Smarter Smart Lights

Commercial Report

Group Supervisor:
Prof. T. Green

22nd February 2007

IC The Light Group
Group members:
Giorgos Georgiadis
Kratinos Michaelides
Ushnish Banerjee
Ashot Kassabian
Andriy Gelman
Matias Hernandez

1. Contents

		Page
1	Contents	1
2	Executive Summary	2
3	Identification of target market	3
4	Business case	5
5	Marketing proposal	9
6	Management plan	13
7	Conclusion	16
8	References	17
9	Appendix A	18

2. Executive Summary

This report brings light on the commercial aspects of the product development. It examines the target market and sets the business potentials by estimating start up costs, deciding on a competitive price and estimating sales and revenue. A marketing plan is also presented which is aimed to strongly introduce the product in the market and built a brand name. Finally a management plan assesses the project's progress, looks into future steps and gives the contingency plan.

The target market will initially be the UK, but objectives are set to address a global market as quickly as possible. More specifically, the target market includes the following categories of customers:

- Existing medium to large offices.
- Medium to large offices being refurbished.
- Medium to large offices under construction.
- Public places where the topography allows installation of the control unit.
- Construction companies

In assessing potential profitability of the devise designed, a number of financial indicators were used. Total fixed costs and variable costs have been estimated as precisely as possible, using market prises and trends in the lighting industry. Fixed costs indicate a low start up cost. Variable costs (per unit) allowed to decide upon a competitive prise with a relatively high contribution ration – the amount contributed by each unit toward covering fixed costs and making profit. Calculations further showed the break even point (the point where all fixed costs are covered) to be achieved in six months. Additionally, the rate of returns on capital invested reaches 36% at the end of the second year. The low start up cost and the high rate of returns make the project attractive to investors or make it mare feasible to borrow money from financial institutions.

Yet for the above to come in place, an effective marketing strategy had to be designed in order to dynamically introduce the product into the market. For this, the marketing proposal considered three fundamental criteria on deciding on the campaign:

- *Cost-effectiveness* of the available advertisement methods.
- *High customer-orientation* – the effectiveness of the method to reach and inform the intended market.
- The effectiveness of the method to create a brand name and competitive edge.

A survey was curried out to reveal that the most effective method of communicating information to our target market is the internet. E-magazines and e-mails will be supported by postal and other advertisement. The team will also seek approval of the product from environmental organisations like Green Peace to ad credibility to it.

The diversity of skills and ways of thinking amongst group members, along with the close collaboration and good project organisation achieved, are producing good results. The prototype will be ready in June 2007 and ready to set on a business venture.

3. Identification of target market

3.1 Overview

As has already been identified in the inception report, our drive is to save energy through a lighting control device that will switch on lights automatically only when they are needed. It has also been stated that the opportunity to save energy (by a single control unit) is greater in medium and large offices and public places rather than in small offices or households. Such cases, where the amount of energy saved through efficiently controlling lighting is considerable, justify the development of a more sophisticated device than existing passive infra red sensors. This is because the money saved by turning off lights when they are not needed is a source of considerable cost reductions and hence a slightly more expensive yet cleverer control system will be profitable to use.

As a result our target market includes:

- Existing medium to large offices.
- Medium to large offices being refurbished.
- Medium to large offices under construction.
- Public places where the topography allows installation of the control unit.
- Construction companies

Our initial target market will be the abovementioned categories in the UK but the objective is to expand as quickly as possible to target a global market. Patents will ensure to protect our income globally, preventing the early popup of close substitutes. Further, efforts will be made to create a strong brand name so the product's demand will not be very sensitive to new similar products. Thereby, the marketing campaign (analysed below) will first be launched in the UK and then to continental Europe and the USA.

It should be noted that the design process has taken into account the needs of modern business where work cannot be interrupted for long hours to install the control unit, respecting the needs of our potential customers. Instead it was designed in such a way to allow installation out of office hours. For example, in a single room of dimensions 8m×8m, having 15 computers a single control unit will need to be installed centrally on the ceiling. The estimated time for two trained technicians to install the unit and the software on the 15 PCs and server and make all connections is estimated to take about one and a half hours.

3.2 SWOT Analysis

A SWOT analysis has been carried to identify the product's **s**trength and **w**eaknesses and the external **o**pportunities and **t**hreats, to give light to the marketing team and enable the development of an effective marketing plan.

Strengths:

- Differentiation from competitor products:
    - High accuracy of detection with all three systems used (Motion detector, PC Monitoring Unit and Mobile Signal Detector).
    - More sophisticated presence detection method and algorithm than alternative products existing in the market;
        - Eliminates the possibility that someone in the corner of the room will not be detected.
        - Eliminates the misdetection of no presence due to no or little motion.
    - Eliminates the possibility of turning off lights when they are needed.

