





UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH

Prototype of a cashless system on existing vending machines

Petar Hlad Colic

Project Proposal and Work Plan

Document: proposal_wp.pdf	Project Proposal and Work Plan Prototype of a Cashless System	 
Date: 1/03/2016		
Rev: 01		
Page 3 of 13		



REVISION HISTORY AND APPROVAL RECORD

Revision	Date	Purpose
0	25/02/2016	Document creation
1	01/03/2016	Document revision

DOCUMENT DISTRIBUTION LIST



Name	E-mail
Petar Hlad Colic (Author)	petar.hlad@gmail.com
Marcel Fernández Muñoz (Project Supervisor)	marcel@entel.upc.edu

WRITTEN BY:		REVIEWED AND APPROVED BY:	
Date	25/02/2016	Date	01/03/2016
Name	Petar Hlad Colic	Name	Marcel Fernández Muñoz
Position	Project author	Position	Project Supervisor

Document: proposal_wp.pdf	Project Proposal and Work Plan Prototype of a Cashless System	 
Date: 1/03/2016		
Rev: 01		
Page 4 of 13		

0. CONTENTS

0.	Contents	4
1.	Project overview and goals	5
2.	Project background	6
3.	Project requirements and specifications	7
4.	Work Plan	8
4.1.	Work Breakdown Structure	8
4.2.	Work Packages, Tasks and Milestones	8
4.3.	Time Plan (Gantt diagram)	11
4.4.	Meeting and communication plan	12
5.	Generic skills	13

Document: proposal_wp.pdf	Project Proposal and Work Plan Prototype of a Cashless System	 
Date: 1/03/2016		
Rev: 01		
Page 5 of 13		



1. PROJECT OVERVIEW AND GOALS

The project is carried out on the authors own.

The purpose of this project is to design and develop a prototype of a cashless system that works on existing vending machines that have not a cashless purchase system. The project will focus on a specific model of vending machine (A Dixie-Narxo DNCB386 cold drink vending machine) because it is the one that is available for the development.

The project main goals are:

- 1.- Develop a hardware system capable of controlling the vending machine and also capable of serving drinks.
- 2.- Develop a server application that will manage the users, the purchases and the venders.
- 3.- Develop a client application that will run on the vender, will communicate with the server and will control the vender's hardware.



Document: proposal_wp.pdf	Project Proposal and Work Plan Prototype of a Cashless System	 
Date: 1/03/2016		
Rev: 01		
Page 6 of 13		

2. PROJECT BACKGROUND

The original idea came from more than a year ago when some colleagues were discussing how cool would it be if we could buy stuff from our vending machine remotely.

The vending machine we are going to use for development is a vending machine that we have in the office of a student association that I am part of and, as a coincidence, I am the one who is responsible for the machine. When the office is crowded, very frequently people ask for change because they have no coins to buy drinks. So the idea is to solve (or to find the way to ...) the part of the people's need to get change for coins in order to buy drinks.

The goal of the project is to build a prototype of a cashless system (software and hardware) that can be later integrated with an existing vending machine.

Document: proposal_wp.pdf	Project Proposal and Work Plan Prototype of a Cashless System	 
Date: 1/03/2016		
Rev: 01		
Page 7 of 13		

3. PROJECT REQUIREMENTS AND SPECIFICATIONS

Project requirements:

