics Design

Explanation for differences in marks awarded to Mechatronics Systems and Mechatronics Design students Mechatronics Design students are expected to take more of a leadership role. This includes, among other tasks associated with this role, the following:

- Convening weekly meetings
- Compiling fortnightly reports and submitting them for assessment
- Preparing project definition document and discussing it with the project supervisor
- Preparing and submitting interim progress report
- Compiling the final project report and documentation
- Assisting junior team members

- Aspects of team management

Weekly Meetings

Team meetings must be held weekly and can include the supervisor. However, the team meetings are organized by the team. The meeting should be facilitated by the **meeting convener** within the team. Each team member is expected to discuss the work performed (status update) and items to do in the next week (actions). It is highly advised that students take notes on actions/status of other students to keep abreast of the work being done. Where you have skills that can benefit that team member, you may find the project would proceed faster if you helped the student. Please only help other students – do not do their work for them. All students should work to assist the overall flow of the project.

Roles: The conveners role is not to chase team members down when assembling the documents or other work. When conveners require written work to be integrated into a document, they must make reasonable requests for documents and input from team members with at least 3 days notice to members. Equally, team members must respond to a request in a reasonable time frame and manner. Failure to response to requests for documents may result in the documents (such a graded scoping document or final report) being assembled without your input. Conveners must not jeopardize the timely submission of the team's work because a student has not submitted work on time to them. Conveners (and indeed all students) are expected to advise and help guide the other team members. However, students must not attempt to assert authority over other students. Where disputes arise, try to resolve these through open group discussions. However, unit coordinators must be advised of problems within a group. Unit coordinators can then assist with conflict resolution and if not resolved, will be subsequently responsible for discussing the issues further with individuals.

Fortnightly Reports

As summarised in the Project Assessment table, the fortnightly reports form important part of the assessment. Each student must submit a fortnightly report. Every report must consist of **status and action** items. Status items indicate what has been done, actios indicate what will be done. Action items cannot be closed until the action is completed or replaced by an alternative action item because of a design change or error. All open action items must be reported on each week, using a very concise summary, typically 1 sentence per item. It is expected that each week, at least 2-5 new action items are added to each students list. The fortnightly report is expected to be less than 2 pages. It is an indication of a problem if the weekly reports grow in size, as this indicates action items are not being closed off while new action items are being added.

Fortnightly reports must be submitted to the Mechatronics Project Box by **Thursday 5pm each fortnight to receive a grade.** A template for the report is available on the web and can be downloaded from: **"Guide to Fortnightly Reports"**.

NOTE: The first fortnightly report is called a Project Request Form. It is due by the end of Week 1 by 5 pm (WAST). If you are not included within a teams project allocation submission, you officially belong to none of the project groups. Consequently, you will not be allowed to conduct the project and you will receive no mark for the project component of the course.

Grades will be assigned for the action/status items of every student. Failure to add action items (an indication of progress), close off action items or provide a reasonable status report of open action items (what was done in the week) will lead to a poor grade.

Where time is spent reading papers, books or other, 3 or so bullet points explaining what has been read must be provided in the report. The bullet points will be used to explain how each student has spent their 6-hours (4.5 hours for the Mechatronics Systems student) of project work each week. If you track your time, provide a bracketed indication of the time spent on each task. Example:

- *Review of tutorial content including use of strain gages and equations governing Wheatstone bridge operation [2hours]*

Fortnightly reports must be signed before submission. Please bring a copy of your report for all team members to have on file during the weekly meeting as all team members are required to know something about the other team members issues/solutions. Action items should be produced during the weekly meeting. This is because the items should be agreed on by all team members as the right thing to do with your resources and time. If a member cannot make the meeting, they should submit an apology and details of the status/action items from that week to the **meeting convener** (it is expected Mechatronics Design student will undertake this role**)**, with any additional comments. Failure to attend the meeting or use email or a proxy to explain the time your spent and what your next tasks are may result in the students attending the meeting rating your performance poorly.