- Competitive price.
- Lights will never be left on overnight. Traditional PIR sensors may be over – righted, going back on relying to humans to press the button. As survey (presented in the inception report) showed this results in frequently letting lights on overnight.
- Easy and fast installation. Avoids the disruption of work in the office, as after office hours can be used.
- Product will continually become more accurate in the future rather than become redundant:
    - Wider use of computers in business and elsewhere.
    - Move toward one mobile phone per adult.
- Suitable for small, medium and large offices. It will pay off its cost quicker in large offices but it will be profitable in the long run for small offices as well.
- Especially suitable for offices with one PC per employee. The control unit employs a sophisticated algorithm to decide whether a computer is being used or not, indicating presence.
- Flexible:
    - Can adjust mobile phone detection range.
    - Can select to use any one of the detectors alone, any combination of two or all three together.

Weaknesses:

- Not everyone has a mobile phone
- Not every office uses one computer per employee
- PIR will still fail with little or no motion.
- Detectors ideal for circular rooms of radius 10m. In real rectangular rooms, mobile phone detector may pick up signals from adjacent rooms.
- Short ceilings may result in detecting mobile phones from rooms below.

Opportunities:

- Raised environmental awareness.
- Green (energy saving) policies improve the image of organisations.
- Government around the world are campaigning on energy saving (as fossil fuels are running out).
- Large global market which can be exploited to maximise sales.
- Patents can protect revenue.

Threats:

- Alternative products:
    - Some products combine the infra red detector with a microwave detector to safeguard against false alarm from moving curtains, heating vents, even animals.
    - Other products use ultrasounds combined with infra red. Sounds received from mouse or keyboard clicks indicate presence, acting to correct wrong judgement of no human presence (by the infra red) due to no or very little motion.
- High start up cost which includes:
    - Development
    - Manufacturing
    - Marketing
    - Patenting

- Mobile phones may be proven to pose a threat on human health and may affect negatively the number of people currying one. This will reduce the accuracy of the devise.

4. Business case

4.1 Overview

In this important part of the report the potential profitability of the project and whether the device designed stands as a business case are going to be examined. Presented below are estimates of:

- The start up cost.
- Variable costs.
- The sales forecasts.
- The break even point.

A rigorous effort has been made to thoroughly vindicate financial figures through realistic assumptions based on observed trends in the lighting control market.

4.2 Start up cost[12]

It is found by adding the estimates of all fixed costs, all costs required to produce the first unit of our product. Marketing costs are detailed in the marketing proposal. The total cost of the campaign for the first year will be considered as a start up costs, spent to introduce the product in the market and create a brand name. The product design costs were estimated by considering that a team of six engineers have been working full time on this project for three weeks. Of these, a product manager paid at £35000 a year, two senior engineers paid at £29000 per year, two junior engineers paid at £19000 per year and a software engineer paid at £20000 per year.

The design for the product's case was estimated to cost £500. Patent costs were estimated based on the assumption that our devise will be considered to be of moderate complexity. Initially patents will be obtained in the UK and the USA, with major European and Asian countries to follow. The prototype will be built using Olimex (http://www.olimex.com/) PCBs and Farnell components. The costs are listed in figure 4.2 - 1below.

Item	Description	Cost (£)
Project manager	3 weeks' salary	2020
2 Senior engineers	3 weeks' salary	3350
2 Junior engineers	3 weeks' salary	2190
Software engineer	3 weeks' salary	1150
Case design	No manufacturing costs included	500
Marketing campaign	All marketing expenses in the first year	9919
UK patent[1]	Rough estimate	1000
US patent[2]	Rough estimate	2500
Prototype	PCB, components, case, software CD, AC/DC adaptor	90
Total:		22719

Figure 4.2 -1: Fixed costs

[1] http://www.bl.uk/collections/patents/faq.html#howmuch
[2] http://www.ipwatchdog.com/patent_cost.html

The start up cost is £22719.

4.3 Variable costs

These are all per unit and indicate the cost incurred due to the production of an extra unit. For example, the production of a single unit includes the costs of the PCB, components, and packaging. Yet since the costs of manufacturing electronic devices are prohibitively high in an already established and highly competitive market, our group has decided that the most cost-effective solution is to utilize the services of existing manufacturers. The alternative would involve setting up a production line, making PCBs, and mounting components (obtained from manufacturers). Consideration of the quality and cost of chip production resulted in a decision to obtain our supplies from Taiwan Semiconductor Producing Corporation (TSPC) based in Taiwan. As a result, the costs of the PCB, components, packaging and labour costs per unit are summarised below as manufacturing costs.

