



BUSINESS, FINANCE AND MANAGEMENT REPORT

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1.0 INTRODUCTION

The following Business, Finance and Management report incorporates both a business feasibility study including a discussion of Intellectual Property Rights, future revenue generating prospects and current management and finance techniques applied.

2.0 BUSINESS

2.1 BUSINESS PROFILE

Using the foundation of robot football's success, the newly formed Warwick Mobile Robotics has been able to reinvent its profile through way of the RoboCup Rescue competition. This reinvention process is analogous to the product life cycle shown in **Figure 1**; a strategic decision model that identifies the phases a product follows.

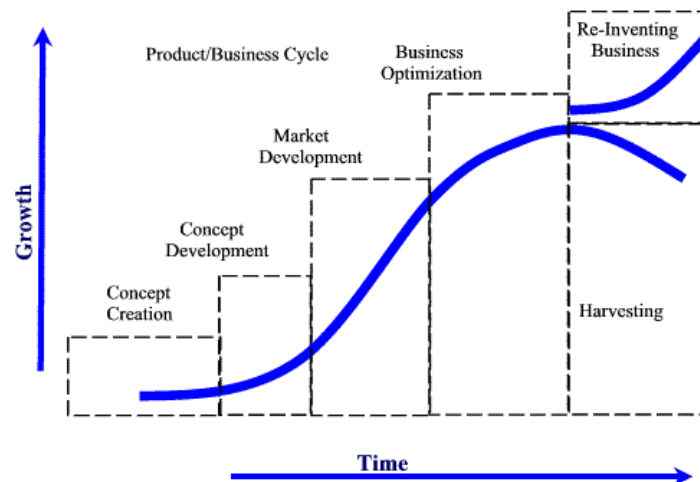


Figure 1 – Product Life Cycle ¹

2.1.1 REVENUE GENERATOR

The RoboCup Rescue competition is used to focus research and development objectives; allowing WMR to develop a mobile rescue robot aid, in a competitive environment. Upon completion of the prototype robot, a technical framework will be in place to produce customised mobile rescue robotic aids for the emergency services sector. Example applications include a military scout robot fitted with custom sensors and corresponding software capabilities that can confirm a building's safety, and a reconnaissance robot competent of navigating adverse terrain to aid rescue personnel for victim discovery in a disaster scenario. Furthermore WMR has received interest from a railway company with the idea of using a mobile robot for line inspection, as current health and safety regulations require several personnel to carry out the task; a costly process.

WMR possesses core competences of a high level of technical ability within the team, the support of experienced and skilled individuals and the facilities of the globally recognised School of Engineering and Warwick Manufacturing Group. In addition, WMR has an established existence within the

robotics industry and has developed strong industrial links through participation and subsequent publicity in the MiroSot Robot Football Championship.

2.1.2 MISSION STATEMENT

Warwick Mobile Robotics' statement of purpose:

“Innovating mobile robotics through research and international competition to produce aids for personnel in the emergency services sector.”

2.2 MARKET POSITION

The Ansoff Matrix is used to help map the strategic options for Warwick Mobile Robotics, whilst also defining the product on offer and target market; crucial to success. WMR is categorised as Product Development; a new product in a current market. Through the use of the RoboCup Rescue competition WMR is able to develop a mobile robotic aid for particular services, such as fire fighting personnel. This lies within the new product – current market category shown in **Figure 2**.

		Products	
		Current	New
Markets	Current	Market Penetration	Product Development
	New	Market Development	Diversification

Figure 2 – The Ansoff Matrix, highlighting Product Development.

The Ansoff Matrix is split into two dimensions, markets and products encompassing four strategies²:

Market penetration – An example of market penetration is the use of volume discounts, where the organisation aims to convert regular clients into frequent clients.

Market development – An organisation with a market development strategy may aim to entice customers from competitors. Alternatively, the introduction of a current product into a foreign market also fits this strategic profile.

Product Development – The product development strategy will be pursued through future investment into research and development. WMR proposes to sell the product to regular clients (the various emergency service organisations), within the existing market. This strategy has been selected because through innovation, an opportunity may arise to gain market share from current competitors.

Diversification – The diversification strategy is known for its high risk, as the organisation has low credibility entering a new product into a new market. This strategy is split into horizontal, vertical, concentric and conglomerate diversification.

The Standard Industrial Classification (SIC), used to organise industries, categorises Warwick Mobile Robotics as 2956 – Manufacture of special purpose machinery.

2.2.1 COMPETITORS

Competitors include manufacturers and distributors of unmanned ground vehicles aiding human safety in multiple types of emergency reconnaissance. In order to gain a greater understanding about the proposed market, one competitor will be researched in detail.

iRobot Corporation is a United States based organisation that operates in two segments; consumer products and government and industrial products. The government and industrial segment, which is of most interest, offers three product lines called PackBot EOD, Explorer and Scout³. iRobot sells direct to military services and government agencies in over 40 countries worldwide.

The following information concerned with the performance of iRobot Corporation has been obtained from Thomson Research⁴, a provider of full text international company reports and accounts.

With sales of \$112m and \$76m in the consumer and government and industrial segments, respectively, 40% of iRobot's total sales are accounted for by unmanned ground mobile robots. Plotting the five year summary data shown in **Figure 3**, it is possible to observe that iRobot Corporation only began to produce a profit in 2004 after high investment in previous years.

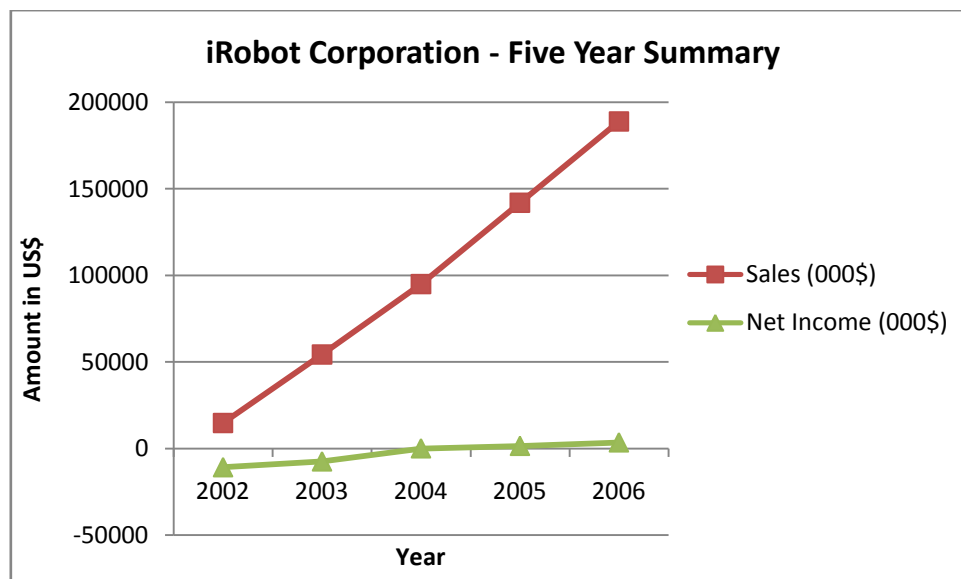


Figure 3 – Five year summary of iRobot Corporation, displaying net income of \$118,000 in 2004 and \$3,565,000 in 2006.

iRobot Corporation is now an established organisation with 371 employees and 164 shareholders and a healthy net income projection. The organisation also has strategic alliances with Deere & Company and The Clorox Company to aid distribution channels and innovation. Similarly to WMR, one of iRobot Corporation's core competences is the high level of technical expertise and innovation available. The awards achieved by iRobot Corporation for innovation and design are boasted on www.irobot.com.

2.2.2 MARKETING MIX

In order to outline the decisions, reactions and positioning of Warwick Mobile Robotics in the marketplace, an accepted tool known as *The Marketing Mix* is used.

To define the strategic position within the marketplace, four variables (The Four P's; product, price, promotion and place) are identified in **Figure 4**. In addition, the variables are used as “a set of controllable factors that a firm can use to influence the buyer’s response”⁵.

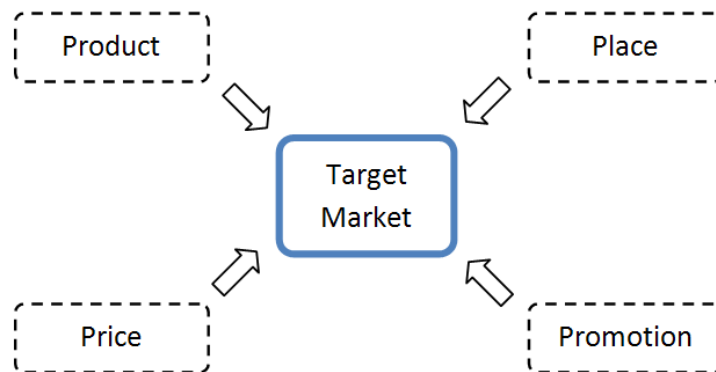


Figure 4 – The four variables of the marketing mix. The optimal blending of these will result in a positive buyer response.

Product – The product will have the correct customisation level of sensory capabilities, automation, mapping abilities and software competence for a customer’s specific scenario. Standard sensor suppliers for example, will be used in order to reduce build costs, but allow a tailored robot.

Price – The pricing strategy will depend upon the time of WMR’s product release and will be geared towards various customers to facilitate maximum sales and the payback of research and development investment. Using the price positioning map, WMR’s product is expected to be high price – high quality.

Promotion – To communicate with the marketplace the principle method of promotion is through demonstration. The RoboCup Rescue competition can be exploited as a promotional tactic to demonstrate the capability of WMR and provide credibility. Additionally, through utilising WMR’s contacts in industry, such as Remotec (a current sponsor) the prospect of communication to emergency services can be facilitated. Another possible method to demonstrate the value of WMR’s products is through attendance to exhibitions, for example Firex South (www.fire-expo.co.uk), a UK based fire protection and prevention exhibition.

Place – As far as distribution channels is concerned, due to the nature of the product on offer, the most effective method is to sell direct to various emergency services. Be that from the Fire Fighting service to military reconnaissance organisations.

2.3 EXTERNAL MACRO-ENVIRONMENT

2.3.1 PEST ANALYSIS

To outline the main external macro-environmental factors that affect WMR, the following Political, Economic, Social and Technological (PEST) analysis is carried out.

	Factor	Potential Impact
Political	Political stability of the environment in which the product will be sold	Medium
	WMR shareholder and stakeholder demands	High
	Government policies (the possibility of a future policy making it compulsory for specific emergency services to be equip with a mobile robotic aid)	High
	Wars and conflicts	Low
Economic	Interest and exchange rates (possible fluctuation will effect international trading)	High
	International trade and monetary issues	Low
	Home and foreign economic trends	Medium
	Product specific taxation (in the event of specialised taxation to either the consumer for the purchase of the product or WMR for the manufacture and/or importation)	Medium
Social	Consumer buying patterns (if many emergency services industries adopt the use of mobile robotic aids, this may influence other potential customers in a decision to purchase a WMR product)	Medium
	Media view and major events (the effect of WMR's image through publicity to various customers) Example: a mobile robot aid helped a fire fighter rescue a person that otherwise would not have been possible	High
	Ethical issues	Low
	General advertising and publicity	Medium
Technological	Technology advancements by competitors	High
	Potential to innovate	High
	Patents and licensing (of particular technology used in a WMR product)	Medium

2.4 INTELLECTUAL PROPERTY RIGHTS

The intellectual property rights of the project belong to the University of Warwick and with companies such as iRobot commercially producing mobile robots, and many teams worldwide competing in robot football, it is in the University's interest to protect the intellectual property associated with the work carried out by WMR.

One way in which intellectual property can be protected is through a patent. This is granted by a patenting office, and is intended to give the inventors of a product a competitive advantage. Patents are normally limited to twenty years, and to be patentable an idea must be new, non-obvious and useful⁶. Although the combination of components used to create a mobile robot for rescue purposes is unique, non-obvious and useful, the concept of a search and rescue robot is not new, and the final product is likely to be deemed too similar to other products on the market to be granted a patent.

Both the software system written for the search and rescue robot, and the new code written for the robot football system are automatically covered by copyright. In the European Community this lasts for 70 years and enables the copyright holder to sue anyone copying the work within this time⁷. In order to use copyright law, the holder must be able to prove the dates the work was written and hence it is recommended the software is well documented. In reality the copying of such software is highly unlikely since it is written for a unique hardware setup.

