Final Report

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Rough notes

Title page Containing the title of the project, the names of the student(s), "University of St Andrews" and the date of submission. You may add the name of your supervisor if you wish.

Abstract

Abstract Outline of the project using at most 250 words.

The project expands on an existing implementation [2] of the streaming architecture for control networks (sACN) protocol [3] in rust with the aim to make a fully compliant library that allows sending and receiving DMX payload data without having to handle E1.31 specifics directly.

Declaration

Declaration "I declare that the material submitted for assessment is my own work except where credit is explicitly given to others by citation or acknowledgement. This work was performed during the current academic year except where otherwise stated. "The main text of this project report is NN,NNN words long, including project specification and plan. "In submitting this project report to the University of St Andrews, I give permission for it to be made available for use in accordance with the regulations of the University Library. I also give permission for the title and abstract to be published and for copies of the report to be made and supplied at cost to any bonafide library or research worker, and to be made available on the World Wide Web. I retain the copyright in this work."

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Introduction

Introduction Describe the problem you set out to solve and the extent of your success in solving it. You should include the aims and objectives of the project in order of importance and try to outline key aspects of your project for the reader to look for in the rest of your report.

Context Survey

Context survey Surveying the context, the background literature and any recent work with similar aims. The context survey describes the work already done in this area, either as described in textbooks, research papers, or in publicly available software. You may also describe potentially useful tools and technologies here but do not go into project-specific decisions.

DMX, SACN and ACN

Other protocols

Requirement specification

Requirements specification Capturing the properties the software solution must have in the form of requirements specification. You may wish to specify different types of requirements and given them priorities if applicable.

Software Engineering Process

Software engineering process The development approach taken and justification for its adoption.

A waterfall based process model was used for the development of the program. In the waterfall method there are several distinct phases of the project as shown in figure: . This development approach was chosen as it has a very clear structure which allows easy to manage distinct milestones so progress through the project can be more easily tracked. This process method has a number of disadvantages aswell with the main one being the inflexibility - if something major needed to change it would be difficult to adapt the project. As this project is based on a clearly defined specification provided by the protocal specification and the domains were clearly defined at the start it means that this inflexibility isn't a major issue and so therefore choosing the waterfall method for its advantages makes sense.

The waterfall model can be clearly seen throughout the development of the program. The first phase of 'requirement analysis' is the protocol specification itself as it clearly lays out the goals of the protocol and what it is required to do. On top of this there is the project goals which were defined around the protocol specifically for how much of the protocol this specification should implement for example universe-syncronisation, IPv4/IPv6 support, Unix/Windows support etc. When take together this gives a clear list of requirements as so allows moving onto the 'system design' phase.

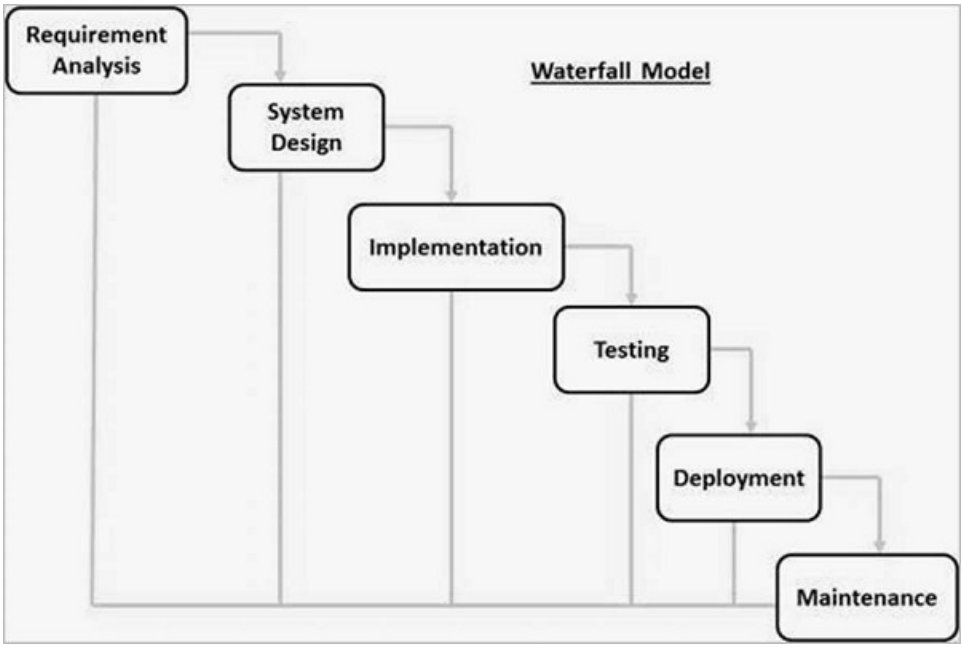

Figure 1: A diagram showing the waterfall development process, [[**?**]]

The system design phase is where the requirements are turned into a technical plan for how they will be implemented. Alot of this also comes from the protocol specification itself as it describes how each bit of a compliant implementation should behave and so therefore the design can be based of this.

