Final Research Proposal, Project Charter
Prosthetic Tactile Sensor With Force Feedback

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Abstract

This document is to expand the initial research aspects of tactile sensory implementation with durable materials, particularly the field of soft robotic applications in the aim to conceive a more applicable human response system.

1. INTRODUCTION

2. BACKGROUND

What is it?

Many projects fail, or have limited success, due to inadequate direction, planning and understanding of the context and desired outcomes. The Project Charter is a ?living and evolving? document that contains the current, critical information about the project.

2.1. Research Questions

Project context

The main purpose of this section is to give confidence to the reader that you understand the problem and the ramifications surrounding it. It should contain a brief statement as to the background of the problem, quantifying where possible, e.g. if it is to do with a particular NZ industry what is the value of the whole industry? Where does the particular Company or activity fit into this? The same for the technologies involved, go from ?blue skies? to ?near future? to ?readily available?. Go from the global to the local to the project specific. The reader should be fully aware as to where your particular project fits into the bigger picture. It is important to base this on verifiable facts, so an initial knowledge search should be one of the first things you do. This is traditionally in the form of a literature search but should include all sources of knowledge.

The scope and any boundaries set for the project should be summarized.

The estimated value of a successful solution (see below) to the stakeholders should be summarized. This gives an immediate indication as to the degree of effort justified in solving the problem.

As the project progresses, the need for new contextual information will be identified and will be added to the Charter. So, for example, as possible solutions to a problem are identified there may be a need to research more about the technologies that underpin these solutions or previous applications.

2.2. Design and Method

Project scope

Defining the scope of a project is often critical to a successful result. If the scope is defined too narrowly you may fail to appreciate the impact of the wider context on your proposed solution. If you define the scope too wide then your solution may not really address the true problem. So, for example, in solving the problem of limited power supply to a specific region should you look at improving the current mechanisms for power supply or should you extend your scope to include new mechanisms.

3. SIGNIFICANCE OF RESEARCH

3.1. Stakeholders

Key stakeholders and their relevance to the project

Stakeholders are either individuals, groups, companies or even communities who the project will affect in some way. The stakeholders should be: ? Listed in order of priority ? Have their relationships to the project clearly defined. E.g. Customer or client, financial investor, financial dependent, lifestyle change, protester etc. ? Have their desired outcomes or expectations of the project idenitifed

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3.2. Ethics

Project authorization

3.3. Limitations

Project constraints

List, with a short statement as to the significance, the constraints being imposed on the project and state whether they are sacrosanct or challengeable. Note that these are problem orientated not solution orientated. They can be thought of ?no go areas? or ?must go areas? to the potential solution and is an essential prerequisite to preparing the design specification. E.g. 1. Patent No 12345NZ applies and must not be infringed ? sacrosanct. 2. Co. policy; plant shuts down every Friday. ? challengeable. 3. Reticulated gas not available. ? sacrosanct. Etc.

3.4. Timeline

Project management

Project Plan: This is the major task involved in preparing a charter. This is where you decide on the approach you are going to take to achieve the outcomes you have defined.

The resources required for a successful outcome; the major resource for your project is likely to be your own effort. The paper requires approximately 150 hours, it is up to you to ensure the scope of your project does not exceed this. Talk to your supervisor about this. Include any special equipment or software you think you may require and how this is to be supplied.

The cost of these resources; If you were employed as an inexperienced graduate by a consulting company your charge out rate would be around 70 dollars per hour, so there is 10000 dollars per team member to start with! Workshop assistance should be costed at 90 dolars per hour. Equipment should be put in at best available estimate.

Management processes. The plan you have now created is the basis of your management system. IT WILL CHANGE, sometimes due to unforeseen circumstances and sometimes due to planned circumstances. The instances of planned change will arise where you have planned an investigative activity and the output from that activity changes your original plan. The important thing is to keep the plan up to date and use it to prompt recovery actions and as details or specifications are refined with time these

4. PROJECT PLAN

Project risks

These are the reasons the project might fail. Keep these to genuine factors, e.g. equipment not being available. For any risk you identify make sure you have an appropriate alternative/recovery/exit plan covered when you do your planning stage. Do not use the old favourite ?run out of time?, think of your bosses? reaction if you put up a Charter to commit 40000 dollars of your time and in it you state that a major risk is that you will not be able to finish it. If this is the case it needs sorting before you commit to a Charter.