2.5 CONCLUSION

Given WMR's foundation to date of contacts in industry, technical expertise and international recognition, starting a business is feasible. However, the following main barriers to entry must be considered. Firstly, the large monetary requirement for research and development to produce a commercial viable product would involve a high initial capital investment. Secondly, acquiring market share from established competitors such as iRobot Corporation may well prove difficult. Nevertheless there is increasing interest by emergency services and other industries (for instance train line inspection) for mobile robots. As technology advances and the capabilities of mobile robots are demonstrated, policies may well be passed to make the use of mobile robots in certain sectors mandatory. Hence there is the potential for demand to rocket even more.

3.0 FINANCE

3.1 INTRODUCTION

The decision to expand the breadth of the project would involve a significant financial outflow, and it was clear from the beginning of the project that a stringent watch over the accounts was required to prevent any overspend.

The project was funded by two accounts. The first, held by Dr. Jones, held money given by the School of Engineering at a rate of £150 per student, £1,200 in total. Any money left in this account at the end of the project was to be taken away, and hence it was important to ensure all this money had been spent by the end of the project.

The second account was held by the WMG in the name of Dr Young. This account carried money over from previous years, and at the beginning of the project was £8,619.59 in credit.

It was important to draw a budget as early as possible to guide project spending. However, this could not be done whilst the team was still waiting to hear from potential sponsors, and whilst decisions were being made about the directions in which to take the project. Paradoxically, the team felt it important that money was spent renovating the laboratory in order to attract sponsors. Hence £800 was set aside, and this was spent on a new display monitor, some new posters and two new PC monitors. New lighting and cabinets were provided for free, courtesy of the Engineering electricians.

3.2 SPONSORSHIP

A sponsorship campaign was then launched, and successful sponsorship deals made. This included £4,000 of sponsorship from the WIMRC and £3,500 from the WMG, bringing the total income to the project to £17,319.59.

Unfortunately sponsorship was discontinued from Denso and the Vice Chancellor of the University of Warwick. However these contacts have been kept updated with the progress of the current project, with the aim of persuading them to be associated with the project in future years.

Other companies contacted over the course of the sponsorship campaign were unable to provide sponsorship since the start of the project fell halfway through the financial year. It was suggested that the team reapply to these companies at the beginning of the financial year. Although any money raised at this time would be too late for the current team, it was agreed it would be helpful for future years of the project to follow up these suggestions.

3.3 FINANCE ALLOCATION

By the end of October the team had decided exactly the goals of the project for the year, had received most confirmations and refusals of sponsorship, and a budget could be set. This budget can

be seen in **Appendix 1**. Since the MiroSot side of the project was to be based mostly on programming, little money was set aside to this project. The total set aside was £420, and this was to cover the cost of new batteries, a cover for the pitch, and new plastic tops for the robots.

A significant part of the budget, £12,000, was then set aside for the development of the rescue robot. This large amount was justified by a breakdown of this cost. The most expensive part of the robot was to be the sensors, since these needed to be high quality and precise. The £3,500 set aside for sensors is justified since these are predicted to last for many years and used in future generations of the robot. The laser scanner, one of the most important sensors on board, was budgeted £1,600 separately due to its exceptionally high price.

The chassis and mechanics of the robot were also budgeted a significant amount, £2,000. Again this is justified since the robot was designed to be highly durable and the components designed to last many years. £1000 was set aside for the on-board processing, and although these components are likely to be updated in future years this figure is justified by the amount of processing power the robot requires.

The batteries, speed controllers, communications, additional electronics and user laptop were budgeted at £2900. A further £1,000 was set aside for any unforeseen purchases and overspend.

The remaining £4,100 was set aside for miscellaneous purchases. This amount would hopefully carry over to give the 2008/2009 project a reasonable starting budget.

3.4 A FINANCIAL RECORD

It was agreed that a meticulous record should be kept of the expenditure of the project to prevent overspend, and to have a comprehensive list of every component owned by the project. Hence copies were taken of every order and purchase order that was raised, and details of the items, expenditure, expende, date, contractor and part number recorded on an Excel spreadsheet. The resulting document can be found in **Appendix 2**.

Since these orders were made including VAT, the expenditure of individual components was recorded including VAT. Concerns were raised that in large orders this may have led to rounding errors, since some suppliers add VAT to the end of an order. However, in practice no such errors were found.

Having two accounts meant further information was kept recording the account from which expenditure had occurred. This was compounded in the first half of the project when sponsorship money had not yet been received, and it was important to not commit money we had no access to. Hence an “accounts” spreadsheet was created in Excel, using data from the expenditure spreadsheet. This document showed the projected and actual income, projected and actual spend and the projected and actual balance, all for both accounts. This document can be found in **Appendix 3**.

3.5 PROJECT COSTING

In addition to expenditure on components, equipment and consumables throughout the project, the group has been fortunate to have free access to manufacturing equipment, technicians and academic advice. These entities have been costed to provide a reasonable estimate of the true financial cost of the project, and are detailed in the table below.

Expense	Cost per Unit	Number of Units	Total Cost
<i>Equipment, Parts and Consumables</i>			
Rescue robot equipment, parts and consumables			£12,153.59
Mirosoft equipment, parts and consumables			£204.27
Other equipment, parts and consumables			£5,196.41
<i>Man-hours</i>			
Time worked by Mahan Ramachandra	£15/hour	400 hours	£6,000.00
Time worked by Alex Smith	£15/hour	400 hours	£6,000.00
Time worked by Alex Barnes	£15/hour	400 hours	£6,000.00
Time worked by Redland Sanders	£15/hour	400 hours	£6,000.00
Time worked by Jonathan Holmes	£15/hour	400 hours	£6,000.00
Time worked by Philip Smith	£15/hour	400 hours	£6,000.00
Time worked by Christopher Payne	£15/hour	400 hours	£6,000.00
Time worked by Edward Elbourne	£15/hour	400 hours	£6,000.00
Consultation with Dr. Peter Jones	£50/hour	25 hours	£1,250.00

Consultation with Dr. Ken Young	£50/hour	40 hours	£2,000.00
Consultation with Mr. Michael Tandy	£50/hour	40 hours	£2,000.00
Consultation with Mr. Sadiq Jaffer	£50/hour	40 hours	£2,000.00
Consultation with Mr. John Oliver	£50/hour	40 hours	£2,000.00
Consultation with Mr. Adam Land	£20/hour	264 hours	£5,280.00
Consultation with Mr. Jonathon Meadows	£20/hour	100 hours	£3,000.00
<i>Production Costs</i>			
Machining undertaken by Mr. Adam Land	£50/hour	180 hours	£9,000.00
Laser cutting undertaken by Mr. Neil Timms	£40/hour	40 hours	£1,600.00
PCB manufacture by Mr. Jonathan Meadows	£20/hour	25 hours	£500.00
PCB manufacture by Mr. Ian Griffith	£20/hour	25 hours	£500.00
<i>Total Project Cost</i>			£94,684.27

Estimated cost of the project, including manufacturing equipment, technicians and academic advice

In most cases the cost per unit of man hours have been taken from a tariff given in the *Handbook for Undergraduate Individual Projects ES3B7/ES4B8*⁸. The production costs have been based on the charges an external contractor would expect to pay for use of the manufacturing equipment within the WMG. This includes any depreciation costs of the equipment and laboratory space used by the technicians.

There have been further costs associated with the project that have been excluded from table 1. The project inherited laboratory space and equipment. It was assumed that this equipment had been fully costed in previous years of the project, and had no significant depreciation. Overheads were also ignored since these would be very difficult to accurately determine. Any costs concerning

administration of the project itself, such as time spent by academics in marking work, were ignored since these were not directly associated with the costs of the final products. Over the project the team received a great deal of support from WMG financial staff and the engineering electronic stores. Again, the hours spent by these staff in association with the project have been ignored; these expenses were occurred due to the project being carried out within the School of Engineering, and were not directly associated with the costs of the final products.

3.6 CONCLUSION

By the end of the project the spending had followed the budget closely. Money spent on refurbishing the office had run £86 over the £800 target, however spending on the MiroSot project had run £215 under budget. This was due to the fact that the proposed plastic tops were found to hinder the performance of the robots, and hence the plan was abandoned. New batteries were also found for a cheaper price than anticipated.

Spending on the search and rescue robot project was £153.59 over the £12,000 budget, an overspend of 1.3%. Spending on the chassis ran £340 under budget, speed controllers £142 under budget, the laser scanner £77 under budget, communications £19 under budget, and the processor £38 under budget. These savings were achieved mainly through negotiations with suppliers over price. The £1,000 budgeted for an operating laptop was not spent; it was found to be more convenient to run the robot software on laptops owned by the members of the group.

Spending on the robot mechanics was £1,068 over budget. This was due to the number of precise, powerful and strong stepper motors required by the robot design. In some cases these motors were imported from overseas. Batteries and power equipment ran £241 over budget and sensors £417 over budget. By spending a little extra on some sensors, such as the infrared camera, high-quality components were procured that would serve the project for many years. Spending on additional electronics ran over by £943, however this included the purchase of stock equipment such as cable reels and solder that would benefit the project in future years.

One unexpected source of expenditure was the cost to participate in the RoboCup Rescue competition in Germany. This cost had not been in the original budget since it had not been expected that the robot would be ready to compete in time. However, with the rapid successful progress made in the project, it was agreed that partaking in the competition would offer important experience to the team, dramatically raise the profile of the project and significantly increase the chances of acquiring sponsorship in future years. The cost of partaking in the competition was £3,827. This included £1,666 for hotels, £917 for entry to the competition and £1235 for travel.

Hence the final account total to be carried over to the 2008/2009 project was £432.84, 10.8% of the budgeted £4,000. However, it was felt that money spent in competing in the RoboCup Rescue competition would be recuperated through additional sponsorship in future years, and hence this was a justified overspend.

4.0 MANAGEMENT

Every successful enterprise needs to have clearly stated and defined aims and objectives. The discipline of management endeavours to help with planning, organisation, managing resources, communication and providing leadership in order to help realize the enterprise's ultimate goals.

The WMR team's goals for the 2007/08 academic year are clearly stated:

4.1 AIMS & OBJECTIVES

- Develop a RoboCup Rescue certified robot:
- Enter the RoboCup Rescue league at a competitive level within three years
- Optimise the WMR MiroSot strategy for the UK championships
- Raise the Profile of WMR and sponsors through a revised marketing strategy
- Increase awareness of Engineering both at the University of Warwick and as a profession

In order to meet these goals appropriate management tools such as Project Plans and a Risk Register were selected and implemented to a level that would aid the team on a week to week basis, to keep track or progress and plan future action, but not hinder it with bureaucracy.

4.2 ORGANISATIONAL STRUCTURE

4.2.1 HIERARCHY

Although there was no need for a formal structure within such a small and centralised team, a network was drawn nevertheless, to illustrate the lines of communication and areas of responsibility. The structure closely resembled a hybrid of the matrix and divisional organisational structures.