The casing cost is dependent on the total chip-size to determine the amount of plastic to be used to coat each product and the average cost of the raw materials used in the coating material. At this stage, acknowledging PCB size and other peripheral components required in the final product, the casing size is expected to be 15cm x 15cm x 7cm in size. Through research into the most cost-effective solutions for casing of electronic goods we selected a Taiwanese company called Chen DIR Industrial Company Ltd. The price in figure 4.3 - 1 below was quoted on e-mail by the marketing department employees of the company.

Adaptor, CD (for the software), and user manual costs are also per unit costs, included below. Further, for the product to be considered a 'finished product' it also has to reach the hands of the end consumer. For this reason delivery costs (per unit) are also included. All costs are estimated based on the assumption that the first order will be for 1000 pieces.

Item	Description	Cost (£)
Manufacturing costs	PCB, components, packaging and labour per unit	41.00
Adaptor	12V AC to DC	4.58
CD	CD and software write	0.55
Case	Excluding design costs	3.00
User manual		1.25
Shipping and distribution	Average per unit	3.00
Total:		53.18

Figure 4.3 - 1: Variable costs

4.4 Sales forecast

In order to produce quarterly sales revenue forecast two elements are needed: the selling price to retailers and the sales volume.
Sales revenue = selling price × sales volume

4.4.1 Selling Price

The decision involved the following criteria:

- Competitor prices.
- Diversity from competitors:
    - Essentially three detection methods combined.
    - Software included.

- Costs per unit.
- Price elasticity of demand for such a product.

Competitor prices range from about £20 to about £80, with devices combining two sensors (at most) being at the top of the range. Our product, combining three detection methods PIR, mobile phone detection and PC monitoring (which includes a software package) is justified to be at the top or even exceed that range.

Cost per unit has been given in figure 4.3 -1 above, totalling £53.18.

Price elasticity of demand show how sensitive demand is to price changes. Since our target market aims at large/medium companies and government and since such a product brings long term benefits, we assume that price elasticity of demand for our product is relatively inelastic; meaning that a higher price will not affect demand negatively by very much. The aim was also to allow retailers a 25% (promotional) profit on the prise.

Considering the above, the product will be sold to retailers at £72 (for orders more than 10), suggesting (or possibly demanding) for them to sell at £90. I.e. £72 × 125% = £90.

4.4.2 Sales Volume

The Sales Volume refers to the total number of products we forecast to sell in the first year and is calculated using the following assumptions in figure 4.4.2 – 1.

Parameter	Value	Remarks
Total number of Offices in the UK.	455553	This figure is an estimate derived from Total Number of Employees in Tertiary Sector of UK economy x (1/Average number of employees per office in UK) = (0.75 x 3037206)/(50) = 455553
Proportion of offices interested in buying our product	0.83	This figure (83%) is obtained from the survey conducted on a sample of companies for the previous Inception Report (see Inception Report Appendix).
Realistic moderation factor	0.01	The moderation factor accounts for the competition we are likely to face from other companies and discrepancies between our survey results and the actual proportion of UK companies interested in our product. We believe, we will realistically be able to secure about 1 % of the sales volume our figures suggest.

Figure 4.4.2 – 1: Sales volume estimation

Sales volume= (Total number of Offices in the UK) x (Proportion of offices interested in buying our product) x (Realistic moderation Factor) = 3781 units.

Speculatively, our quarterly sales for the first year are forecasted as shown in figure 4.4.2 – 2:

Year 1	**Sales (Units)**
Quarter 1	400
Quarter 2	850
Quarter 3	1100

Quarter 4	1430
Total:	3781
Year 2	
Quarter 5	1859
Quarter 6	2000
Quarter 7	2100
Quarter 8	2180
Total:	8139

Figure 4.4.2 – 2: Quarterly sales forecast of first two years

Sales are estimated to rise steeply in the first year (more than 50% in the second quarter), a result of the effective marketing of the product. The graph of sales forecast for the first two years can be found in Appendix A. We estimate that by the end of the first year the product will become known in the market. From the end of the second year on, sales are expected to rise slightly more than 30% in 6 years, (the percentage increase of the lighting industry every 6 years).

4.5 The break even point

This is the point where we will sell enough units just to cover our fixed costs and start making profit. This can be given in units or pounds sterling. To find this we need the contribution ration, which is how much each unit contributes towards covering fixed costs.
Contribution ratio = Price per unit – Variable cost per unit = £72.00-£53.18 = £18.82

***Break even point = Fixed costs / Contribution per unit** = £22719/£18.82 = 1208 Units*

The product has to sell 1208 units in order for the fixed costs to be covered and start making profit. Using the sales forecast in Figure 1.4.2 – 2, it follows that this will be achieved towards the end of the second quarter.