Please use the template or similar format provided for your fortnightly reports. An example of an excellent report is provided on the mechatronics web site. In the fortnightly report, students must assign a points score to themselves and their other team members based on their contributions and effort. **These scores are to be submitted confidentially, and not discussed within or after the meeting.** Point scores must sum to 100. For example, if the team has 4 members and all work equally as hard as yourself, give all members 25 points. Alter the points value of each team member to reflect the work performed in the previous fortnight, as discussed in the meetings of the previous 2 weeks. Where extremely high or low points are assigned, a brief explanation is required. During grading of the fortnightly report by the unit coordinators, the point scores you assigned to yourself and other team members will be taken into consideration.

Note that regular meetings and action items are standard in the engineering workplace. Creating the action items and documenting them is not difficult if you work consistently.

<u>The key with action items</u> is to keep the action simple, so that is can be completed in the week. Many tasks take many weeks to completed, but can be broken into much simpler tasks. Think about the steps you will take (call vendor, get product specification, review specification, selected product, request quote, order part…)..don't just say "design the system" if you have no idea what you need to undertake the design. Remember we want several of these action items per week, and you need to demonstrate 6-hours (4.5 hours for the Mechatronics Systems students) work per week. If some weeks, you may only have 2 hours to spend and have only a few items to report (status/actions). State this upfront in your report to the team. You will need to make up that time in the next week to receive a reasonable point score from your team and reasonable grade from the unit coordinators based on your fortnightly report. Don't slip behind. <u>An action as simple as requesting a quote from a vendor can significantly delay a project if forgotten.</u>

Technical Project Diary

You must write a technical project diary while you are working on your projects. You must record the times you work on your project in your diary. The diary can be requested at any time, and will be **assessed** at the final demonstration (i.e. you must **bring** your diary to the final project demonstration). We will check that:

- You have recorded your reading progress, achievements in skill development, concepts, design sketches, implementation notes, test plans, test results. Review Chapter 1 of the MD Notes for a discussion of Lab books.

- You have recorded the reasons for important design decisions.

- You have recorded time spent on the project, as well as the necessary learning tasks to develop skills needed for the project.

- Your personal time records match team progress

IMPORTANCE OF A DIARY IN COMMERCIAL ENGINEERING PRACTICE

In a commercial setting, your diary records would form the basis for auditing project accounts and expenditure records. If you have no evidence that you have spent time working on a specific project, your client may not pay you for the work completed. The records of design decisions, and testing results provide a *traceable* record of design and testing that forms an essential part of any quality assurance program.

Read Appendix 2 for more detailed information about keeping a technical diary.

Scoping Document

Each group is required to submit a single Scoping Document (one for each team) by the Thursday of Week 5, 5 pm WAST. Details and template for the Scoping Document can be found at:

http://www.mech.uwa.edu.au/mechatronics/MD/Projects/Mechatronics%20Projects.html

Hardcopy submission (to the Mechatronics Project Assignment box) is preferred Electronic submission is acceptable, provided that all electronic document names carry the project name :

`Project_name-report.doc`

where `Project_name` is replaced by the name of the project (see list of projects).

The scoping document must contain detailed list of system requirements and desired specification:

1) **Overview containing (less than 4 pages , MD students complete):**
   a) Photographs of a mock-up of the physical system, completed components photographs, CAD (e.g. SolidWorks) drawings and/or detailed flow diagram of code (if working on a program). Mock-ups should be built using any available materials to represent the final output. The contribution of each student should be represented in the mock up. Where the system to be made is very large, a scaled model of the system should be created. The advantage of the mock up over solid models is that it give a real impression of how large the product will be and features such as cables and harnesses cannot easily be modeled. Keep all physical mock-ups, drawings and code flow charts/diagrams — they will be evaluated in the Mechatronics Laboratory G19/G21 during the final project presentation.

2) b) Functional Block Diagrams and Flow Diagrams should indicate all interconnections. It is highly recommended that the actual connectors required between each of the sub-system components are used for the interconnections in the mock up. Once the physical and electrical features of the interconnections are defined, students need to adhere to the interconnection. For projects spanning for several years, defining the system and the interconnection will be critical to all inter-operability.