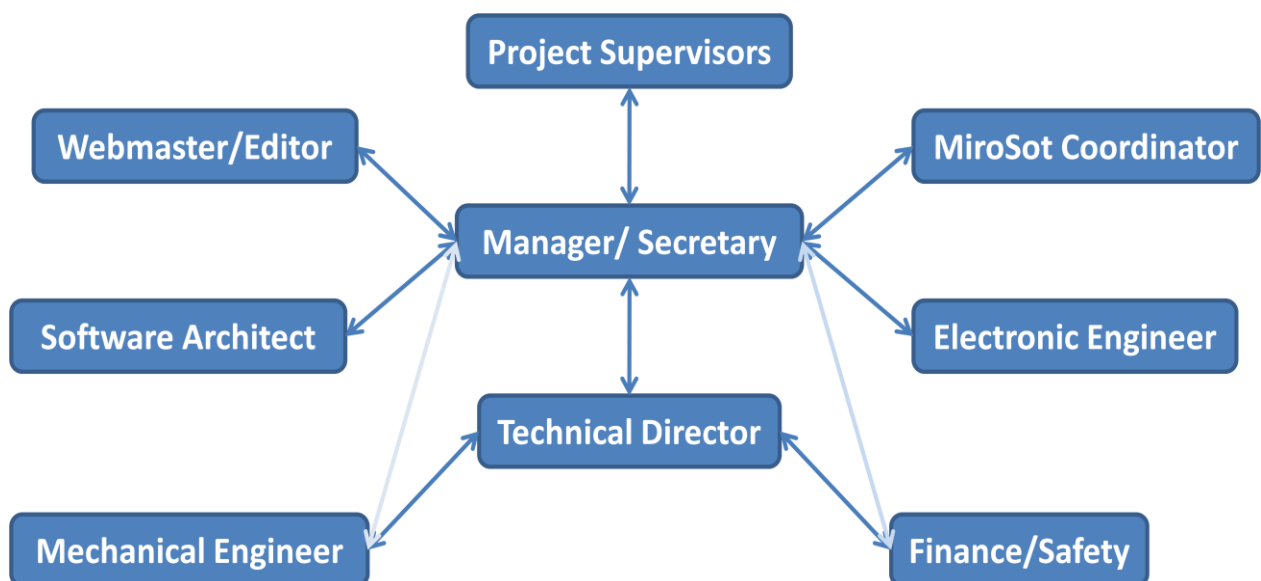


Figure 5 - Organisational Network

4.2.2 SUPERVISION

The WMR project is supervised by Dr. Ken Young and Dr. Peter Jones. Their role is to monitor progress, moderate peer assessment, offer advice and guidance. They also control the overall budget available to the team from the WMG and School of Engineering through their individual cost codes. Their position is analogous to managing directors.

4.2.3 THE TEAM

Each team member was assigned work according to their individual speciality and competencies. Team members would be ultimately responsible for the work required from roll assigned to them and held accountable. The team also took the Belbin⁹ Team Role Inventory assessment in order to ascertain their individual behavioral types



Alexander Barnes - Electronic Engineer:
Electronics, Software Architect
Belbin Role: Implementer



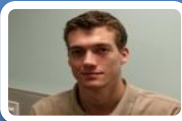
Edward Elbourne - System Engineer:
Finance/Safety Officer
Belbin Role: Team worker



Jonathan Holmes - Mechanical Engineer:
Webmaster, Sponsorship, Mechanics
Belbin Role: Completer



Chris Payne - Electronic Engineer: MiroSot
Coordinator/Programmer
Belbin Role: Shaper



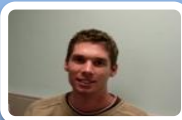
Redland Sanders - Mechanical Engineer: CAD,
Mechanics, Sponsorship
Belbin Role: Resource Investigator/Specialist



Mahan Ramachandra - Manufacturing Engineer:
Project Manager, Secretary
Belbin Role: Coordinator



Alexander Smith - Mechanical Engineer:
Technical Director
Belbin Role: Plant/Specialist



Phillip Smith - Electronic Engineer: Electronics,
Sensors
Belbin Role: Monitor Evaluator

4.3 MEETINGS

Formal weekly meetings were held in the WMR laboratory over the duration of the project. The purpose of these meetings was to provide the supervisors with a progress report and demonstrations of the team's work over the previous week, as well as an outline of work required over the next week. The meetings also allowed team members the opportunity to obtain support, advice and feedback from the supervisors.

Each meeting had a set out agenda outlining the progress report, points of discussion and the previous meeting minutes. Copies of these were published privately online and a copy e-mailed to all intended to attend the meeting.

In addition to this the team also held informal meetings outside working hours to discuss progress and required work within the team, prepare for deadlines and major milestones, prepare for presentations, allocate work and make decisions. These meetings were also a good opportunity for the members to socialise and engage in team building.

4.4 COMMUNICATIONS

It was found that the best way to communicate within the team was through the means of an online forum. A 'Google Groups' page was set up specifically for the WMR project. This allowed members to start online discussions that would automatically email each post on the forum to subscribers. There was also ability to upload files and documents that could be shared between members. This allowed the team to build up a central knowledge base and communicate quickly and transparently.

A notice board was also installed in the laboratory for posting official documentation, business cards, project plans etc. There were also whiteboards available to allow the team to leave messages in the lab.

4.5 PROJECT PLAN/SCHEDULE

As with most projects WMR used a Gantt chart to monitor progress, plan work schedules, allocate resources, highlight risks and identify critical activities.

An initial schedule was brainstormed at the beginning of the project and activities/task was generated from major deadlines, milestones and the activities needed to achieve them. The schedule was refined weekly, adding new tasks and removing one deemed unnecessary, the various iterations of the schedule could be used to follow the team's decision making process.

From this schedule a Gantt chart was generated containing the following fields;

4.5.1 ACTIVITY FIELDS

Task Identity: Name or description of activity

Task Number: The task's identification code

Duration: The estimated time required or completion, with start and finish dates

Resource Name: The individual(s) responsible for the task

Percentage Complete: An estimate of the progress achieved to date on that task

Predecessor: A list of linked tasks that require completion before the activity can be completed

Criticality: The team's assessment how important the task was towards achieving various deadlines/objectives

Status: An indicator of the current condition of the activity ranging from Blue (completed), Green (on schedule), Yellow (under risk) and Red (Late)

In addition to the activities schedule and delivery schedule was created to help keep track, and inventory of important components that were bought in. This helped manage procurement of hardware as well other necessary purchases such as printing, transportation bookings, publicity material etc.

Altogether the final project plan contained close to 200 different tasks. A project of this size became hard to visualise and keep track of all at once. Printing out the entire task became somewhat of a daunting task.

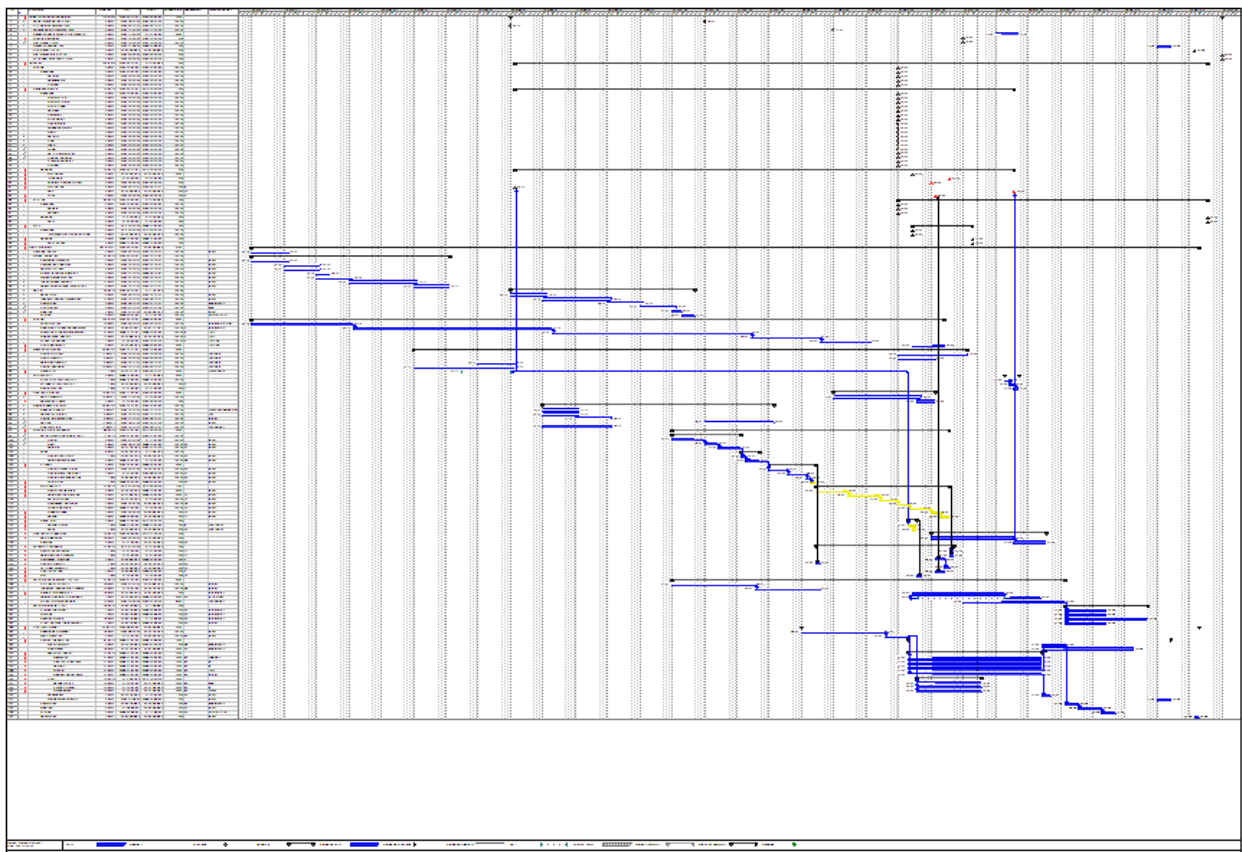


Figure 6 - The Entire Project Plan

To ameliorate this situation the plan was broken down into individual sections of critical activities and their associated tasks, deadlines and deliveries. This resulted in the creation of several smaller more dedicated project plans. These plans were then updated appropriately and used to reconstruct the master project plan which can be found attached.

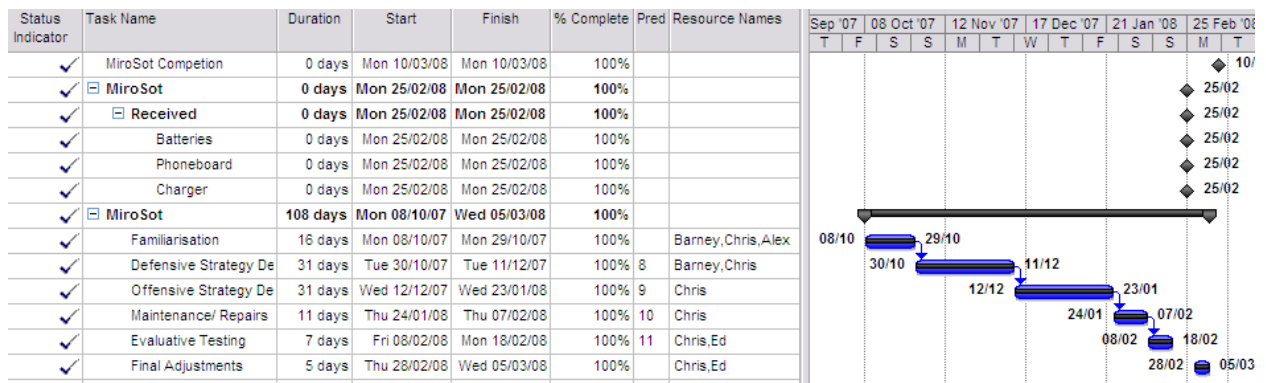


Figure 7 - The MiroSot Project Plan

In addition to smaller plans the entire plan was summarised into core activities to help keep track of the overall progress of the project.