4.6 Project's Potential Profitability

Based on the above calculations, this product has great profitability potentials. A start up cost of just £22700 implies a low risk investment. This makes it relatively feasible to borrow money from financial institutions or seek funding from a venture capitalist. Further, the estimated break even point of about six months means that profit will soon be made out of it. Forecasted sales indicate a gross profit of about £150400 in the second year, since all fixed costs will have been covered and the contribution of £18.82 per unit will go to profits. The low start – up cost and high profit potential make the project attractive to investors or allow easy finance by borrowing.

4.7 Sources of Finance

The main sources of funding for the start of our project will be through private investments and equity from venture capitalists and business angels. Once our business achieves a reasonable cash-flow, we aim to acquire further financing through debt and IPO. We plan to utilize the strong relations between Imperial College and the electronics industry to obtain ample networking opportunities with investors specialized in the field. We also hope to consult and accrue invaluable advice and information from relevant academics on how to present our business case in such a way so as to increase chances of obtaining financing. The key conditions with which we seek to bargain with investors are presented below.

Key conditions for private investors

- Up to 30 % ownership stakes in the company: We are willing to offer a maximum of 30 % of the shareholding in the start-up company to the investor or investment firm. This is the start-up value, as this shareholding proportion is likely to diminish over time as the business will raise finance for capital investments through IPO. The upper bound ensures that the original ownership of the company is not severely diluted over time.
- No decision-making power over the business: We do not wish to provide the investors any decision-making power over the company, however we are willing to hold regular meetings and conferences with them to allow them to evaluate our performance and weaknesses. This also means that the investors will have no say in the hiring and firing of management or staff of the business.
- Dividends payable from Year 3 onwards: Due to the capital-intensive nature of our company, we are unlikely to allocate annual profits towards paying dividends to stakeholders and rather invest in capital to ensure long-term growth for the business. The company is likely to require at minimum 2 years to take-off in terms of profits, therefore in light of this we plan to provide dividends to shareholders from Year 3 onwards.
- Exit Strategy to be formulated: Although we have not developed an exit strategy yet, we hope to discuss and develop a plan in the near future. However, it is unlikely that we will exit the business before Year 6 of operations, considering the break-even point and take-off times of typical technology companies.
- 77 % return on initial investment in 6 years: We hope to minimally achieve on average 10 % annual profit growth over 6 years, thereby ensuring our investors receive at least (1.10^6) -> 77 % added value over their initial investment by Year 6.

5. Marketing proposal

5.1 Overview

The main objective of this section is to explore the different advertising means we plan to utilize to make our target customer-base aware of our product as well as the associated costs of employing such marketing strategies. The decision-making process underlying the choice of marketing to promote our final product was based on the careful consideration of a set of fundamental criteria and the results from the conduction of a survey as highlighted below.

Criteria for choice of advertising

- ***Cost-effectiveness***: The costs of employing the type of advertising had to be acknowledged with regard to the limited financial resources which are likely to be at our disposal at the start of our venture. Therefore the type of advertising must be feasible enough to be realistically employed by a start-up technology firm.
- ***High customer-orientation***: The type of marketing must be effective enough in reaching the intended market in such a way so as to ensure. Additionally, the advertising should allow us to fully inform our potential clients of the merits of our solution as well as allowing us to fully highlight how our product is different and superior to that of competitors.
- ***Brand name establishment and competitive edge***: The advertising mechanism should facilitate the establishment of a brand-name for our product as well as provide the company immunity from competitors and new market entrants through market barrier creation. This requisites the type of marketing to be innovative and to possess the necessary qualities to have a long-lasting impact on the customers.

5.2 Survey

Furthermore, a survey was conducted to identify the most important sources of information companies consult when planning to refurbish existing offices, investing in new ones or simply wishing to curb energy bills in their offices. The results of the survey served to reinforce the choices made on the basis of the aforementioned criteria by providing us more knowledge on where our client-firms will tend to look for a product such as ours.

The planned means of advertising can be broadly categorized into internet, postal and miscellaneous. Internet marketing mainly encapsulates placing advertisements on e-magazines and sending e-mail promotions to potential customers. Postal advertisements refer to attracting clients through usage of flyers and brochures in the mail amongst other means discussed in more detail below. Miscellaneous refer to other forms of advertising campaigns such as through telephone directories and recommendations through other companies etc. The survey was conducted to determine the order of importance of these three categories to a sample of ten companies.