The 'implementation' phase was done

One of the requirements of the project that was defined was that the implementation should be in rust. This combined with the existing base incomplete implementation that was used meant that the general system design was built around this. In general the system was designed around there being distinct receivers and senders with communication being mostly one-way. This meant that the two different sides could be developed in relative isolation as all their communication must be done in a way that is compliant with the protocol which provides the interface between them.

The 'testing' phase is the combining of the various bits of the implementation. This is marked by the passing of the various intergration tests where the sender and the receiver were passing information back and forth. Also part of this phase is the overall compliance tests which are detailed later which show that the implementation of the protocol as a whole conforms to the design and requirements.

Once the testing phase has finished the implementation can move onto the 'deployment' phase. In an industry project this would mean distributing the implementation to users and then later moving to the maintenance stage to fix issues or improve various parts of the project as opportunities or problems are reported. Within this project the deployment took the form of the development of 2 small programs, one which transmits data specified by the user in the form of various dynamic patterns and a receiver which logs all received input. Theses programs followed a waterfall development methodolgy as described later. These programs were then used with various other sACN devices in a real-world environment to show real usage/deployment of the protocol. Issues that are discovered at this point can then be fixed through patches which represent the 'maintenance' phase of the program.

Reflection on the methonolody used In general the approach used worked well for the project as it fit the natural development stratergy meaning there weren't any points where the development felt like it was 'fighting' the approach chosen. There were a few potential problems that were identified however. One of these was that the model forced rigid time constraints. This is because if too long is spent on any one stage all the subsequent stages would suffer. This was taken as a fairly minor issue for this project because the constraints of fixed submissions deadlines already meant that there some rigid time constraints in place.

?? https://www.tutorialspoint.com/sdlc/sdlc_waterfall_model.htm (01/01/2020)

Ethics

Ethics Any ethical considerations for the project. You should scan the signed ethical approval document, and include it as an appendix.

Design

Design Indicating the structure of the system, with particular focus on main ideas of the design, unusual design features, etc.

ANSI E1.31-2018

Critique of the protocol

Implementation

Implementation How the implementation was done and tested, with particular focus on important / novel algorithms and/or data structures, unusual implementation decisions, novel user interface features, etc.

Implementation dependent specifics

Evaluation and Critical Appraisal

Evaluation and critical appraisal You should evaluate your own work with respect to your original objectives. You should also critically evaluate your work with respect to related work done by others. You should compare and contrast the project to similar work in the public domain, for example as written about in published papers, or as distributed in software available to you.

Conclusions

Conclusions You should summarise your project, emphasising your key achievements and significant drawbacks to your work, and discuss future directions your work could be taken in.

Appendices

The appendices to your report will normally be as follows. Testing summary This should describe the steps taken to debug, test, verify or otherwise confirm the correctness of the various modules and their combination.

Testing

Automated Testing

Real-world Testing

User Manual

User manual Instructions on installing, executing and using the system where appropriate.

Other Appendices

Other appendices If appropriate, you may include other material in appendices which are not suitable for inclusion in the main body of your report, such as the ethical approval document. You should not include software listings in your project report, unless it is appropriate to discuss small sections in the main body of your report. Instead, you will submit via MMS your code and associated material such as JavaDoc documentation and detailed UML diagrams

Bibliography

[1] ANSI E1.17 - 2015 Entertainment Technology?Architecture for Control Networks

[2] https://github.com/lschmierer/sacn (September 2019)

[3] ANSI E1.31 ? 2018 Entertainment Technology Lightweight streaming protocol for transport of DMX512 using ACN

[4] https://www.element14.com/community/groups/open-source-hardware/blog/2017/08/24/dmx-explained-dmx512-and-rs-485-protocol-detail-for-lighting-applications (17/09/2019)

[5] https://github.com/hhromic/libe131 (17/09/2019)

[6] https://www.rust-lang.org/ (17/09/2019)

[7] http://artisticlicence.com/WebSiteMaster/User%20Guides/art-net.pdf (17/09/2019)