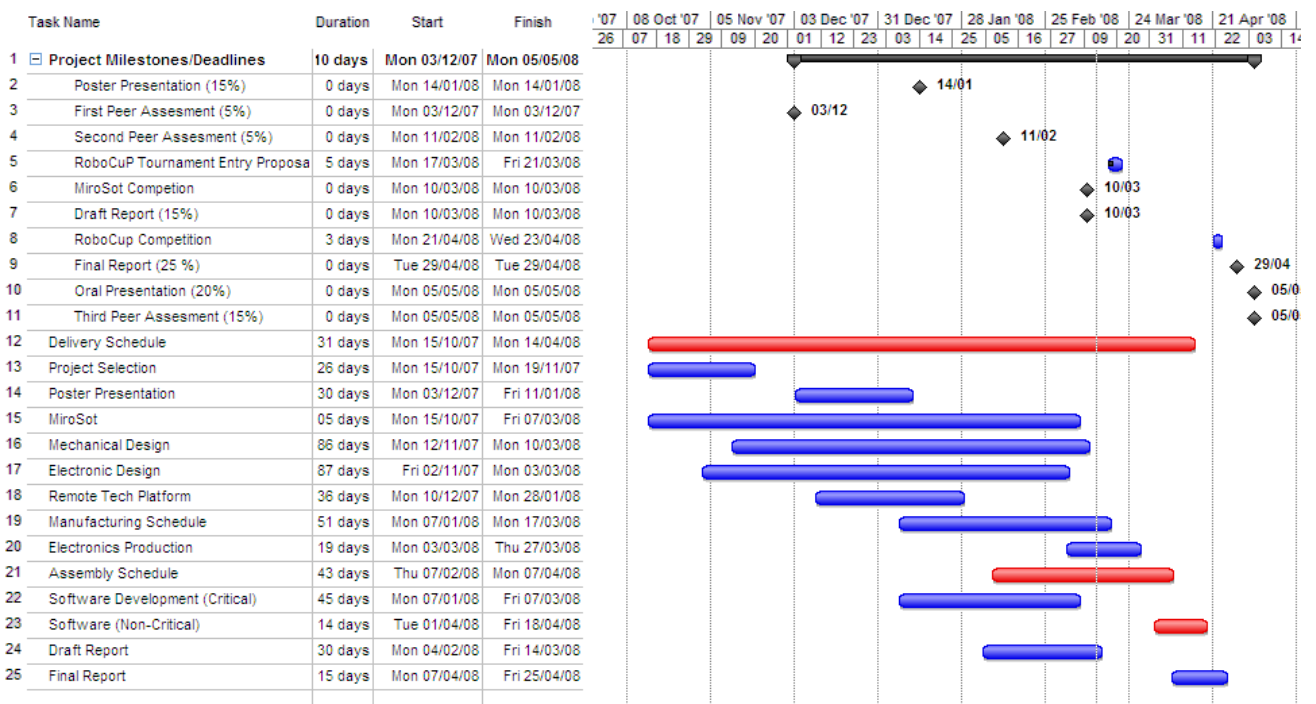


Figure 8 - Condensed Project Plan Overview

4.6 CRITICAL ACTIVITIES

Critical Path analysis is widely used in industry to identify the minimum time required for completion of a project (the summation of the duration the longest chain of interdependent tasks). This is used to calculate the available 'float' or buffer time available to the entire project as well as individual tasks. The team thought it would be prudent to also take into account certain activities that may not necessary appear on the critical path, but still important and susceptible to a high level of risk

4.6.1 RISK MANAGEMENT

There are several approaches to risk management that were taken depending on the criticality of the task.

4.6.1.1 AVOIDANCE (ELIMINATION)

If a risk is identified early enough it may be possible to plan in such a way that the risk avoided altogether, either by circumvention or choosing to approach the associated activity through a different route. However it is very difficult to spot every possible risk especially when undertaking a new project with little experience.

4.6.1.2 REDUCTION (MITIGATION)

This method involves trying to reduce the impact of risk in the likelihood of adversity. Practicing this approach however can become very expensive, requiring insurance arrangements that may not be feasible for a small project on a tight budget.

4.6.1.3 RETENTION

Sometimes risks are unavoidable and cannot be protected against, it is also true that some risks have negligible impact and can be simply ignored.

4.6.1.4 RISK TRANSFER

Shifting the risk is not a viable approach in regards to this project. The responsibility for the team's success or failure cannot be projected on to other individuals or organisations. The team is essentially liable for anything that may go wrong.

4.6.2 RISK REGISTER

Once high medium – high risk activities were identified by the team they were logged into a risk register that prescribed one or more of these approaches to help deal with possible outcomes.

The register took a standard format and the individual(s) responsible for that particular task filled out the risk management planning.



RoboCup Rescue Production Risk Assessment

Red

No.	Task	Duration	Float	Associated Risks	Possible Contingencies
39	IR camera: delivery is late; it has currently been rescheduled for Friday the 7 th of March. External	N/A	N/A	Unfortunately until the camera arrives and it can be actually tested any progress that has been made is uncertain.	Programming for the camera can and has started before delivery; the appropriate dongle has been bought for connecting the camera to the PC.
38, 41, 84, 114	Robot Arm: Due to low confidence in the specifications available on line the current mechanical designs will need to be refined. Mahan, Jong, Alex, Red, Barney,	N/A	N/A	<ul style="list-style-type: none"> - If the laser cutting may not be available - Lack of a robot arm may reduce the teams competitive edge in the competition 	<ul style="list-style-type: none"> - Reschedule production: Finish as much work as is possible before the rest of the servos arrive, and reschedule the remainder of the work. - Scrap the arm: as it is not critical to our entry to the competition (though it would give us a competitive edge) - Source new servos locally and redesign the arm accordingly

Amber

No.	Task	Duration	Float	Associated Risks	Possible Contingencies
122	Electronics Production	14 days	14 days	<ul style="list-style-type: none"> - Delay in PCB production - Error in circuit schematic or PCB 	<ul style="list-style-type: none"> - Get schematics to Ian early - All sub-circuits simulated in Multisim to

Figure 9 - An extract from the risk register

4.7 CONCLUSIONS

In terms management the main conclusion drawn is the recommendation that the next team use the existing administrative framework. Much time and effort went into refining the structure and content of the weekly formal meeting, the project plan, risk register etc. The next project manager can save time by using the existing templates.

It can also be difficult to predict and plan for the outcomes of various activities (especially external activities that the team has little or no control over) Introducing the risk register system and updating the project plan as frequently as possible is the most effective means of making sure the team is managing risk prudently. This system is also an effective means of assessing the overall health of the project.

Keeping minutes of all team meetings is the best way of keeping track of work allocation. Assigning team members weekly individual assignments and deadlines also created stepped progress and accountability.

Developing a good working relationship with the technical staff at both the School of Engineering and the IRC is critical for success. Coordination of things such activities as machine time and design consultancy need to be scheduled as early as possible, as there is often a rush towards the end of the year when other project teams submit their requirements.

5.0 REFERENCES

¹ Product Life Cycle diagram, http://www.arundelstreet.com/case_studies_life_cycle.htm, last accessed: 4 March 2008

¹ Chelsom J.V., Payne A.C. Reavill L.R.P., “Management for Engineers, Scientists and Technologists”, Wiley, 2nd edition, (2004), pp. 452-453.

¹ Tactical Robot Product Range, iRobot Corporation Website, http://www.irobot.com/uk/government_industrial.cfm, last accessed: 7 March 2008.

¹ Thomson Research, <http://research.thomsonib.com/gaportal/mktpages/welcome.htm>, last accessed: 1 March 2008.

¹ Kotler, P., *Principles of Marketing*, Prentice-Hall, Englewood Cliffs, NJ, (1983).

¹ May, C. and Sell, S.K., *Intellectual Property Rights: A Critical History*. Lynne Rienner Publishers (2006), Inc. pp 5-11.

¹ Korah, V., *An Introductory Guide to EC Competition Law and Practice*. Hart Publishing (2004). pp 291-292.

¹ Belbin. M. (1981). *Management Teams*. London; Heinemann.

Outgoing		
	Budgeted Cost	Notes
Office Equipment		
Office Refurbishment	£800.00	Including display screens, lighting, posters.
<i>Subtotal:</i>	<u>£800.00</u>	
Field Robot		
Chassis	£1,000.00	Including materials, labour.
Mechanics	£1,000.00	Including belts, pulleys, bearings, motors.
Batteries	£700.00	
Speed Controllers	£500.00	
Sensors	£3,500.00	Vision, CO2, IR, Sound, Accelerometer, Tilt.
Laser Scanner	£1,600.00	
Communications	£500.00	
Processor	£1,000.00	
Additional Electronics	£300.00	For sensor interfaces etc.
User Laptop	£900.00	
Misc	£1,000.00	
<i>Subtotal:</i>	<u>£12,000.00</u>	
Mirosot		
Plastic tops	£100.00	
New Batteries	£300.00	
Pitch cover	£20.00	
<i>Subtotal:</i>	<u>£420.00</u>	
Bipedal		
<i>Subtotal:</i>	<u>£0.00</u>	
Misc		
Printing poster	£100.00	
Budget left over for next year	£4,000.00	
<i>Subtotal:</i>	<u>£4,100.00</u>	
Total Expenditure:	<u>£17,320.00</u>	

Incoming		
	Budgeted Income	Notes
Brought over from previous budget	£8,619.59	
Project fund	£1,200.00	
Sponsorship	£8,000.00	
Total Income:	<u>£17,819.59</u>	

Profit/Loss	
Account Total:	<u>£499.59</u>

7.0 APPENDIX 2

WMR 2007/8 Expenditure

27/04/2008

Office Equipment							
	Expenditure (inc. VAT)	Expendee	Date	Contractor/Supplier	Part number, notes etc.	Account Used	Taken?
Refurbishment							
Whiteboard 900mm x 600mm	£0.00	n/a	10/10/2007	WMG	Free since going spare.	n/a	Y
Office cabinets	£0.00	n/a	10/10/2007	WMG	Free since going spare.	n/a	Y
Dabs Value 37" HD Ready LCD	£383.23	Ed Elbourne	17/10/2007	Dabs.com	Items received.	WMG	Y
Volgels VES wall support	£51.18	Ed Elbourne	17/10/2007	Dabs.com	Items received.	WMG	Y
Belkin VGA monitor replacement cable	£12.14	Ed Elbourne	17/10/2007	Dabs.com	Items received.	WMG	Y
DABS delivery	£18.95	Ed Elbourne	17/10/2007	Dabs.com	Items received.	WMG	Y
2 x Posters printed	£90.00	A. Smith	17/10/2007	Warwick Print	Items received.	WMG	Y
4 x Spotlights	£0.00	n/a	10/10/2007	WMG	Put on buildings budget.	Buildings	Y
Hyundai ImageQuest N220W-A 22" TV	£147.94	R. Sanders	23/01/2008	Scan Computers	Item received.	WMG	Y
Hyundai Delivery	£9.35	R. Sanders	23/01/2008	Scan Computers		WMG	Y
Hyundai ImageQuest N220W-A 22" TV	£147.94	R. Sanders	28/01/2008	Scan Computers	Item received.	WMG	Y
Hyundai Delivery	£9.35	R. Sanders	28/01/2008	Scan Computers		WMG	Y
Logitech Black X-140 Speakers	£15.93	R. Sanders	13/02/2008	Ebuyer	Items received.	WMG	Y
<i>Subtotal:</i>	<u>£886.01</u>						
Total Office Expenditure:	<u>£886.01</u>						

Field Robot							
	Expenditure (inc. VAT)	Expendee	Date	Contractor/Supplier	Part number, notes etc.	Account Used	Taken?
Chassis							
2 x 5" Round Bar 175mm Long	£68.93	A. Smith	09/01/2008	Ravenace Metals Ltd	00010. Items received.	WMG	Y
2 x 5" Round Bar 125mm Long	£52.85	A. Smith	09/01/2008	Ravenace Metals Ltd	00020. Items received.	WMG	Y
2 x 4" Round Bar 100mm Long	£37.47	A. Smith	09/01/2008	Ravenace Metals Ltd	00030. Items received.	WMG	Y
2 x 1/2" Plate - 500mm x 300mm	£57.44	A. Smith	09/01/2008	Ravenace Metals Ltd	00040. Items received.	WMG	Y
1.1/8" Round Bar 550mm Long	£14.36	A. Smith	09/01/2008	Ravenace Metals Ltd	00050. Items received.	WMG	Y
1/2" Plate - 250 x 120 (Centre plate)	£7.61	A. Smith	20/02/2008	Ravenace Metals Ltd	Items received.	WMG	Y
1/2" Plate 250 x 130 (Back Plate)	£8.18	A. Smith	20/02/2008	Ravenace Metals Ltd	Items received.	WMG	Y
1/2" Plate 250 x 140 (Front Plate)	£8.75	A. Smith	20/02/2008	Ravenace Metals Ltd	Items received.	WMG	Y
1/2" Plate 100 x 100 (Gearbox Clamps)	£2.69	A. Smith	20/02/2008	Ravenace Metals Ltd	Items received.	WMG	Y
1/2" Plate 250 x 175 (motor box plate)	£10.77	A. Smith	20/02/2008	Ravenace Metals Ltd	Items received.	WMG	Y
12mm Plate 250 x 80 (top plate)	£4.99	A. Smith	20/02/2008	Ravenace Metals Ltd	Items received.	WMG	Y
12mm Plate 90 x 70 (Ladar Bracket)	£1.66	A. Smith	20/02/2008	Ravenace Metals Ltd	Items received.	WMG	Y
2 x 1/2" Plate - 350mm x 140mm (Side Plates)	£24.40	A. Smith	20/02/2008	Ravenace Metals Ltd	Items received.	WMG	Y
650 Bolts of sizes between M4 & M8	£55.51	A. Smith	20/02/2008	Brocol Engineering Supplies	Items received.	Eng	Y
Taper lock brush - 1108 - 12mm	£13.90	A. Smith	20/02/2008	Brammer UK Ltd	Items received.	WMG	N
4 x 160 x 180 1/2" Plate Aluminium 6082	£44.65	A. Smith	31/03/2008	Ravenace Metals Ltd	Items received.	WMG	N
Anodising of aluminium shafts and plates	£94.00	A. Smith/R. Sanders	01/04/2008	Aluminium Surface Engineering	Items received.	WMG	N
Taper lock brush - 1108 - 12mm	£13.59	A. Smith	11/03/2008	BSL Brammer Ltd	Items received.	WMG	Y
4 x Fenner - 325-5M-9MM	£17.19	A. Smith	11/03/2008	BSL Brammer Ltd	Items received.	WMG	Y