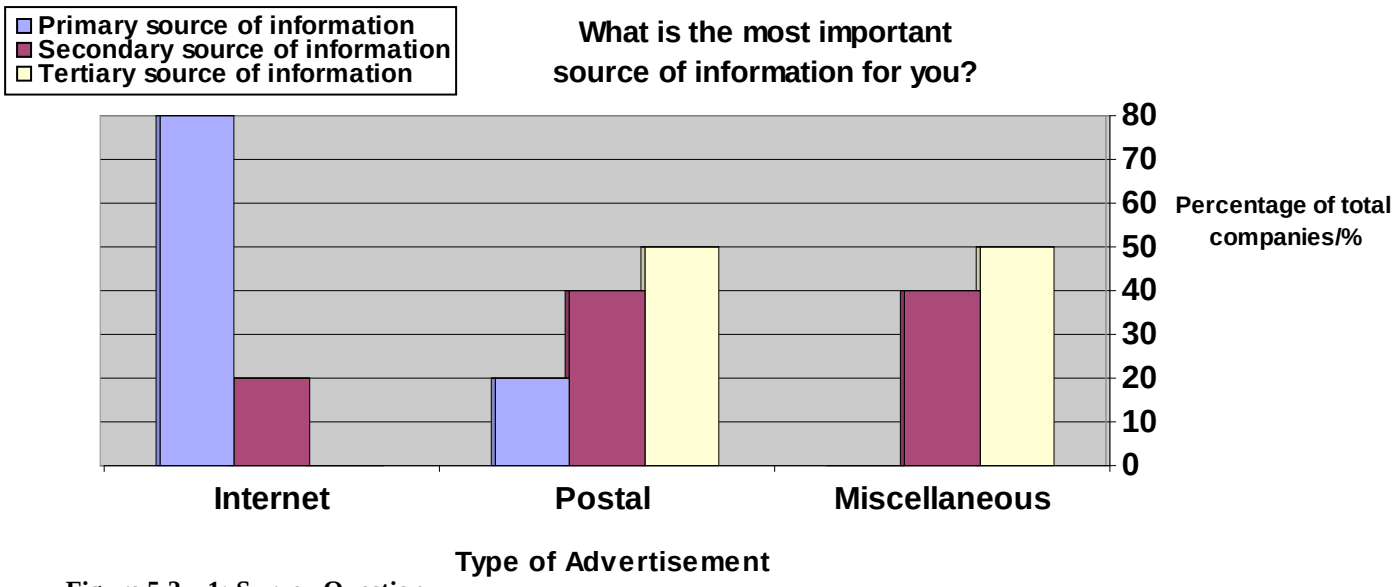

Figure 5.2 – 1: Survey Question

5.3 Analysis of survey results

A large majority of the companies in our survey chose the internet as their most important source of information related to construction and building changes, which suggests that the internet is the most vital advertising medium. Postal and others shared a similar success and seem to be equally important to customers as secondary sources of information.

5.3.1 Internet

The results of the survey as listed above suggest that e-advertising is the primary medium of information businesses refer to during refurbishment, lowering energy costs or opening new offices, thereby rendering it the most powerful promotion portal through which to communicate with our clients. Due to its high importance amongst our customer-base, we aim to employ e-advertising throughout the year rather than seasonally. The four main ways to utilize the internet are advertising through a company website, posting advertisements in renowned e-magazines affiliated with the lighting industry, showing up as one of the primary results for keywords in search engines and through circulating promotional e-mails to client-businesses.

Company Website

- This involves the design and maintenance of a company website to offer customers an insight into our technology, range of products and contact details. The main costs here are those associated with web domain registration, design and maintenance. We aim to use the services of a web-design firm called Startup Internet based in the UK. The prices below are the ones quoted on their website.
- Costs and time planning: £ 1870 per year, as the company charges £ 900 for a medium sized website, £ 10 per month for hosting and maintenance, £ 300 for the first month of an advertising campaign and £ 50 per month thereon. Therefore the total cost is £ 900 + 12 months*(£ 10)+ £ 300 + (11*£ 50) = £ 1870.

E-magazines

- Building Products: One of the largest and most popular e-domains in the UK for companies to advertise any products related to construction and building, thereby ensuring target-market penetration. The typical costs for advertising on this site are reasonable and therefore also within the financial scope of an infant company.
    - Costs and time planning: £ 290[3] per year for us to provide our company profile, relevant links and details.
- What's new in Building? : Another large e-advertising domain in the UK for construction and building related companies. Marketing here is similarly effective in reaching target customers and is not prohibitively expensive to employ.
    - Costs and time planning: £ 320 per year for us to provide our company profile, relevant links and details.

E-mail

- Mail e-brochures and promotions to companies: This is a simple and effective means of drawing customers. There are little to no costs involved in sending advertisements and promotions through mail, however there are moderate expenses associated with obtaining professional marketing catalogues from web advertising firms. A specialized company called Giraffe-Ads was consulted for possible future e-mail advertising campaigns and the prices below are ones quoted from their website.
    - Costs and time planning: £ 640-800 per year in addition to variable circulation costs, as the average cost of having an e-advertisement designed is £ 80-100 per campaign and we plan to issue 8 annually (once every two months).