2) **Process flow for the project and associated schedule (less than 2 pages, All team members contribute, MD students integrate):**
   *Y*ou should map the process flow for the project and associated schedule. A very popular tool for it is Microsoft Project, and it is recommended (but not required) that you use this tool to map out and plan your work. A brief introduction (together with examples) to Microsoft Project is provided in Appendix 3

3) **Sub-systems (less than 4 pages from each student, individual effort by each student)**
   All students are expected to complete a section which clearly describes their work, detailing a functional block diagram or flow diagram for their sub-section. A detailed plan including proposals, methods and ideas are to be presented. The aim of section is to indicate you clearly understand what you will be focusing on

in the remaining weeks. You need to indicate what you expect your deliverable (outcome) will be. Where possible, use bullet points to make your writing clear, simple and to the point.

Roles: Please identify all authors or co-authors of each section in the document. Where co-authors contribute to a section please indicate the percentage contribution of each author after the section title, eg:

Overview (Keating 40%, Wittek 60%)

Final Report and Presentation

REPORT

Part A – Group Report

A single report is required from each group of students. This must be submitted (to the Mechatronics Project Assignment Box) as both a printed report on paper, with the Mechanical Engineering cover sheet signed by the authors and on CD-ROM (reports, drawings, circuits, software etc.). All drawings, circuits, reports and software must be uploaded to the relevant mechatronics Wiki pages.

The role of the MD students is to write an overview of the project and assemble/compile the final report. It is every student's duty to provide the relevant section/sections for the report detailing the tasks conducted by the student. Each student is responsible for the content and format of their section of the report. The students assembling the document must not alter other student sections other than to number pages and renumber section where needed.

As most of the projects will run for several years, the report must be written under the assumption that students in next year's course will use the report as a reference for their own work. In this way, each year cohort of students will advance the project work further than before. (Note that some project supervisors will not be making the previous year reports available to students.) With this in mind, write the report so that it tells students what they need to know to take the work to the next stage. If you found something really hard to understand, and it took time before you were really able to work with it, write explanations in the report that will help students next year. This way, they will benefit from your experience. The final report must contain a final progress report with the full record of team contributions. You must use the templates available from the Mechatronics Project website (the template follows IEEE transactions format). The presentations must be at a high standard, roughly equivalent to three chapters in a final year thesis (approx 30 pages including diagrams but excluding appendices). The report must describe the overall system design using functional block diagrams, diagrams of the individual modules etc. However, the detailed description and drawings should be limited to the particular scope of the project. For example, for a Telelabs project, it is not necessary to describe the full Telelabs system. Instead, assume the reader knows the overall system and needs to know how your part fits into the "whole picture". Samples of design work, software etc. must be included along with relevant test results. Evidence of systematic testing will qualify for more marks than the designs or software code.

Part B – Individual Report

This must be submitted separately by each individual group member to the relevant assignment box (either MCTX3420 or MCTX2420). This is a report on your contributions to the project, the time you spent, your experience, and what you learned from the project (4 pages maximum). You are also encouraged to include your suggestions for improving the course in this report.

From the Scoping Document, demonstrations, individual reports, and work records in the fortnightly reports, we note where the contributions of individual group members has been significantly different. If you think that some group members made far greater contributions than others, this is your opportunity to tell us in a fair and balanced manner. Please backup you comments with details and examples.

We adjust marks where individual efforts vary. The marks of the more active contributors are raised to compensate for marks that might have been gained if all members had worked to their full potential. However, effective operation of the team is important. Students will also be evaluated on how well they work within the team.

PRESENTATIONS

At least two reviewers will be used to evaluate the group presentation. The grade will be determined based on the group as a whole and the performance of each student. Therefore, this grade will be unique for each student. Students are expected to be able to answer detailed questions on their own part in the project and general questions on the work of their colleagues in the team.

Presentation Arrangements

A timetable will be on display in the Mechatronics Lab (G.19) showing the time-slots available for demonstrations of each project (will depend on supervisors' teaching and other fixed commitments). The students should reserve time-slots.

Where necessary, students must place signs on the equipment to be used for the demonstration advising other students when the equipment is required for the demonstration. This is particularly important for shared equipment. Students must check that the equipment is working satisfactorily before the scheduled demonstration time.