2 x Acrylic LED Array covers manufacture	£19.79	A. Smith	10/04/2008	Aqua Jet Profiles Ltd.	Reference drawing: Polycarbonate centre section lid:LID)	WMG	N
Lid manufacture	£71.83	A. Smith	10/04/2008	Aqua Jet Profiles Ltd.	Reference drawing: LED Light array cover.	WMG	N
100 x M4x12mm Cap Head bolts	£10.17	A. Smith	16/04/2008	Brocol Engineering Supplies		WMG	N
100 x M4x6mm Button Head bolts	£5.76	A. Smith	16/04/2008	Brocol Engineering Supplies		WMG	N
100 x M5x6mm Button Head bolts	£6.17	A. Smith	16/04/2008	Brocol Engineering Supplies		WMG	N
100 x M4 nuts	£2.35	A. Smith	16/04/2008	Brocol Engineering Supplies		WMG	N
100 x M5 nuts	£2.35	A. Smith	16/04/2008	Brocol Engineering Supplies		WMG	N
100 x M3 nuts	£2.35	A. Smith	16/04/2008	Brocol Engineering Supplies		WMG	N
<i>Subtotal:</i>	<u>£659.71</u>						
Mechanics							
Comma Gear Box Oil 5L	£28.47	A. Smith	11/12/2007	Oscott Equipment	EP80W. Item received.	WMG	Y
2 x 940x50mm T10V Endless Belt	£82.10	A. Smith	17/12/2007	Brammer UK Ltd	ZP40BS. Items received	WMG	Y
2 x 1100x75mm T10V Endless Belt	£125.64	A. Smith	17/12/2007	Brammer UK Ltd	ZP40BS. Items received	WMG	Y
Motors: S23-G-285E	£343.46	A. Smith	17/12/2007	Magmotor USA	Items not yet received	WMG	N
Magmotor delivery	£0.00	A. Smith	17/12/2007	Magmotor USA	Received	WMG	N
2 x Internal Gear	£83.20	A. Smith	09/01/2008	HPC Gears	INI-80. Items received.	WMG	Y
4 x Spur Gear - Standard Bossed.	£41.96	A. Smith	09/01/2008	HPC Gears	G1-20. Items recieved.	WMG	Y
HPC Delivery	£19.15	A. Smith	09/01/2008	HPC Gears	ANCA. PM7110PG56-24V12. Items received.	WMG	Y
Parvalux Gearedmotor	£232.76	A. Smith	08/01/2008	Brammer UK Ltd		WMG	Y
Brammer Delivery	£14.93	A. Smith	08/01/2008	Brammer UK Ltd		WMG	Y
25 x iGlidur Polymer Bearing	£89.32	A. Smith	08/01/2008	Igus UK	GFM5055-10. Items received	WMG	Y
11 x iGlidur Polymer Bearing	£26.79	A. Smith	08/01/2008	Igus UK	GFM283239-20. Items received.	WMG	Y
25 x iGlidur Polymer Bearing (inc. delivery)	£35.90	A. Smith	07/01/2008	Igus UK		WMG	Y
P36-5M-15mm	£17.43	A. Smith	16/01/2008	Brammer UK Ltd	GFM1820-06 42227. Items received.	WMG	Y
P38-5M-15mm	£37.31	A. Smith	16/01/2008	Brammer UK Ltd	42227. Items received.	WMG	Y
305-5M-9mm	£4.12	A. Smith	16/01/2008	Brammer UK Ltd	42227. Items received.	WMG	Y
325-5m-9mm	£4.30	A. Smith	16/01/2008	Brammer UK Ltd	42227. Items received.	WMG	Y
350-5m-9mm	£4.52	A. Smith	16/01/2008	Brammer UK Ltd	42227. Items received.	WMG	Y
20 x 1400-18mm (Circlip to fit 18mm shaft)	£1.73	A. Smith	16/01/2008	Brammer UK Ltd	42227. Items received.	WMG	Y
20 x 1400-50mm (Circlip to fit 50mm shaft)	£11.65	A. Smith	16/01/2008	Brammer UK Ltd	42227. Items received.	WMG	Y
RX-64 Servo	£158.63	A. Smith	22/02/2008	RoboSavvy Ltd	Items received.	WMG	N
RX-28 Servo	£117.38	A. Smith	22/02/2008	RoboSavvy Ltd	Items received.	WMG	N
USB2Dynamixel	£52.88	A. Smith	22/02/2008	RoboSavvy Ltd	Items received.	WMG	N
Roboteq AX500 motor controller	£115.39	A. Smith	28/01/2008	Active Robots	Item received	WMG	Y
Sensor Cable 60(Phidgets)	£4.55	A. Smith	28/01/2008	Active Robots	Item received	WMG	Y
Active Robots Delivery	£5.87	A. Smith	28/01/2008	Active Robots	Item received	WMG	Y
2 x RX-10 Servo.	£119.85	A. Smith	26/02/2008	RoboSavvy Ltd	Items received.	WMG	N
3 x OF-RX-28H Set	£56.40	A. Smith	26/02/2008	RoboSavvy Ltd	Items received.	WMG	N
OF-RX-64H Set	£24.68	A. Smith	26/02/2008	RoboSavvy Ltd	Items received.	WMG	N

Robosavvy Delivery	£8.23	A. Smith	26/02/2008	RoboSavvy Ltd	Items received.	WMG	N
3 x 13 tooth spur gear, stainless steel	£28.02	R. Sanders	31/03/2008	HPC Gears	Items received.	WMG	N
HPC delivery	£5.88	R. Sanders	31/03/2008	HPC Gears	Items received.	WMG	N
RX-64 Servo	£158.63	A. Smith	11/03/2008	RoboSavvy Ltd	Items received.	WMG	N
Robosavvy Delivery	£7.04	A. Smith	11/03/2008	RoboSavvy Ltd	Items received.	WMG	N
<i>Subtotal:</i>	<u>£2,068.17</u>						
Batteries and Power							
Autobar BatteryTerminals (pack of 2)	£3.10	A. Smith	11/12/2007	Oscott Equipment	Items received	WMG	Y
Autobar 4-way Fuse Box	£3.22	A. Smith	11/12/2007	Oscott Equipment	Items received	WMG	Y
Autobar 10A Blade Fuses (pack)	£1.69	A. Smith	11/12/2007	Oscott Equipment	Items received	WMG	Y
Autobar 30A Blade Fuses (pack)	£1.69	A. Smith	11/12/2007	Oscott Equipment	Items received	WMG	Y
Isolator Switch	£6.70	A. Smith	11/12/2007	Oscott Equipment	Items received	WMG	Y
Autobar Assorted Small Blade Fuses	£1.69	A. Smith	11/12/2007	Oscott Equipment	Items received	WMG	Y
Unknown Oscott Charge	£94.22	A. Smith	11/12/2007	Oscott Equipment	Items received	WMG	Y
DC Power Plug 2.5mm	£0.17	A. Smith	30/11/2007	Electronic Stores	Items received	Eng	Y
Crocodile Clip Standard	£0.22	A. Smith	11/12/2007	Electronic Stores	Items received	Eng	Y
DC Power Plug 2.5mm	£0.17	A. Smith	13/12/2007	Electronic Stores	Items received	Eng	Y
2 x DC Power Plug 2.1mm	£0.32	A. Smith	17/12/2007	Electronic Stores	Items received	Eng	Y
25 x Rechargeable NiMH 'D' 10Ah Cell	£190.35	R. Sanders	07/01/2008	Farnell	5030641. Items received.	Eng	Y
2 x 4-way Surge Protector 2m Cable (White)	£6.49	R. Sanders	06/02/2008	Ebuyer	Items received	WMG	Y
2 x Belkin E-series 6 socket surgestrip 3m	£13.16	R. Sanders	06/02/2008	Ebuyer	Items received	WMG	Y
Ebuyer Delivery	£8.21	R. Sanders	06/02/2008	Ebuyer	Items received	WMG	Y
Charger (inc. delivery)	£97.77	A. Smith	18/01/2008	Rosendale Models	Items received	WMG	Y
Charger.	£108.03	A. Smith	16/01/2008	Midland Helicopters	Order cancelled, money has now been refunded.	WMG	Y
20 x Rechargeable NiMH 'D' 10Ah Cell	£145.70	A. Smith	16/04/2008	Farnell	117-3791	Ramachandra Sponsorship	N
Power Supply 240-13.8V 20A Auto	£40.20	Ramachandra M.	16/04/2008	Midland Helicopters	Order no. MJ11RH10076.	Ramachandra Sponsorship	Y
Robbe Power Peak Infinity 3 Bid	£218.29	Ramachandra	16/04/2008	Midland Helicopters	Order no. MJ11RH10076.	Ramachandra Sponsorship	Y
<i>Subtotal:</i>	<u>£941.39</u>						
Speed Controllers							
2 Channel Speed Controller (inc. 5% Discount)	£357.65	A. Smith	28/11/2007	Active Robots LTd	AX3500. Items received	WMG	Y
<i>Subtotal:</i>	<u>£357.65</u>						
Sensors							
Omni-directional Microphone	£4.01	E. Elbourne	23/11/2007	Electronic Stores	Item received	Eng	Y
Voltage Divider (inc. 5% Discount)	£5.24	A. Smith	28/11/2007	Active Robots LTd	1121. Items received	WMG	Y
Phidgets 20A Current Sensor (inc. 5% Discount)	£25.39	A. Smith	28/11/2007	Active Robots LTd	1119. Items received	WMG	Y
PhidgetTextLCD Blue & 8/8/8 IF Kit (inc. 5% Discount)	£102.33	A. Smith	28/11/2007	Active Robots LTd	1202. Items received	WMG	Y
3 x Sensor Cable 60 (inc. 5% Discount)	£6.94	A. Smith	28/11/2007	Active Robots LTd	3002. Items received	WMG	Y
Sharp GP2D120 Sensor (inc. 5% Discount)	£10.90	A. Smith	28/11/2007	Active Robots LTd	GP2D120. Items received	WMG	Y
6 x Maxsonar Range Finder EZ0 (inc. 5% Discount)	£119.25	A. Smith	28/11/2007	Active Robots LTd	MAX-EZ0. Items received	WMG	Y
Maxsonar Range Finder EZ3 (inc. 5% Discount)	£19.88	A. Smith	28/11/2007	Active Robots LTd	MAX-EZ3. Items received	WMG	Y
MR-8515 CPU Board (inc. 5% Discount)	£18.35	A. Smith	28/11/2007	Active Robots LTd	MR-8515. Items received	WMG	Y
Active Robots Delivery	£14.36	A. Smith	28/11/2007	Active Robots LTd		WMG	Y
2 x Unibrain Fire-I Desktop Digital Camera	£173.42	A. Smith	28/11/2007	Mac Heaven	# 2036. Items received. Broken in	WMG	Y

