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# Work Plan

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Sunday, 15<sup>th</sup> of February 2015

2IO70

This document should streamline the process of our project to lead to the goals, defined in this document.

Group 16

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Version 2

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## **Introduction**

In this document you will find the details on how we will design and build, in the coming eight weeks, a sorting machine and the software that runs it. The Work Plan will contain a clear schedule for the tasks to be completed over the course of the project. This includes, but is not limited to, assigning responsibility and setting deadlines for each deliverable. This document will likely be updated with newer versions later on as unforeseen circumstances arise.

## **Goals and objectives**

### **Goal of the project**

The goal of this project is to design and build a machine capable of sorting black and white disks and the embedded system controlling it. In addition to this, we will learn how to perform different roles in a group project. Obtain experience in specification, design, and construction of a simple embedded system. As well as learning how to keep design and implementation of the software manageable by using a programming language as a stepping stone to the machine language. And to become aware of the influence of electrical and mechanical limitations on the realizability of machine controlled systems.

### **Objectives Machine Design**

The objectives of Machine Design are to design and construct a physical sorting machine by solely using the parts in the provided Fisher Technik construction kit and to define the System Level Requirements, which consists of use cases, user constraints and safety properties.

Use cases: description of a usage scenario of the machine. Use cases also clarify the features and observable qualities of the machine.

User constraints: description of the expected behaviour of users, with the assumption that the system works properly.

Safety properties: specification of a set of relations between inputs and outputs written in English, but later expressed using UPPAAL.

In the document “Machine Design”, the System Level Requirements, as well as the connections between different parts of the machine and the micro-controller, the so-called machine interface, must be completely and accurately described.

### **Objectives Software Specification**

The objectives of Software Specification are to write a description, as accurately as possible, of the required behaviour of the PP2. Described are:

Which signals from the machine interface are inputs to the program, and what these signals represent.

Which signals from the machine interface are outputs to the program, and what these signals control.

How the inputs depend on the outputs, that is, how the PP2 reacts to the inputs.

When this is done the document “Software Specification” and accessory UPPAAL model are to be handed in.

### **Objectives Software Design**

In the phase Software Design one objective is to construct a computer program in high level code, like Java. This should be realized with all requirements defined in the Software Specification. The code doesn't necessarily need to be compilable and executable. It serves as a stepping stone towards the Assembly Language program of the next phase.

Another objective in this phase is to construct a document containing the design decisions with explanation and/or motivation. To assure correctness of the program it's needed to explain correctness, at least, informally. This should also be part of the document.

### **Objectives Software Implementation and Integration**

For Software Implementation and Integration, the Java program written in the previous phase is converted into Assembly code. Then it is compiled and integrated into the PP2 processor and the Fisher Technik machine. In order to be able to do this, it is required that a representation is chosen of all variables and data structures from the Java program and that a uniform coding standard is developed. Both the data representation and the coding standard are detailed in a document called "Software Implementation".

### **Objectives System Validation and Testing**

The objective of System Validation and Testing is to verify whether or not the end product meets the initial requirements. System Validation and Testing is carried out during all the other software related steps. The process is split in 3 main methods: Code Review , Test Cases and Formal Proofs.

Code review consists of having a group of people assess and review lines of code. For every review a report has to be created, from a simple Walk-through to a Formal Peer Review or Pair Programming.

Test Cases must be created describing with an input and an expected output, the Test Run must cover all statements, conditions and decisions, all executions of the test cases must be documented along with a description of the result of the test.

The Formal Proofs is checking if requirements written in a mathematical logic satisfy the UPPAAL models of the Software Specification.

### **Final Report**

This document is a compilation of all previous documents, and adds to that: a table of contents, an introduction, and a conclusion. This conclusion will go over some of the problems the group faced over the course of this project, and how these problems were eventually solved. The "Final Report" is the final document to be handed in collectively, and marks the completion of the project of designing and building a sorting machine and the software that controls it.

## Roles

**The president** leads the upcoming meetings and, in order to do that, prepares an agenda. The President is succeeded by the secretary after every week.

**The secretary** writes down minutes during the meetings, which are to be discussed and approved during the next meeting. He also compiles all individual logbooks into one collective logbook. Similarly to the president, the secretary is changed weekly.