Students are responsible for arranging other visual aids (e.g. computer projector) required for the demonstration or explanations. Computer projectors can be arranged through the Mechanical Engineering IT Support Office (Angus Stewart – E-mail: astewart@mech.uwa.edu.au).

Students *must* have design notes, testing records, implementation notes and project diaries available for inspection at the demonstration.

APPENDIX 1: PREVIOUS EXPERIENCES FROM STUDENTS CONDUCTING THE PROJECTS

- ✓ Managing a group project is not as easy as it looks. It requires communication and an understanding of the other team member issues.
- ✓ Never accept at face value what a team member tells you. Always have them demonstrate the work in 1) a plot, 2) a demonstration of the code, electronics, mechanics, 3) have another team member independently evaluate/test the system.
- ✓ Do no feel threatened by other team members asking you about your work or progress. This is an opportunity to ask for help. Do not hide your results or issues.

- ✓ Divide the work/effort as equitably (equally) as possible. Do not rely on the expertise of one member to produce a large volume of the work. Work will be evaluated in the content of a team members background expertise – if you achieve a lot, but already knew how to do it, you may not score well. Accept challenges in areas you do not necessarily have expertise and divide work evenly.
- ✓ Ask for help from others, especially experts. Workshops, academics including but not limited to Adrian Keating and Adam Wittek. Use the 3rd year students in your team (and other teams) a much as possible – they have done this before.
- ✓ Set and keep a regular (weekly) meeting time.
- ✓ Document as you go in your diaries and fortnightly reports.
- ✓ Test every module of code, circuit and mechanical design at each stage as rigorously before proceeding. Without a robust system which has been well tested, subsequent efforts are often delayed or stopped.
- ✓ Student often find spend a lot of time wondering what to do. Make efficient use of your time – take with each other and others when you are finding it difficult to proceed. Try as best as you can to present you problems clearly or at least indicate where you are to date (not started, confused, post requirements, post designed …)
- ✓ Don't reject idea from team members because it does not fit all the requirements. Often working as a team you can take the idea and make it work. Always openly discuss ideas and if necessary go away to think about it. For example, in one project, a particular design was disregarded because the team thought there would be too much friction without even trying to investigate lubrication options.
- ✓ Don't underestimate the time required to perform testing.
- ✓ Planning - it's always more important to thoroughly plane the work up front, and think in detail about it, rather than to rush into the project and realize the failing too late.

APPENDIX 2: WHY AND HOW TO KEEP TECHNICAL DIARY?

WHY KEEP A DIARY?

First, your diary will record all your ideas, code specification notes, implementation notes and test results. This is normal professional practice. All professional engineers must work on the assumption that a replacement engineer may need to take over their work at short notice. No one is indispensible in any properly managed engineering project. Your diary is the key to this. It will enable another person to take over your work at any time.

Second, your diary will record the time you spent working at every aspect of this course, and your project work in particular. You will need this information for your progress reports, and also to re-plan your project if the need arises.

Third, your diary will help you remember your mistakes and successes. Many ideas developed for a project end up being discarded. Sometimes they are not feasible, sometimes they are too expensive. However, they can come in useful in later projects so you need to keep a record.

IDEAS

Write your ideas down as they occur to you. Write the date and time at the top of every page or the start of a new section. Your ideas will develop with time: keeping records helps this development.

SPECIFICATION NOTES

You are only ready to write your code, design your machine, or your circuits, when you know enough to completely specify them. This means writing the following in your diary:

- Block diagram of all module(s) (code, mechanisms, machines, circuits etc.)

As applicable:

- Sketches of mechanisms, electronic circuits.
- Diagram of code (LabVIEW) or code text sections (Java or C). You don't have to include every detail, but the "sketch" should be detailed enough for someone else to follow. It does not have to be neat: corrections, insertions, and changes are inevitable.
- Inputs needed to demonstrate correct operation, and expected output results.