						testing. One returned		
Mac Heaven Delivery	£6.99	A. Smith	28/11/2007	Mac Heaven			WMG	Y
2 x Unibrain Fire-I Desktop Digital Camera	£90.14	A. Smith	19/12/2007	Mac Heaven		#2036. Replacement. Items received.	WMG	Y
Bantam Temperature Sensor	£7.52	A. Smith	28/01/2008	Rosssnedale Models		Items received.	WMG	Y
Cable and Software for E-Station BC6	£14.99	A. Smith	28/01/2008	Rosssnedale Models		Items received.	WMG	Y
Rosssnedale Models Carriage	£3.00	A. Smith	28/01/2008	Rosssnedale Models		Items received.	WMG	Y
Compass Model with Tilt Compensation	£241.53	A. Smith	25/01/2008	Sparkfun Electronics		SEN-08507. Paid in US\$. Items received.	WMG	Y
IMU 6 DoF - v2 woth ADXRS300	£70.40	A. Smith	26/01/2008	Sparkfun Electronics		SEN-08191. Paid in US\$. Items received. Invoice no 5-390-82090.	WMG	Y
Sparkfun Inport Duty	£42.74	A. Smith	01/02/2008	FedEx Express			WMG	Y
AXIS 206 Network Camera	£156.93	R. Sanders	06/02/2008	Ebuyer		Items received. Item not yet received	WMG	Y
Flir Photon Core IR Camera and bits	£2,522.90	A. Smith	31/01/2008	Focus 2000 IR Ltd			WMG	Y
Plantronics Aduio 300 Microphone	£8.14	R. Sanders	13/02/2008	Ebuyer		Item received.	WMG	Y
Axis Network Camera 207	£195.33	R. Sanders	13/02/2008	Ebuyer		Item received.	WMG	Y
LED camera light (inc. fabrication)	£16.07	P. Smith	12/02/2008	Electronic Stores		Item received 4JKQWS. Item not yet received.	Eng	Y
Hauptpage USB Live Video Capture	£41.08	A. Smith	20/02/2008	Dabs.com			WMG	Y
<i>Subtotal:</i>	<u>£3,917.83</u>							
Laser Scanner								
Hokuyo Robotics Laser (inc. 7% Discount)	£1,522.54	A. Smith	28/11/2007	Active Robots LTd		URG-04LX. Items recieved	WMG	Y
<i>Subtotal:</i>	<u>£1,522.54</u>							
Communications								
Linksys 4-Port USB Hub	£9.33	A. Smith	11/12/2007	Dabs.com		27511. Items received	WMG	Y
Buffalo Router	£40.96	A. Smith	11/12/2007	Dabs.com		27511. Items received	WMG	Y
Dabs delivery	£5.87	A. Smith	11/12/2007	Dabs.com		# 42243	WMG	Y
AVR-ISP: AVR ISP Downloader	£12.30	A. Smith	24/01/2008	Active Robots		Items received.	WMG	Y
Active Robots Delivery.	£3.40	A. Smith	24/01/2008	Active Robots		Items received. 23862. Items received.	WMG	Y
5 Belkin Cat5e assembled UTP patch cable	£3.11	R. Sanders	15/02/2008	Ebuyer			WMG	Y
2 Belkin Gold series VGA monitor extension cable	£9.53	R. Sanders	15/02/2008	Ebuyer		20839. Items received.	WMG	Y
Plexus Hi-spped USB 2.0 extension cable 2m	£1.86	R. Sanders	15/02/2008	Ebuyer		130588. Items received.	WMG	Y
Linksys Wireless-N Gigabit Router w/ storage link.	£215.18	R. Sanders	15/02/2008	Ebuyer		129218. Items received.	WMG	Y
Ebuyer delivery	£10.56	R. Sanders	15/02/2008	Ebuyer			WMG	Y
5 x Plexus Cat5e UTP patch cable 5m	£5.46	R. Sanders	13/02/2008	Ebuyer		Items received	WMG	Y
Ebuyer delivery	£8.14	R. Sanders	13/02/2008	Ebuyer		Items received 4RK6WS. Items returned. Money refunded	WMG	Y
2 x Linksys Wireless-N Gigabit Router	£0.00	A. Smith	20/02/2008	Dabs.com			WMG	Y
Dabs delivery	£6.85	A. Smith	20/02/2008	Dabs.com			WMG	Y
2 x Buffalo Router	£122.47	A. Smith	26/02/2008	Dabs.com		4S92WS. Items received.	WMG	Y
Dabs delivery	£6.85	A. Smith	26/02/2008	Dabs.com			WMG	Y
3 x 1.22mm Coaxial cable (100m)	£9.55	A. Smith	16/04/2008	Farnell		385-5302	Ramachandra Sponsorship	Y
3 x 2.54mm Coaxial Cable (100m)	£9.31	A. Smith	16/04/2008	Farnell		121-8576	Ramachandra Sponsorship	Y
<i>Subtotal:</i>	<u>£480.73</u>							
Processor								
Jetway J9F2-Extreme Core Duo Mainboard	£158.33	R. Sanders	26/11/2007	LinITX		J9F2EX. Item recieves. Broken in	WMG	Y

						testing and returned.		
2.5" Hard Drive IDE adapter	£5.58	R. Sanders	26/11/2007	LinITX		PA-HD25. Items received	WMG	Y
40 to 44 pin IDE Cable - 30cm	£3.50	R. Sanders	26/11/2007	LinITX		PA-HD44C30. Items received	WMG	Y
M200 Enclosure with bootable CF reader	£38.19	R. Sanders	26/11/2007	LinITX		M200. Items received	WMG	Y
12-32V 80W picoPSU-WI-32V	£45.61	R. Sanders	26/11/2007	LinITX		Pico80-WI-32. Items received	WMG	Y
LinITX Delivery	£5.82	R. Sanders	26/11/2007	LinITX			WMG	Y
Intel Core 2 Duo Mobile T7500, 2.20 GHz	£145.24	R. Sanders	26/11/2007	ScanComputers		LN18980. Items received but sent back due to wrong part.	WMG	Y
Silverston NT07 CPU Cooler	£8.17	R. Sanders	26/11/2007	ScanComputers		LN19607. Items received	WMG	Y
16GB Samsung Solid State Harddrive	£150.86	R. Sanders	26/11/2007	ScanComputers		LN17865. Items received	WMG	Y
2GB Corsair TwinX XMS2 Unbuffered.	£27.24	R. Sanders	26/11/2007	ScanComputers		LN12200. Items received	WMG	Y
ScanComputer Delivery	£7.17	R. Sanders	26/11/2007	ScanComputers			WMG	Y
Intel Core 2 Duo T5600, 1.83 GHz	£145.24	R. Sanders	03/12/2007	ScanComputers		Replacement for T7500. Items received.	WMG	Y
ScanComputer Delivery	£7.17	R. Sanders	03/12/2007	ScanComputers			WMG	Y
Jetway J9F2-Extreme Core Duo Mainboard	£158.33	R. Sanders	04/01/2008	LinITX		Replacement. Item not yet received.	WMG	Y
LinITX Delivery	£0.00	R. Sanders	04/01/2008	LinITX			WMG	Y
B/kin Desktop Network Adapter RJ45 PCI Card	£4.99	R. Sanders	06/02/2008	Ebuyer		Item not yet received.	WMG	Y
Firewire Header (inc. delivery)	£6.15	A. Smith	17/01/2008	LinITX		Items received	WMG	Y
2 x Scythe Mini-Kaze 40mm quiet cooling fan	£17.65	R. Sanders	31/03/2008	Ebuyer		Items received.	WMG	N
4 x Hiper 80mm 3pin case fan blue LED	£11.47	R. Sanders	31/03/2008	Ebuyer		Items received.	WMG	N
Antec Tricol 92mm case fan - 3/4 pin connector	£10.18	R. Sanders	31/03/2008	Ebuyer		Items received.	WMG	N
Ebuyer delivery	£4.78	R. Sanders	31/03/2008	Ebuyer		Items received.	WMG	N
Subtotal:	£961.67							
Additional Electronics								
2 x Equipment Wire 16/0.2mm 4A Red	£0.12	A. Smith	11/12/2007	Electronic Stores		Items received.	Eng	Y
2 x Equipment Wire 16/0.2mm 4A Black	£0.12	A. Smith	11/12/2007	Electronic Stores		Items received.	Eng	Y
4 x D 9 Way Socket Solder Bucket	£0.64	A. Smith	11/12/2007	Electronic Stores		Items received.	Eng	Y
2 x 4mm Plug Red Stackable	£1.22	A. Smith	11/12/2007	Electronic Stores		Items received.	Eng	Y
2 x 4mm Plug Black Stackable	£1.22	A. Smith	11/12/2007	Electronic Stores		Items received.	Eng	Y
10 x Crimp Blue Push On Receptacle F 6.3	£0.46	A. Smith	12/12/2007	Electronic Stores		Items received.	Eng	Y
10 x 560K 0.6W 1% Metal Film	£0.15	A. Smith	12/12/2007	Electronic Stores		Items received.	Eng	Y
10 x Crimp Yellow Butt Splice	£0.42	A. Smith	12/12/2007	Electronic Stores		Items received.	Eng	Y
2 x Equipment Wire 32/0.2mm 10A Red	£0.15	A. Smith	13/12/2007	Electronic Stores		Items received.	Eng	Y
2 x Equipment Wire 32/0.2mm 10A Black	£0.24	A. Smith	13/12/2007	Electronic Stores		Items received.	Eng	Y
D 9 Way Plug Solder Bucket	£0.16	A. Smith	17/12/2007	Electronic Stores		Items received.	Eng	Y
2 x D 9 Way Cover	£0.46	A. Smith	17/12/2007	Electronic Stores		Items received.	Eng	Y
3 Equipment Wire 32/0.2mm 10A Orange	£0.22	A. Smith	17/12/2007	Electronic Stores		Items received.	Eng	Y
3 Equipment Wire 32/0.2mm 10A Red	£0.22	A. Smith	17/12/2007	Electronic Stores		Items received.	Eng	Y
3 Equipment Wire 32/0.2mm 10A Black	£0.35	A. Smith	17/12/2007	Electronic Stores		Items received.	Eng	Y
D 15 Way Socket Solder Bucket	£0.22	A. Smith	17/12/2007	Electronic Stores		Items received.	Eng	Y
D 15 Way Cover	£0.24	A. Smith	17/12/2007	Electronic Stores		Items received.	Eng	Y
Insulation Tape	£0.49	A. Smith	17/12/2007	Electronic Stores		Items received.	Eng	Y
Sleeving Heatshrink 1.6mm (1.2m long)	£0.60	A. Smith	17/12/2007	Electronic Stores		Items received.	Eng	Y
Sleeving Heatshrink 2.4mm (1.2m long)	£0.60	A. Smith	17/12/2007	Electronic Stores		Items received.	Eng	Y