Health and safety

A health and safety management plan should be included in the project charter for any practical work being completed as part of the project. Basic health and safety plans include how (and by whom) authorisation is given to facilities, under what terms this is given and for what purpose facilities can be used for.

Communication plan

A plan as to how you are going to keep the stakeholders informed of your progress and major decisions should be drawn up. One idea is to have the plan milestone driven rather than time driven. In other words, you take your time plan and identify key tasks (usually tasks with high uncertainty level) and plan communication events as each of these is completed. This puts an emphasis on completing the task and not on justifying why you are late! You will obviously have to meet progress requirements as per the paper outline.

4.1. Deliverables

Project deliverables

The project deliverable (sometimes referred to as ?outputs?) are the things you are going to leave with your client. In addition to the stipulated output requirements for this paper: (see the assessment schedule and paper outline), they could also include the raw data, proven software, a tested proto type etc. This presents a problem, because your project should give you the opportunity to explore alternative solutions to the problem, you will not be in a position at the beginning of the project to identify the project outputs other than in very general, simplistic terms. The projects undertaken for this paper vary immensely except in one factor, they all should be of about the same student workload. This is achieved by refining the project outputs with your supervisor.

Therefore an activity ?Defining Project deliverables? should appear in an appropriate place in your time plan as a major milestone. Ideally this needs to be

at a point where a solution or course of action has been decided upon but not so late that the outputs are already obtained. For the majority of projects this will be before the first progress review. This is a critical dynamic action and should be reviewed at each progress stage.

What does it achieve?

The Project Charter is an internal document. It provides all the critical project information to ensure all internal stakeholders have a common understanding of project.

4.2. Outcomes

Project outcomes

These should be expressed in terms of the desired end state which would exist if the problem is solved. The difference between an Outcome and an Output is that the Outcome is a state whereas an Output is a means of achieving the change to reach the desired state. For example if your project is to design a safer road layout for intersections then the Outcome would be ? reduced number of accidents at intersections? and the Output would be whatever you planned to introduce to achieve that, intelligent traffic lights, new layout for road markings, driver education etc. Two things to be aware of at this stage: (1) sub-optimisation ? draw your boundaries to the problem with care and (2) make sure the ?problem? being described to you is the problem and not a symptom, make use of cause and effect analysis techniques to avoid this.

DO NOT use ?The outcome of this project will be to increase the amount of insulation on the external parts of the drying plant and hence reduce the energy costs by 10

A better outcome would be; The aim of this project is to reduce the overall running costs of the drying process by 10

The first aim does not give you the scope to explore alternative solutions and it could be achieved at the expense of other factors actually leading to a higher overall running cost of the plant.

What is considered a successful outcome? A successful outcome is one that can be verified in some way. Avoid relative terms such as ?better?, ?lighter?, ?cheaper? etc. If the aim is to reduce the cost then by this stage the current cost should be known and a target cost agreed, similarly, if your aim is to increase the reliability of a communications network then appropriate metrics should be used. The verification method should be stated for each outcome and could involve calculations, trials, experiments, prototypes etc.

The value of a successful outcome (financial, social, environmental); It is essential that the value placed on a successful outcome is understood as this is the dominant factor in the viability of the project. When considering the financial aspect, do not restrict your thinking to cost savings, very few projects can be justified purely on savings. Increased demand, entering new markets or meeting compliance requirements are far more likely to yield desired returns and these opportunities can arise from the social or environmental considerations (organic free range eggs!). Do not forget the potential value of Intellectual Property.

What it means for your project?

You should NOT look on the Project Charter as an end product in itself. It supports your project, it is a ?living document?, there is no reason why you should not be thinking about possible solutions to your problem while preparing the charter.?In this project we are focusing on the Charter as a means of emphasizing the need for a clear project direction and understanding of the project context. You will take longer to prepare you Project Charter than normal commercial practice.