IMPLEMENTATION NOTES

Record names of source code modules, drawings etc. and record changes made as you prepare drawings, or circuit diagrams, or write the code. Changes that do not reflect the specification are unfortunate, but inevitable while learning. Note these changes and variations on the original specification.

TEST RESULTS

For software, write test modules that generate the test data inputs and display the results. Record the source files for these test modules in your diary and keep backup copies. Note test results in your diary. If the tests fail and the reason is not immediately apparent, note the results and print out your source code. Leave the problem diagnosis for a later session. Instead of trying to fix the problem immediately, get on with another code module.

For mechanisms or electronic circuits, follow the analogous procedures. Tests your designs to their performance limits and record the results clearly in your diary. You can learn from failures: they are valuable. A successful test is pleasing, but may not indicate how close to ultimate failure your design is. Again, when you encounter a problem, don't waste time by trying to fix it if the reason is not immediately apparent.

Some hours, or days later, return to the problem. Review the test results, and follow through the design (or code) to understand why the tests returned unexpected results. If the problem is not apparent, don't keep trying. Design extra displays of the intermediate results and run the tests again. Compare these results with your predictions. By following this routine, you will spend minimal time diagnosing problems.

IS IT WORTH ALL THE TIME TO WRITE THIS DOWN? SURELY IT IS QUICKER JUST TO GET ON WITH THE WORK!

As an engineer, your skills may be needed elsewhere for something more important at a moment's notice. Therefore it is essential that you document your work so someone else can take over when needed. Also, you need to prepare for future maintenance and enhancements. Documenting what you do is essential if you want to come back and improve it later. All this is 100% standard engineering practice.

IMPORTANCE OF A DIARY IN COMMERCIAL ENGINEERING PRACTICE

In a commercial setting, your diary records would form the basis for auditing project accounts and expenditure records. If you have no evidence that you have spent time working on a specific project, your client may not pay you for the work completed. The records of design decisions, and testing results provide a *traceable* record of design and testing that forms an essential part of any quality assurance program.

APPENDIX 3: BRIEF INTRODUCTION TO MICROSOFT PROJECT

Microsoft Project is one of the applications that allow the process flow for the project and its associated schedule to be mapped out. Actions are initially mapped out at very high level (e.g. software, hardware, electronics, integration, test etc.). Within each level, sub-actions are defined and owners and durations are assigned to sub-actions. Each item can have many sub-levels until all the tasks are mapped out as a very simple level (e.g. call vendor, inspect part, review drawing…). Microsoft Project helps to determine how long the final tasks will take and assists with the development of the work direction. Actions can have "dependencies" so that you can see where one part of the project depends on someone else's part (e.g. hardware depends on software tests). This helps to define clear points where strong interaction between different team members is required. For some examples see:

http://office.microsoft.com/en-us/project/HA101656381033.aspx
http://www.stellman-greene.com/aspm/content/view/18/38/

A detailed example of a project managed by Microsoft Project can be found on the Mechatronics web-site, look for:

Example Project&Schedule.mpp

APPENDIX 4: **DELIVERABLES**

Week 1: The first report (referred to as a Project Request Form) is due on Friday of the 1st week of the semester. Students must report on the team assembled, and list 5 projects desired to work on, in order : 1-being the most desirable, 5 being less desirable. The report should summarise the first meeting of the team, detailing the skills/strengths of each student in bullet point form (skills/strengths include but not limited to mechanical, electrical, software, firmware, control, management and expertise with applications – LabVIEW, Microsoft Project, Compliers, CAD etc.….). Meeting convener is to be discussed, determined and reported on.

The earlier the report is submitted the more likely the desird project will be obtained.
Note: If you are not included in any project allocation form submitted by a team you belong to none of the project groups. Consequently, you will not be allowed to conduct the project and you will receive no mark for the project component of the course.

Week 2: Start of regular team meetings.

Week 3: Start of fortnightly meetings.

Week 5: **Scoping Document due.** Any mock ups created of the systems are to be put on display in the Mechatronics Laboatory and identified to MCTX3420 and MCTX2420 co-ordinators. Reports must provide a walk through of the mock up, system or flow chart, so that it can be understood without the team being present.