**The Quality Assurance Manager** has to keep the Work Plan up to date and is responsible for the communication between the group and the tutor. Moreover, he is responsible for the whole process of the project. He makes sure that the products meet the requirements and are handed in time. The Quality Assurance Manager is rotated after the first three weeks and two weeks after that.

**The role of the materials manager** is responsible for the provided materials, with the purpose of maintaining their initial state until the end of the project. The role of materials manager is not changed during the course.

## Weekly Schedules

WEEK 1			
President		Phung D.T. (Dat)	
Secretary		Boelens W.W. (Wigger Boelens)	
Quality Assurance Manager		Berg S.H.M. van den (Stefan)	
Material Manager		Keet M. (Maarten)	
Document(s)	Members Assigned	Responsible	Deadline
Abstract	All members of the group are assigned individually.	Every member is responsible for their own Abstract.	6 <sup>th</sup> of February

WEEK 2			
President		Boelens W.W. (Wigger Boelens)	
Secretary		Verschuuren R.T. (Rolf)	
Quality Assurance Manager		Berg S.H.M. van den (Stefan)	
Material Manager		Keet M. (Maarten)	
Document(s)	Members Assigned	Responsible	Deadline
Work Plan	Phung D.T. (Dat), Keet M. (Maarten), Petrescu T. (Tudor), Verschuuren R.T. (Rolf)	Verschuuren R.T. (Rolf)	18 <sup>th</sup> of February
Ex. 5.2 (c)	Boelens W.W. (Wigger Boelens), Berg S.H.M. van den (Stefan), Verschuuren R.T. (Rolf)	Berg S.H.M. van den (Stefan)	13 <sup>th</sup> of February

WEEK 3			
President		Verschuuren R.T. (Rolf)	
Secretary		Keet M. (Maarten)	
Quality Assurance Manager		Berg S.H.M. van den (Stefan)	
Material Manager		Keet M. (Maarten)	
Document(s)	Members Assigned	Responsible	Deadline
Machine Design	All members of the group are assigned.	Keet M. (Maarten)	27 <sup>th</sup> of February

WEEK 4			
President		Keet M. (Maarten)	
Secretary		Petrescu T. (Tudor)	
Quality Assurance Manager		Phung D.T. (Dat)	
Material Manager		Keet M. (Maarten)	
Document(s)	Members Assigned	Responsible	Deadline
Software Specification	All members of the group are assigned.	Verschuuren R.T. (Rolf)	6 <sup>th</sup> of March



WEEK 5			
President		Petrescu T. (Tudor)	
Secretary		Berg S.H.M. van den (Stefan)	
Quality Assurance Manager		Phung D.T. (Dat)	
Material Manager		Keet M. (Maarten)	
Document(s)	Members Assigned	Responsible	Deadline
Software Design	All members of the group are assigned.	Boelens W.W. (Wigger)	20 <sup>th</sup> of March

WEEK 6			
President		Berg S.H.M. van den (Stefan)	
Secretary		Phung D.T. (Dat)	
Quality Assurance Manager		Phung D.T. (Dat)	
Material Manager		Keet M. (Maarten)	
Document(s)	Members Assigned	Responsible	Deadline
Software Design	All members of the group are assigned.	Boelens W.W. (Wigger)	20 <sup>th</sup> of March
Software Implementation & Integration	All members of the group are assigned.	Berg S.H.M. van den (Stefan)	27 <sup>th</sup> of March

WEEK 7			
President		Boelens W.W. (Wigger)	
Secretary		Berg S.H.M. van den (Stefan)	
Quality Assurance Manager		Keet M. (Maarten)	
Material Manager		Keet M. (Maarten)	
Document(s)	Members Assigned	Responsible	Deadline
Software Implementation & Integration	All members of the group are assigned.	Berg S.H.M. van den (Stefan)	27 <sup>th</sup> of March
Software Validation & Testing	All members of the group are assigned.	Petrescu T. (Tudor)	27 <sup>th</sup> of March

WEEK 8			
President		Verschuuren R.T. (Rolf)	
Secretary		Keet M. (Maarten)	
Quality Assurance Manager		Keet M. (Maarten)	
Material Manager		Keet M. (Maarten)	
Document(s)	Members Assigned	Responsible	Deadline
Final Report	All members of the group are assigned.	Phung D.T. (Dat)	17 <sup>th</sup> of April