20 x Cable Tie 140mm	£1.39	A. Smith	17/12/2007	Electronic Stores	Items received.	Eng	Y
D 9 Way Plug Solder Bucket	£0.16	A. Smith	17/12/2007	Electronic Stores	Items received.	Eng	Y
100x75x40mm ABS	£1.10	A. Smith	18/12/2007	Electronic Stores	Items received.	Eng	Y
2 x Terminal Block 12 Way 6A	£1.00	A. Smith	18/12/2007	Electronic Stores	Items received.	Eng	Y
5 x 4mm Plug White Stackable	£2.90	A. Smith	20/12/2007	Electronic Stores	Items received.	Eng	Y
6 x 4mm Plug Black Stackable	£3.66	A. Smith	20/12/2007	Electronic Stores	Items received.	Eng	Y
6 x 4mm Plug Red Stackable	£3.66	A. Smith	20/12/2007	Electronic Stores	Items received.	Eng	Y
3 x Equipment Wire 32/0.2mm 10A White	£0.22	A. Smith	20/12/2007	Electronic Stores	Items received.	Eng	Y
4mm Socket Black	£0.10	A. Smith	02/01/2008	Electronic Stores	Items received.	Eng	Y
6 x Crimp Yellow Ring M5	£0.25	A. Smith	02/01/2008	Electronic Stores	Items received.	Eng	Y
4mm Socket Red	£0.16	A. Smith	02/01/2008	Electronic Stores	Items received.	Eng	Y
Finder Relay (DIN Mount)	£12.67	A. Smith	17/12/2007	Farnell	1329725. Items received.	Eng	Y
2 x Capacitor	£4.84	A. Smith	17/12/2007	Farnell	1198694. Items received.	Eng	Y
Green LED	£2.66	A. Smith	17/12/2007	Farnell	1139497. Items received.	Eng	Y
Yellow LED	£2.66	A. Smith	17/12/2007	Farnell	1139501. Items received.	Eng	Y
2 x Red LED	£5.31	A. Smith	17/12/2007	Farnell	1105208. Items received.	Eng	Y
2 x Rectifier Diode	£3.95	A. Smith	17/12/2007	Farnell	9099352. Items received.	Eng	Y
5 x 20mm Cable Gland	£5.88	A. Smith	17/12/2007	Farnell	1245207. Items received.	Eng	Y
DC/DC Converter 15W 5V	£29.52	A. Smith	17/12/2007	Farnell	1299027. Items received.	Eng	Y
Maxi Fuse Holder	£5.72	A. Smith	20/12/2007	Farnell	9943129. Items received.	Eng	Y
Fuse Holder Cover	£0.86	A. Smith	20/12/2007	Farnell	9943137. Items received.	Eng	Y
3 x 60A Maxi Slau Blau Fuse	£4.27	A. Smith	20/12/2007	Farnell	9943188. Items received.	Eng	Y
10 x 4A Fuse	£1.76	A. Smith	20/12/2007	Farnell	9943498. Items received.	Eng	Y
10 x 10A Fuse	£2.70	A. Smith	20/12/2007	Farnell	9943420. Items received.	Eng	Y
12V PSU	£34.37	A. Smith	20/12/2007	Farnell	1254991. Items received.	Eng	Y
Allen Keys	£14.45	A. Smith	20/12/2007	Farnell	871886. Items received.	Eng	Y
Crimp Tool (Ratchet)	£23.58	A. Smith	20/12/2007	Farnell	3126353. Items received.	Eng	Y
5 x LED W/White 5mm	£4.52	P. Smith	11/01/2008	Farnell	LM520A. Items received.	Eng	Y
5 x LED Telux White	£5.82	P. Smith	11/01/2008	Farnell	TLWW9600. Items received.	Eng	Y
15 x LED TLWW9600	£17.45	P. Smith	15/01/2008	Farnell	8311161. Item received.	Eng	Y
Taperbrush 12mm	£4.14	E. Elbourne	22/01/2008	Farnell	184-347. Item received.	Eng	Y
6.23 UNC (hex-head screw)	£9.59	E. Elbourne	29/01/2008	RS	376-3984	Eng	Y
1108x28mm taper lock	£4.64	E. Elbourne	29/01/2008	FEC	376-3985	Eng	Y
PCB posts pkg 25 nickel plated	£5.32	E. Elbourne	29/01/2008	FEC	8908-7039	Eng	Y
TTZ serial to USB	£13.04	E. Elbourne	29/01/2008	FEC	1329-311	Eng	Y
RS232 serial to USB	£17.04	E. Elbourne	29/01/2008	FEC	1329-310	Eng	Y
1 00x75x40mm ABS	£1.10	P. Smith	29/01/2008	Electronic Stores	Item received.	Eng	Y
88m Equipment wire 32/0.2mm 10A black	£10.34	P. Smith	29/01/2008	Electronic Stores	Item received.	Eng	Y
7m Equipment wire 32/0.2mm 10A black	£0.82	P. Smith	29/02/2008	Electronic Stores	Item received.	Eng	Y
Adhesive Strip 12mm x 150mm	£0.07	P. Smith	29/01/2008	Electronic Stores	Item received.	Eng	Y
1/64" Roebuck Allen Key	£0.02	E. Elbourne	01/02/2008	Farnell	102-344	Eng	Y
13A plug top fuse	£0.10	P. Smith	04/02/2008	Electronic Stores	Item received.	Eng	Y
20m Equipment Wire 7/0.2mm 10A black	£0.69	P. Smith	04/02/2008	Electronic Stores	Item received.	Eng	Y

58m Equipment Wire 7/0.2mm 2A orange	£1.10	P.Smith	04/02/2008	Electronic Stores	Item received.	Eng	Y
D 15 way socket solder bucket	£0.22	P.Smith	04/02/2008	Electronic Stores	Item received.	Eng	Y
D 9 way cover	£0.23	P.Smith	05/02/2008	Electronic Stores	Item received.	Eng	Y
D 9 way socket solder bucket	£0.16	P.Smith	05/02/2008	Electronic Stores	Item received.	Eng	Y
5 x Allen Key	£0.82	E. Elbourne	05/02/2008	Farnell	102-344	Eng	Y
Insulation Tape	£0.49	P.Smith	13/02/2008	Electronic Stores	Item received.	Eng	Y
2 x LED Bulbs	£35.56	E. Elbourne	13/02/2008	Farnell	1333-825	Eng	Y
5 x MR11 Connectors	£15.39	E. Elbourne	13/02/2008	Farnell	530-669	Eng	Y
3 x ATMEGA64 - 16AU	£22.77	E. Elbourne	14/02/2008	Farnell	917-1355	Eng	Y
2 x Switched Regulator (5V)	£8.46	P. Smith	15/02/2008	Farnell	LM2576T-5.0	Eng	Y
6 x Switched Regulator (Adjustable)	£29.82	P. Smith	15/02/2008	Farnell	LM2576T-Adj	Eng	Y
2 x 24V Relay	£1.72	P. Smith	19/02/2008	Farnell	1175/078	Eng	Y
10 x Schottky Diode	£4.91	P. Smith	19/02/2008	RS	654-7139	Eng	Y
2 x Magnet	£0.82	E. Elbourne	20/02/2008	RS	433-2404	Eng	Y
2 x 2-way connector male	£13.04	A. Smith	20/02/2008	Farnell	345-4022	Eng	Y
2 x 2-way connector female	£15.25	A. Smith	20/02/2008	Farnell	345-4034	Eng	Y
Magnet 3.2 x 3.2 x 19.1	£0.41	E. Elbourne	20/02/2008	Farnell	433-2404	Eng	Y
Knipex Circlip A1	£9.88	E. Elbourne	20/02/2008	Farnell	135-7519	Eng	Y
Knipex Circlip A2	£10.82	E. Elbourne	20/02/2008	Farnell	135-7521	Eng	Y
Knipex Wire strippers	£17.47	E. Elbourne	20/02/2008	Farnell	876-227	Eng	Y
5 x Rolls of electrical tape	£2.50	E. Elbourne	20/02/2008	Electronic Stores		Eng	Y
Electrolytic 100uF (p=5)	£1.23	P.Smith	19/02/2008	Electronic Stores	Item received.	Eng	Y
Electrolytic 1000uF 25V (p=5)	£2.85	P.Smith	19/02/2008	Electronic Stores	Item received.	Eng	Y
100uH inductor	£1.44	P.Smith	19/02/2008	Electronic Stores	Item received.	Eng	Y
150uH inductor	£0.48	P.Smith	20/02/2008	Electronic Stores	Item received. Item returned. 20% handling charge	Eng	Y
Megger Clamp Meter - RETURNED	£32.26	A. Smith	04/03/2008	RS	incurred.	Eng	Y
2 x Heat sink	£2.70	P. Smith	05/03/2008	Farnell	131-9495	Eng	Y
7 x Heat sink	£13.41	P. Smith	05/03/2008	Farnell	121-3468	Eng	Y
Iso-tech ICM-136R Clampmeter	£119.85	A. Smith	06/03/2008	RS	468-1265	Eng	Y
10 x 1000uF Capacitor	£6.20	P. Smith	07/03/2008	Farnell	969-2312	Eng	Y
2 Piece clamp 28mm	£15.66	E. Elbourne	10/03/2008	RS	363-9421	Eng	Y
2 x MOSPEC Diode U30D20C	£2.59	P. Smith	11/03/2008	Farnell	144-0110	Eng	Y
USB Type A Socket	£0.38	P. Smith	12/03/2008	Farnell	1308-874	Eng	Y
USB Type A Socket	£0.85	P. Smith	12/03/2008	Farnell	131-4363	Eng	Y
5 C/W Heatsink	£1.69	P. Smith	13/03/2008	Farnell	121-9495	Eng	Y
50 x Nylon Spacers	£15.86	E. Elbourne	18/03/2008	RS	325-671	Eng	Y
Stainless Screws M3+12	£11.37	E. Elbourne	18/03/2008	RS	281-007	Eng	Y
Zinc Hex Screws M2.5 x 6	£15.40	E. Elbourne	18/03/2008	RS	483-812	Eng	Y
Vernier Caliper	£69.78	E. Elbourne	18/03/2008	RS	245-5676	Eng	Y
Black Nylon Sheet 12mm	£33.48	E. Elbourne	26/03/2008	RS	257-7316	Eng	Y
20 x White 5mm LED	£23.27	P. Smith	27/03/2008	Farnell	8311-161	Eng	Y
10 x 150Ohm Resistor	£1.95	E. Elbourne	27/03/2008	Farnell	140-0163	Eng	Y
10 x 130 Ohm Resistor	£1.95	E. Elbourne	27/03/2008	Farnell	140-0161	Eng	Y
10 x Connector - Header surface mount 2 pin	£3.76	E. Elbourne	27/03/2008	Farnell	949-2534	Eng	Y
10 x Connector - Housing 2 pin	£0.31	E. Elbourne	27/03/2008	Farnell	361-6186	Eng	Y
100 x Connector - Contacts	£4.58	E. Elbourne	27/03/2008	Farnell	361-7210	Eng	Y
40 x LEDs white 5mm	£23.03	E. Elbourne	27/03/2008	Farnell	857-7153	Eng	Y
50 x Resistor 51 Ohm	£1.35	E. Elbourne	31/03/2008	Farnell	420-074	Eng	Y
Solder wire 3.23mm	£8.86	E. Elbourne	31/03/2008	Farnell	070-201	Eng	Y
Solder wire 1.2mm	£4.84	E. Elbourne	31/03/2008	Farnell	988-7164	Eng	Y
Push button switch - green LED	£8.20	E. Elbourne	31/03/2008	Farnell	4389-438	Eng	Y
E-stop button	£14.50	E. Elbourne	31/03/2008	Farnell	134-627	Eng	Y