Week 12: Presentations of projects

Week 13: Final report due.

APPENDIX 5: RESOURCES

Using Accessible Expertise Is a Key Skill to Develop

You are highly encouraged to seek out expert advice. This can come from the workshop technicians, academics, books and published literature. Wikipedia is NOT an expert source and references to unrefereed sources from the web are not encouraged without corroboration. Students should document in each fortnightly report any use of expert advice as this will improve the grade assigned to the students actions/status

Please distinguish between cheating/plagiarism and seeking the advice of others to help guide your efforts and avoid extraneous work. Maximise the work to effort ratio – Get the most work done for the minimum amount of effort. *This does not mean having someone else do your work.* You must contribute and put effort into the project. It is not cheating to ask for advice and/or help and subsequently use that input. Copying the work of others without suitable acknowledgement is plagiarism. The original authors must be clearly shown everywhere it is used: in code comments, drawing comments, in final report, in the list of references in the final and progress reports. A precise reference is required giving the original source of the code, not just the name of the person from whom it was obtained. Always acknowledge input, from staff, technicians or colleagues. People appreciate you appreciating their input enough to acknowledge it. Further, this process helps to develop your t*echnical coordination* skills. Technical coordination can be described as working with, and influencing other people so they conscientiously perform some necessary work in accordance with a mutually agree schedule.

Sharing (with proper acknowledgements of the original authors) design and software is normal industrial practice. However, all design work and software code must be thoroughly tested, and the testing fully documented in the technical project diary.

Academics

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Note: No entry to the workshop will be permitted at any time without safety glasses and shoes (thongs, sandals are not acceptable). Safety glasses can be obtained from the School of Mechanical Engineering office on 2nd floor.

From each group, one (and only one) representative will be chosen to liase with the workshop. All questions to the workshop, from your group must be asked through this one representative. If the person with the question must see the workshop staff for a face-to-face discussion, the primary representative must be present and introduce the other team member. This is to avoid large numbers of students from approaching the workshop on mass. This contact must be managed carefully.

First Contact The chosen representative must approach the workshop contact early in the project, introduce themselves and the projects aims/requirements.

Seeking assistance: The workshop has a large team with wide expertise. That can assist with design, material selection, and concepts.

Where input from the workshop has been used, this must be acknowledged within 1) the fortnightly reports and 2) the final report. It is unethical and wrong to use the input of others and not acknowledge it.

It is still your unique work if you take input front N-experts and combine it into a new system. The co-ordination of the inputs, combined with your thoughts and efforts makes the contribution valuable and worthwhile.

APPENDIX 6: MANAGING THE PROJECT

Specifying and Documenting Code

The first form of documentation is the specification of the software. As an example, a draft of the telelabs server specification is available on the unit web site.

LabView code, in particular, can be documented by generating HTML files and images of the code segments - an automatic process in LabView. However, this is not sufficient by itself. The code must contain internal documentation in the form of:

- Comments visible when the block diagram is opened and inspected
- On-line help - use descriptions of objects so context help window displays descriptions
- Use names that define the function of the object

Follow the advice given in the LabView reference manual on programming style and design - see the "Help" menu, "View Printed Manuals" option.

Code in other languages must also be documented fully with in-line comments and written specifications.

Equipment Specifications and Descriptions

You will not be required to include drawings and descriptions of the equipment you have used, provided these are already available in the appropriate laboratories. However, you will be required to include drawings and descriptions of any equipment you have built for yourself. Also, drawings of certain aspects of equipment and circuits will be required.

These drawings must be produced to a high standard. Whenever possible, follow international or Australian drawing standards.

Back-Up Your Work

It is your responsibility to back-up your own computer work, both in the university laboratories and at home. Keep two separate back-ups on high quality diskettes, CD-ROM's or Zip discs. One back-up should be taken daily: the other should be taken weekly and kept in a safe location.

Failure to keep adequate back-ups will not be allowed as an excuse for late work.

USE the Mechatronics WIKI

Each team must keep the wiki up to date with electronic copies of:

- Fortnightly report
- Scoping document
- References and relevant links
- Final report
- Drawings
- Circuits
- code