4.3. Results

Key project performance criteria (metric)

How will you know if your project has been successful? A clear list of criteria should be defined generally relating to the outcomes and deliverables, and should be measurable and quantifiable.

5. CONCLUSIONS

Change control

A plan for making changes to the project plan or project charter must be put in place. Both an authorisation procedure and aspects which are not subject to change need to be discussed at the outset of the project.

APPENDIX

ACKNOWLEDGMENT

References

[1] G. O. Young, Synthetic structure of industrial plastics (Book style with paper title and editor), in Plastics, 2nd ed. vol. 3, J. Peters, Ed. New York: McGraw-Hill, 1964, pp. 1564.

[2] W.-K. Chen, Linear Networks and Systems (Book style). Belmont, CA: Wadsworth, 1993, pp. 123135.

[3] H. Poor, An Introduction to Signal Detection and Estimation. New York: Springer-Verlag, 1985, ch. 4.

[4] B. Smith, An approach to graphs of linear forms (Unpublished work style), unpublished.

[5] E. H. Miller, A note on reflector arrays (Periodical styleAccepted for publication), IEEE Trans. Antennas Propagat., to be publised.

[6] J. Wang, Fundamentals of erbium-doped fiber amplifiers arrays (Periodical styleSubmitted for publication), IEEE J. Quantum Electron., submitted for publication.

[7] C. J. Kaufman, Rocky Mountain Research Lab., Boulder, CO, private communication, May 1995.

[8] Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, Electron spectroscopy studies on magneto-optical media and plastic substrate interfaces(Translation Journals style), IEEE Transl. J. Magn.Jpn., vol. 2, Aug. 1987, pp. 740741 [Dig. 9th Annu. Conf. Magnetics Japan, 1982, p. 301].

[9] M. Young, The Techincal Writers Handbook. Mill Valley, CA: University Science, 1989.

[10] J. U. Duncombe, Infrared navigationPart I: An assessment of feasibility (Periodical style), IEEE Trans. Electron Devices, vol. ED-11, pp. 3439, Jan. 1959.

[11] S. Chen, B. Mulgrew, and P. M. Grant, A clustering technique for digital communications channel equalization using radial basis function networks, IEEE Trans. Neural Networks, vol. 4, pp. 570578, July 1993.

[12] R. W. Lucky, Automatic equalization for digital communication, Bell Syst. Tech. J., vol. 44, no. 4, pp. 547588, Apr. 1965.

[13] S. P. Bingulac, On the compatibility of adaptive controllers (Published Conference Proceedings style), in Proc. 4th Annu. Allerton Conf. Circuits and Systems Theory, New York, 1994, pp. 816.

[14] G. R. Faulhaber, Design of service systems with priority reservation, in Conf. Rec. 1995 IEEE Int. Conf. Communications, pp. 38.

[15] W. D. Doyle, Magnetization reversal in films with biaxial anisotropy, in 1987 Proc. INTERMAG Conf., pp. 2.2-12.2-6.

[16] G. W. Juette and L. E. Zeffanella, Radio noise currents n short sections on bundle conductors (Presented Conference Paper style), presented at the IEEE Summer power Meeting, Dallas, TX, June 2227, 1990, Paper 90 SM 690-0 PWRS.

[17] J. G. Kreifeldt, An analysis of surface-detected EMG as an amplitude-modulated noise, presented at the 1989 Int. Conf. Medicine and Biological Engineering, Chicago, IL.

[18] J. Williams, Narrow-band analyzer (Thesis or Dissertation style), Ph.D. dissertation, Dept. Elect. Eng., Harvard Univ., Cambridge, MA, 1993.

[19] N. Kawasaki, Parametric study of thermal and chemical nonequilibrium nozzle flow, M.S. thesis, Dept. Electron. Eng., Osaka Univ., Osaka, Japan, 1993.

[20] J. P. Wilkinson, Nonlinear resonant circuit devices (Patent style), U.S. Patent 3 624 12, July 16, 1990.