6mm Blue cable	£16.93	E. Elbourne	31/03/2008	Farnell	117-9195	Eng	Y
6mm Red cable	£16.93	E. Elbourne	31/03/2008	Farnell	117-9198	Eng	Y
18 x Mosfet FQPTN10	£7.40	P. Smith	02/04/2008	Farnell	984-5690	Eng	Y
5 x Mosfet FQP7P06	£2.35	P. Smith	02/04/2008	Farnell	9846-557	Eng	Y
30 x 3mm Red LED	£5.08	P. Smith	02/04/2008	Farnell	114-2514	Eng	Y
10 x Diode IN4001	£0.52	P. Smith	02/04/2008	Farnell	956-4993	Eng	Y
10 x Schottky diode MBR360	£3.06	P. Smith	02/04/2008	Farnell	489-7456	Eng	Y
3 x USB Type B reciever	£0.92	P. Smith	02/04/2008	Farnell	130-8876	Eng	Y
5 x Diode IN4002	£0.12	P. Smith	02/04/2008	Farnell	146-7453	Eng	Y
4 x 10- way header	£5.17	P. Smith	02/04/2008	Farnell	129-8785	Eng	Y
5 x 5mm switch	£1.47	P. Smith	02/04/2008	Farnell	947-1707	Eng	Y
2 x USB Art FT22322	£12.71	P. Smith	02/04/2008	Farnell	951-9793	Eng	Y
14-way straight boxed header	£1.13	P. Smith	03/04/2008	RS	625-7274	Eng	Y
36 x Terminal Strip PCB 36 way	£3.30	P. Smith	03/04/2008	Electronic Stores	Item received.	Eng	Y
3 x Electrolytic 100uF (p=5) capacitor	£1.23	P. Smith	03/04/2008	Electronic Stores	Item received.	Eng	Y
IDC 14 way socket	£0.21	P. Smith	03/04/2008	Electronic Stores	Item received.	Eng	Y
IDC 14 way socket	£0.21	P. Smith	03/04/2008	Electronic Stores	Item received.	Eng	Y
Electrolytic 10uF (p=2) capacitor	£0.09	P. Smith	03/04/2008	Electronic Stores	Item received.	Eng	Y
Voltage convertor	£0.72	P. Smith	03/04/2008	Electronic Stores	Item received.	Eng	Y
25 x 2W Header	£6.46	P. Smith	07/04/2008	Farnell	112-1826	Eng	Y
25 x 2W Plug	£18.80	P. Smith	07/04/2008	Farnell	112-1766	Eng	Y
PCB Manufacture	£35.00	P. Smith	08/04/2008	Engineering	This is an estimate: Invoice to follow.	WMG	N
2 x Small PCB Board Manufacture	£35.00	P. Smith	08/04/2008	Engineering	This is an estimate: Invoice to follow.	WMG	N
14 Way stragith box header	£1.13	P. Smith	09/04/2008	RS	625-7274	Eng	Y
15 x 100nF Capacitor	£2.95	M. Tandy	11/04/2008	Farnell	130 1179	WMG	N
10uF Capacitor	£0.45	M. Tandy	11/04/2008	Farnell	146 3371	WMG	N
10 x 33nF Capactior	£0.79	M. Tandy	11/04/2008	Farnell	360 6170	WMG	N
50 x 10k Resistor	£1.29	M. Tandy	11/04/2008	Farnell	933 7016	WMG	N
50 x 27 Resistor	£0.71	M. Tandy	11/04/2008	Farnell	933 6290	WMG	N
50 x 1k5 Resistor	£0.65	M. Tandy	11/04/2008	Farnell	933 7113	WMG	N
50 x 4k7 Resistor	£1.23	M. Tandy	11/04/2008	Farnell	613 782	WMG	N
50 x 1M Resistor	£0.65	M. Tandy	11/04/2008	Farnell	933 7032	WMG	N
50 x 470 Resistor	£0.65	M. Tandy	11/04/2008	Farnell	933 7431	WMG	N
2 x 5V Relay	£3.48	M. Tandy	11/04/2008	Farnell	109 4008	WMG	N
1 x 5V to +/- 12V converter	£4.45	M. Tandy	11/04/2008	Farnell	872 7503	WMG	N
2 x Darlington Driver	£0.87	M. Tandy	11/04/2008	Farnell	966 4378	WMG	N
1 x USB B Socket Surface Mount	£0.73	M. Tandy	11/04/2008	Farnell	132 1918	WMG	N
5 x Resonator 6MHz	£4.41	M. Tandy	11/04/2008	Farnell	117 0434	WMG	N
2 x Resonator 20MHz	£2.16	M. Tandy	11/04/2008	Farnell	121 8537	WMG	N
2 x 15-way solder bucket connector	£3.54	A. Smith	16/04/2008	Farnell	107-5229	Ramachandra Sponsorship	Y
Soder Wick, 80 Series 1.9mm 3m Solder	£4.00	A. Smith	16/04/2008	Farnell	860-748	Ramachandra Sponsorship	Y
Soder Wick, 80 Series 2.9mm 3m Solder	£4.40	A. Smith	16/04/2008	Farnell	959-9525	Ramachandra Sponsorship	Y
Red Illuminated push-button switch.	£8.97	A. Smith	16/04/2008	RS	314-9322	Ramachandra Sponsorship	Y
10 x 60A max-blade fuse	£9.87	A. Smith	16/04/2008	RS	493-7108	Ramachandra Sponsorship	Y
10 x 80A max-blade fuse	£9.87	A. Smith	16/04/2008	RS	493-7136	Ramachandra Sponsorship	Y
50 x Cable tie.	£3.82	A. Smith	16/04/2008	RS	666-751	Ramachandra Sponsorship	Y
6mm Spacers 25pk	£4.47	P. Smith	16/04/2008	Farnell	517-628	WMG	N
SMA RG316 cable 25cm	£17.01	P. Smith	16/04/2008	Farnell	105-6167	WMG	N
4 x Male Harting 2-way connector	£26.70	P. Smith	16/04/2008	Farnell	345-4022	WMG	N
4 x Female Harting 2-way connector	£31.40	P. Smith	16/04/2008	Farnell	345-4034	WMG	N

10m Blue equipment wire 0.2mm 2A	£0.19	P. Smith	14/04/2008	Electronic Stores	Item received.	WMG	Y
10m Red equipment wire 0.2mm 2A	£0.36	P. Smith	14/04/2008	Electronic Stores	Item received.	WMG	Y
10m Black equipment wire 0.2mm 2A	£0.34	P. Smith	14/04/2008	Electronic Stores	Item received.	WMG	Y
10 x Cable tie 140mm	£0.70	P. Smith	14/04/2008	Electronic Stores	Item received.	WMG	Y
10m Green equipment wire 0,2mm 2A	£0.19	P. Smith	14/04/2008	Electronic Stores	Item received.	WMG	Y
20 x Crimp blue push on receptacle female 6.3	£0.92	P. Smith	15/04/2008	Electronic Stores	Item received.	WMG	Y
D 15-way socket solder bucket	£0.22	P. Smith	15/04/2008	Electronic Stores	Item received.	WMG	Y
D 15-way plug solder bucket	£0.22	P. Smith	15/04/2008	Electronic Stores	Item received.	WMG	Y
D 9-way plug solder bucket	£0.16	P. Smith	15/04/2008	Electronic Stores	Item received.	WMG	Y
D 9-way socket solder bucket	£0.16	P. Smith	15/04/2008	Electronic Stores	Item received.	WMG	Y
10m Green equipment wire 0,2mm 2A	£0.19	P. Smith	15/04/2008	Electronic Stores	Item received.	WMG	Y
10m Blue equipment wire 0.2mm 2A	£0.19	P. Smith	15/04/2008	Electronic Stores	Item received.	WMG	Y
Multilayer ceramic capacitor 100nF	£0.11	P. Smith	15/04/2008	Electronic Stores	Item received.	WMG	Y
9m White equipment wire 0.6mm 3A	£0.19	P. Smith	15/04/2008	Electronic Stores	Item received.	WMG	Y
4 x Insulation tape	£1.96	P. Smith	16/04/2008	Electronic Stores	Item received.	WMG	Y
Push switch 1 pole push to make	£0.14	P. Smith	16/04/2008	Electronic Stores	Item received.	WMG	Y
Crimp yellow ring M8	£0.69	P. Smith	16/04/2008	Electronic Stores	Item received.	WMG	Y
Crimp yellow ring M6	£0.54	P. Smith	16/04/2008	Electronic Stores	Item received.	WMG	Y
Crimp blue ring M5	£0.29	P. Smith	16/04/2008	Electronic Stores	Item received.	WMG	Y
Crimp blue ring M6	£0.31	P. Smith	16/04/2008	Electronic Stores	Item received.	WMG	Y
IDC 14 way header straight	£0.26	P. Smith	17/04/2008	Electronic Stores	Item received.	WMG	Y
2A 20mm antisurge	£1.00	P. Smith	17/04/2008	Electronic Stores	Item received.	WMG	Y
500mA 20mm antisurge	£0.39	P. Smith	17/04/2008	Electronic Stores	Item received.	WMG	Y
Subtotal:	£1,243.90						
User Laptop							
Subtotal:	£0.00						
Misc							
Subtotal:	£0.00						
Total Field Robot Expenditure:	£12,153.59						

MiroSot Robots							
	Expenditure (inc. VAT)	Expendee	Date	Contractor/Supplier	Part number, notes etc.	Account Used	Taken?
Mechanical							
Subtotal:	£0.00						
Communications							
Subtotal:	£0.00						
Electronics							
2 x Kokam 350mAh 7.4V Li-poly Pack	£21.49	C. Payne	16/01/2008	E-Flight	Item Received.	WMG	Y
4 x Kokam 350mAh 7.4V Li-poly Pack	£42.98	A. Smith	27/02/2008	E-Flight	Items received.	WMG	Y
Subtotal:	£64.47						
Programming							
Subtotal:	£0.00						
Misc							
Foamboard Tops	£22.00	C. Payne	06/02/2008	Warwick Print	Job no. 86576. First batch wrong size - replacements for	WMG	Y

Trophies for Championships	£43.80	E. Elbourne	27/02/2008	Coventry Trophies	free.	WMG	Y
Refreshments for Championships	£74.00	E. Elbourne	07/03/2008	Costcutter		WMG	Y
<i>Subtotal:</i>	<u>£139.80</u>						
Total Mirosoft Expenditure:	<u>£204.27</u>						

Biped Robots	Expenditure (inc. VAT)	Expendee	Date	Contractor/Supplier	Part number, notes etc.	Account Used	Taken?
Mechanical							
<i>Subtotal:</i>	<u>£0.00</u>						
Communications							
<i>Subtotal:</i>	<u>£0.00</u>						
Electronics							
<i>Subtotal:</i>	<u>£0.00</u>						
Programming							
<i>Subtotal:</i>	<u>£0.00</u>						
Misc							
<i>Subtotal:</i>	<u>£0.00</u>						
Total Biped Expenditure:	<u>£0.00</u>						

Total Outgoing	Expenditure (inc. VAT)	Expendee	Date	Contractor/Supplier	Part number, notes etc.	Account Used	Taken?
Misc							
Unknown engineering stores purchase	£2.94	Unknown	01/08/07	Engineering stores		WMG	Y
3 Posters for Presentation	£170.00	J. Holmes	09/01/08	Warwick Print	Ordered and Received.	Eng	Y
Refreshments for Open Day	£64.72	R. Sanders	29/01/08	Costcutter	Items received.	WMG	N
Promotional Stickers	£8.36	J. Holmes	09/04/08	Warwick Print	Credit Card used	WMG	Y
Transfer from WMG to Eng account	£200.00	E. Elbourne	11/04/08	WMG/Eng	See quote no. 15330.	WMG	Y
Post Charges	£37.37	Various		WMG	To compensate for overspend	WMG	Y
<i>Subtotal:</i>	<u>£483.39</u>				Cost of postage over project.	WMG	Y
RoboCup Rescue Competition							
Hotels for RoboCup Rescue	£1,666.70	Various	23/04/08	In Hotel Bad Minden	Paid by credit card	WMG	Y
Entry to RoboCup Rescue	£916.80	Various	21/04/08	RoboCup Rescue	Money taken.	WMG	Y
Car hire for RoboCup Rescue	£302.65	Various	21/04/08	Budget Rental	Inclusive of member fee.	WMG	N
Ferry Tickets to RoboCup Rescue	£544.00	A. Smith	11/03/08	Stella Line	Paid in full	WMG	N
RAC Breakdown cover	£53.82	R. Sanders	16/04/08	RAC Ltd	Paid	WMG	Y
Parking costs at RoboCup Rescue	£34.44	R. Sanders	24/04/08	Hannover Messe	Paid by credit card	WMG	Y
Fuel costs for RoboCup Rescue	£300.40	R. Sanders	24/04/08	Various	Paid by credit card	WMG	Y
Internet use at RoboCup Rescue	£8.20	R. Sanders	24/04/08	Hannover Messe	Paid by credit card	WMG	Y
<i>Subtotal:</i>	<u>£3,827.01</u>						
Total Outgoing:	<u>£17,554.27</u>						

Incoming					
	Income		Notes	Account Used	Received?
WIMRC sponsorship	£4,000.00			WMG	Y
WMG sponsorship	£3,500.00	03/01/08		WMG	Y
Brought over from previous budget	£8,619.59	01/08/07		WMG	Y
MEng project fund	£1,200.00	01/10/07	£150 per student.	Eng	Y
Transfer from WMG to Eng account	£200.00	11/04/08	WMG/Eng	Eng	Y
Ramachandra Sponsorship	£467.52	16/04/08	To cover costs as needed	Ramachandra.	Y
Total Incoming:	£17,987.11				

Profit/Loss					
Account Total:	£432.84				

8.0 APPENDIX 3

WMR 2007/8 Current Balance

27/04/2008

	Projected Income	Income to date	Projected Spend	Outgoing to date	Projected Balance	Balance to date
WMG Account	£16,119.59	£16,119.59	£15,635.27	£13,150.37	<u>£484.32</u>	£2,969.22
Eng Account	£1,400.00	£1,400.00	£1,451.48	£1,451.48	<u>-£51.48</u>	-£51.48
	Projected Total Income	Total Income to Date	Projected Total Spend	Outgoing to Date	Projected Total Balance	Total balance to date
	£17,519.59	£17,519.59	£17,086.75	£14,601.85	<u>£432.84</u>	£2,917.74

5.0 REFERENCES

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⁹ Belbin. M. (1981). *Management Teams*. London; Heinemann.