Google Adwords (Search Engine Advertising)

- Search engine advertisement refers to marketing through certain keyword searches on Google by our potential customers, which then returns our website and product as the primary result. Google then charges per visit to our website through a search engine result, thereby ensuring that all our advertising costs are associated with potential sales revenue from clients. We plan to register on the UK scheme under the search-words 'lighting control', 'energy saving' and 'light saving'. Due to its competency in targeting our consumers and the low financial risks associated with the search engine service renders Google Adwords a relatively cheap and effective marketing solution for our company.

[3] http://www.buildingproducts.co.uk/media_rates.php

1. Costs and time planning: £100, this is derived from estimated sales volume x proportion of sales volume through internet searches for yearly costs.

5.3.2 Postal advertising

Although not as essential as the internet, postal advertisements are still quite important to pave the way towards expanding the customer base and increasing sales volume of the product.

1. Postal advertisements include sending flyers, catalogues and brochures to different potential clients with the aim of attracting business. Postal promotions are simple to conduct, very cost-effective and has customer-drawing power if implemented correctly. As the volume of such promotional mail received by a client business is likely to be large, such marketing would only be effective if our advertisements are eye-catching, differentiated and fully informative of our product from the myriad of others. The main expenses incurred would be that of consulting professional advertising agencies to aid in preparing brochures or catalogues and the additional costs of circulating the mails.
    - Costs and time planning: £ 3600-4000 per year, not including distribution costs, as the average cost of consulting a marketing agency and printing a catalogue or brochure is £ 1800-2000 per year including printing and we plan to release such advertisements twice a year.

5.3.3 Miscellaneous

Miscellaneous refer to advertising through telephone directories, gaining recognition and trading under the approval of environmentally friendly organizations.

1. Telephone directories: Marketing through telephone directories is not highly effective in penetrating our specific market however it still serves to increase the presence of the product on the market at a reasonable cost. We plan to advertise our website, company and contact details on the yellow pages telephone directory on a year-long basis and the prices presented below are ones quoted from their website.
    - Costs and time planning: £ 336[4] per year, this is the price that the UK yellow pages charges for a year-long subscription.
2. Approval from green organizations: As our solution aids in reduction of energy wastage and thus helps curb carbon dioxide emissions, we hope to gain support and affiliation with environmentally friendly organizations such as the Environmental society of Imperial College (ESoc) and Greenpeace etc through networking opportunities. This in turn should positively impact the image of our company and aid in boosting sales of our product and market share.
    - Costs and time planning: £ 2500 per year, this cost includes sending company representatives to environmental awareness raising conferences and other such events.

Table 1: Marketing Cost summary

1. Internet	Building products	£ 290	£ 3380
	What's new in building	£ 320	
	E-mails	£ 800	
	Google Adwords	£ 100	

[4] http://www.yelldirect.com/yelldirect/viewBasketItemStart.do;jsessionid=abnb6M6o5dN6?basketIndex=1

	Website design, maintenance and advertising £ 1870	
2. Postal Advertising		£ 4000
3. Miscellaneous	Yellow Pages phone directory £ 336	£ 2836
	Approval from green organizations £ 2500	
4. Total annual marketing expenditure estimate for Year 1 of product launch.		**> £ 9916**

6. Management plan

6.1 2nd Stage Plan

The plan for the second stage was supposed to be included in the first report. But since it was only done early this term, for completeness we decided to include it in this report.

This stage had to be completed in 7 weeks. This stage included:

- Identifying the target market
- Making a business case
- Coming up with ideas for the marketing proposal
- Making a top level design close to the real case
- Designing the medium level design
- Low level design
- Deciding how to test the system
- Planning the next stage
- Writing the reports

Although various group members contributed to completion of a section, the final responsibility and the writing up was divided as follows (shown in Table 6.1 – 1).

Table 6.1 – 1: Allocation of Tasks

Task	
Identifying the target market	Kratinos Michaelides
Business case	Kratinos Michaelides
	Ushnish Banerjee
Marketing Proposal	Ushnish Banerjee
Top and Medium Level design	Giorgos Georgiadis
Low level Design and test specification of PIR	Giorgos Georgiadis
Low level Design and test specification of PC Monitoring Unit	Giorgos Georgiadis
Low level Design and test specification of Interface	Giorgos Georgiadis
Low level Design and test specification of Control Unit	Ashot Kassabian
Low level Design and test specification of Motion Detector Circuit	Andriy Gelman
Planning the next stage	All
Executive summary of Business report	Kratinos Michaelides
Executive summary of Design report	Matias Hernadez
Management Plan	Matias Hernadez
	Giorgos Georgiadis
Conclusion of the Commercial Report	Kratinos Michaelides
Conclusion of the Design Report	Giorgos Georgiadis

The deadlines set for writing each part are summarised in table 6.1 – 2.

Table 6.1 – 2: Deadlines for 2nd stage

Deadlines	
Module design	15/2/2007 Thursday
Marketing Proposal	15/2/2007 Thursday
Management Plan	15/2/2007 Thursday
Business Case	16/2/2007 Friday
Test Specification	16/2/2007 Friday
Top level design	17/2/2007 Saturday
Executive summary of business report	17/2/2007 Saturday
Executive Summary of Design report	18/2/2007 Sunday
Identification of target market report	18/2/2007 Sunday
Conclusions, Introductions	19/2/2007 Monday

Table 6.1 – 3 shows the time plan for this term. Note that we decided to have 2 meetings each week (just like in the first term).

Table 6.1 – 3: Time plan for 2nd stage

Week	Session a	Session b
1	Identified the tasks to be done this term Decided to start research on how to design the various parts of the system	Each member showed to the others the solutions for the various parts of system. The design work was split to various group members
2	Decided to split the business case, identification of target market and the marketing proposal research into pairs.	Each member said their opinion for the tasks allocated in the previous part. We decided to split the work for the business aspect to various group members
3	Designing of the medium and low level of the system	
4	Identifying problems, contingency plans created. Research for target market, creating business case and marketing proposal.	
5	Design of the system discussed. Business plans also mentioned.	
6	Writing of parts and final alterations to the project.	Deadline of all parts of the project. Handed in to group coordinator. Editing of report was set to be done in the weekend.
7	Brief meeting to discuss report. Final changes on the structure.	Printing of project. Report handed in, in time.

6.2 Management report

We have managed to relatively meet the deadlines set since we met regularly and always set new deadlines. From Week 1 to Week 3 we have managed to keep the deadlines. From then on table 6.2 -1 shows what we actually did.

Table 6.2 -1: Management report

Week		
4	Progress on the sub-tasks was discussed by each team and individual, views on cohesion between independent parts of the project were analyzed.	
5	The purpose of this meeting was to supervise the correct progress of each sub-task. Integrants of the group	Second progress supervision to ensure deadlines were likely to be met.

	were able to discuss any problems they found, and voice the need for more help on certain areas of the project.	
6	Each nearly finished report was shared between the group to comment on how best to put the final touches on it and offer any relevant suggestions. Final deliverables were exchanged on Saturday prior to the Sunday meeting through e-mail.	
7	Editing of the project final draft.	

6.3 Management Plan for 3rd stage

The third stage includes the following tasks:

- Implementation of PIR circuit
- Implementation of Mobile Signal Detector circuit
- Implementation of Control Unit
- Implementation of Interface
- Software Programming
- Implementation of Power supply
- Creating package
- Demonstrating the product

Table 6.3 – 1 shows how the work was decided to be split.

Table 6.3 – 1: Work allocation

Task	
Building and testing PIR circuit	Kratinos Michaelides
	Giorgos Georgiadis
Building and testing Mobile Signal Detector Circuit	Matias Hernandez
	Andriy Gelman
Building and testing the Interface	Giorgos Georgiadis
Building and testing the Control unit	Ashot Kassabian
	Ushnish Banerjee
Software Programming	Giorgos Georgiadis
Building and testing the Power supply	Kratinos Michaelides
Creating Package	Matias Hernadez
Presentation Preparation	Kratinos Michaelides
	Andriy Gelman
	Ushnish Banerjee
Demonstration	Giorgos Georgiadis
	Matias Hernandez
	Ashot Kassabian

The time plan set for the next stage is summarized in Table 6.2 – 2.

Table 6.3 – 2: Time plan for 3rd stage

Time Plan	
Week 1	Building and testing of PIR circuit, mobile Signal Detector Circuit, Software Programming
Week 2	
Week 3	Software Programming, Building and testing of Power supply and Interface, Creating Package
Week 4	Testing system as a whole. Prepare for presentation

Week 5	Presentation and Demonstration

The deadlines set are summarized in Table 6.3 – 3.

Table 6.3 – 3: Deadlines for 3rd Stage

Deadlines	
Building and testing of PIR circuit, mobile Signal Detector Circuit	1/6/2007
Software Programming, Building and testing of Power supply and Interface, Creating Package	8/6/2007
Testing system as a whole. Prepare for presentation	15/6/2007
Presentation and Demonstration	18/6/2007 – 22/6/2007

1.4 Contingency Plans

A complicated system is always difficult to design and implement. Although a lot of time was spent to design the system as thoroughly as possible it is always important to have some contingency plans in case something doesn't work correctly.

Each block of the system will be built and tested separately. In the analysis of the PIR, there is a second motion detector circuit that can be used in place this one doesn't work correctly.

The Interface circuit can also be built with a different circuit and it has been included in the report. The alternative circuit does not have an IC, and may not be as stable as the chosen one, but still offers a different solution.

The Mobile Signal Detector has also a different circuit to be implemented. The Power supply interface will be bought ready, so we shouldn't have any problems in connecting it with the rest of the system.

The Control Unit and the Software are relatively straightforward and we shouldn't have any problems in implementing them.

7. Conclusion

Work done in this report has proven the importance of this project as a business case.
Trends in the modern world, where saving energy is becoming crucially important, and cutting energy waste from lighting systems is becoming clearly beneficial, create a sizeable global market for lighting control systems. With an initial target market in the UK, addressing medium to large offices and public places, the business could expand quickly to the US, Europe and the giant Asian market.

A planned and organised marketing campaign, that will utilise the most effective means to communicate information about the product to the target market, will help to quickly establish a brand name and high sales volumes. The internet seems to be the major player of today and tomorrow in this field, with postal and other advertisement methods to support it.

Further, financial calculations using supported estimates prove that with a small start up cost of £22700, and selling initially in the UK, the business venture will break even as soon as six months from the launch day. Profits in the second year can bring a rate of returns on capital invested as high as 36%. And this is just for the UK.

Finally, the potentially increasing accuracy of the devise wile time elapses, due to increased use of mobile phones and PCs, may suggest sustainable profits for a long time.

8. References

[1] http://www.bl.uk/collections/patents/faq.html#howmuch *(accessed 23 Jan 2007)*
[2] http://www.ipwatchdog.com/patent_cost.html (accessed 5 Feb 2007)
[3] http://www.buildingproducts.co.uk/media_rates.php *(accessed 28Jan 2007)*
[4]http://www.yelldirect.com/yelldirect/viewBasketItemStart.do;jsessionid=abnb6M6o5dN6?basketIndex=1 *(accessed 12 Feb 2007)*

9. Appendix A

Here is the graph of sales forecast for the first two years.

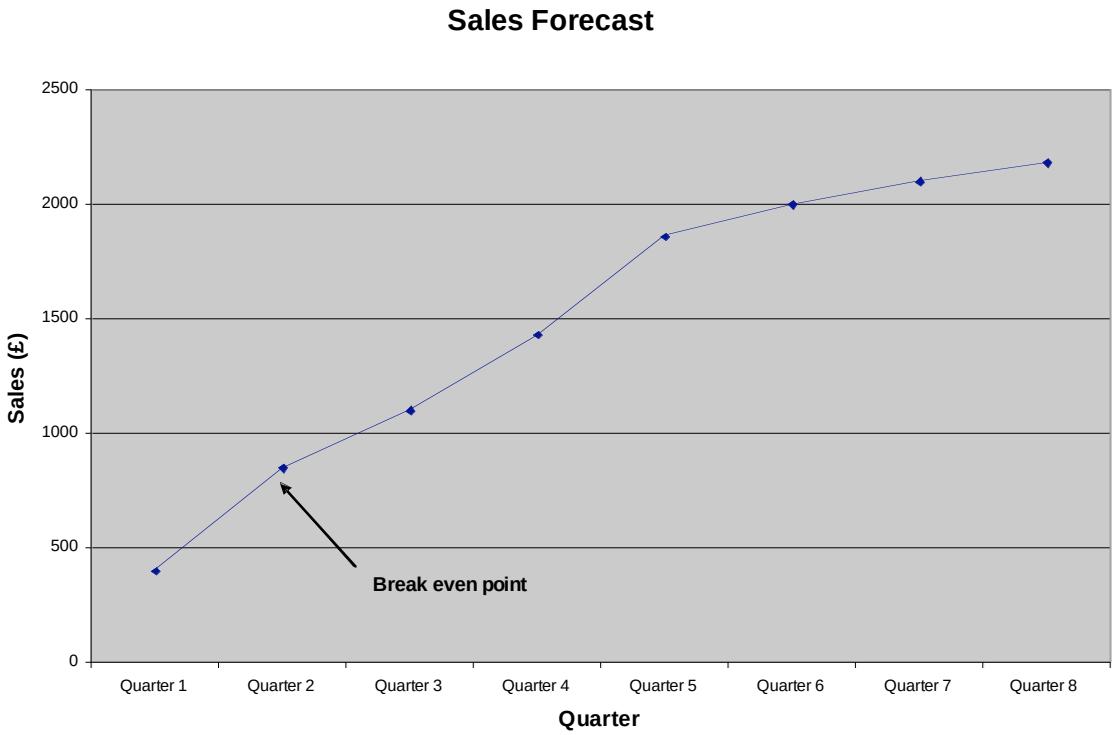

Figure A – 1: Sales forecast for the first two years