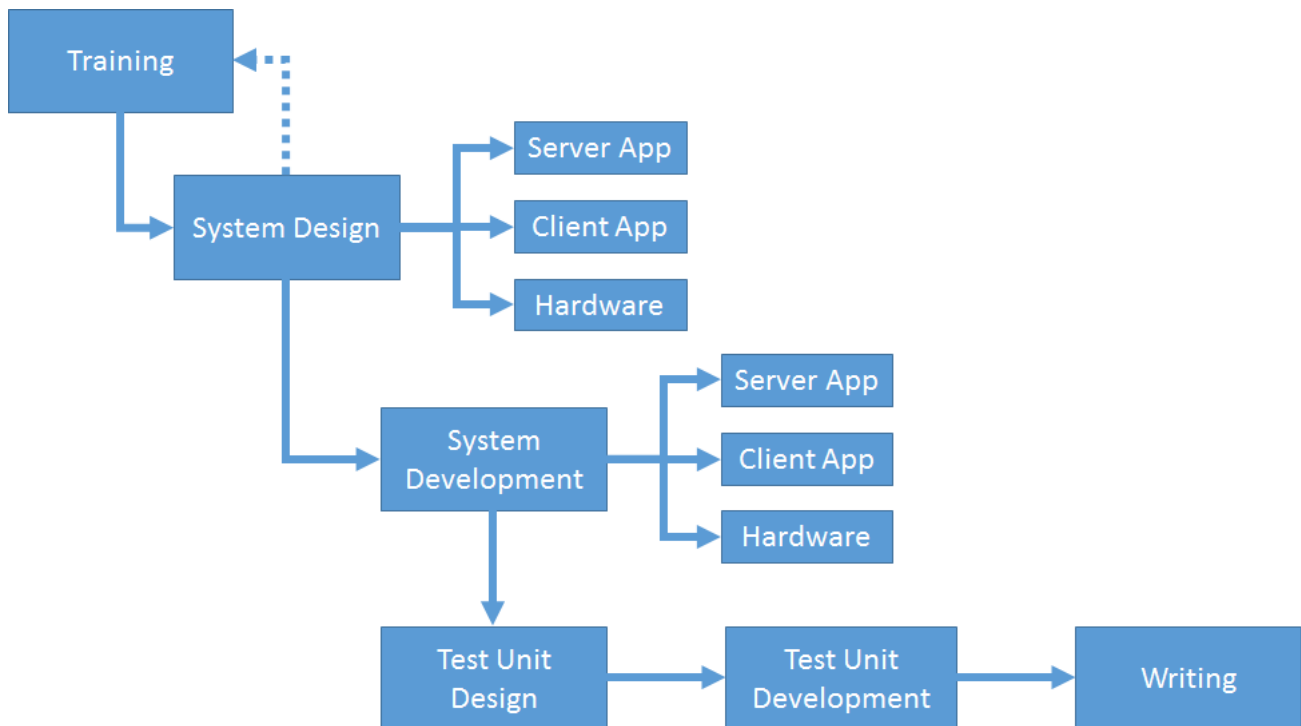
- **Cashless system:** the developed system has to remove the need of cash use in the moment of the purchase.
- **Feature improvement:** the solution must not worsen the existing features of the vending machine.
- **Safety:** the solution must be safe enough to prevent fraud or customer's money theft. At least must not less safe than the existing vending machine.

Project specifications:

- The solution has to be a pre-pay system
- User identification will be done using personal NFC tags
- The user's available credit amount will be recorded and managed by a centralized system (unlike other known solutions that the credit is managed by the vending machine and recorded on the user's personal card)
- Software development using Python language:
 - o Web/Server application using Django framework.
 - o Client application using PyQt library.

4. WORK PLAN



4.1. Work Breakdown Structure



4.2. Work Packages, Tasks and Milestones

Work Packages:

Project: Prototype of a cashless system	WP ref: WP1	
Major constituent: Programming Learning	Sheet 1 of 6	
Short description: Learn python language and other software concepts that will be needed in the software development in order to design the software system.	Planned start date: 01/02/2016	
	Planned end date: 12/03/2016	
Internal task T1: Learn python. Internal task T2: Learn to use other needed tools.	Start event: T1	
	End event: T2	
	Deliverables: None	Dates: None



Document: proposal_wp.pdf	Project Proposal and Work Plan Prototype of a Cashless System	 
Date: 1/03/2016		
Rev: 01		
Page 9 of 13		

Project: Prototype of a cashless system	WP ref: WP2	
Major constituent: System design	Sheet 2 of 6	
Short description: Design of the whole system (software and hardware) fulfilling the project requirements and specifications Also will have to do all proofs of concept to ensure that the design is feasible.	Planned start date: 28/02/2016 Planned end date: 26/02/2016	
	Start event: T1 End event: T4	
Internal task T1: Design server application Internal task T2: Design client application Internal task T3: Design hardware system Internal task T4: Proofs of concept	Deliverables: None	Dates: None

Project: Prototype of a cashless system	WP ref: WP3	
Major constituent: System development	Sheet 3 of 6	
Short description: Develop the system following the system design.	Planned start date: 27/03/2016 Planned end date: 07/05/2016	
	Start event: T1 End event: T3	
Internal task T1: Develop the server application Internal task T2: Develop the client application Internal task T3: Develop the hardware system	Deliverables: None	Dates: None

Project: Prototype of a cashless system	WP ref: WP4	
Major constituent: Design the test unit	Sheet 4 of 6	
Short description: Design the test and demonstration unit that will be portable to show the results of the project	Planned start date: 08/05/2016 Planned end date: 14/05/2016	
	Start event: T1 End event: T1	
Internal task T1: Design the test unit	Deliverables: None	Dates: None

Project: Prototype of a cashless system	WP ref: WP5	
Major constituent: Develop the test unit	Sheet 5 of 6	
Short description: Develop the test unit that will be used in the presentation following the design.	Planned start date: 15/05/2016 Planned end date: 28/05/2016	
	Start event: T1 End event: T2	
Internal task T1: Develop the test unit Internal task T2: Test the system on the test unit	Deliverables: None	Dates: None

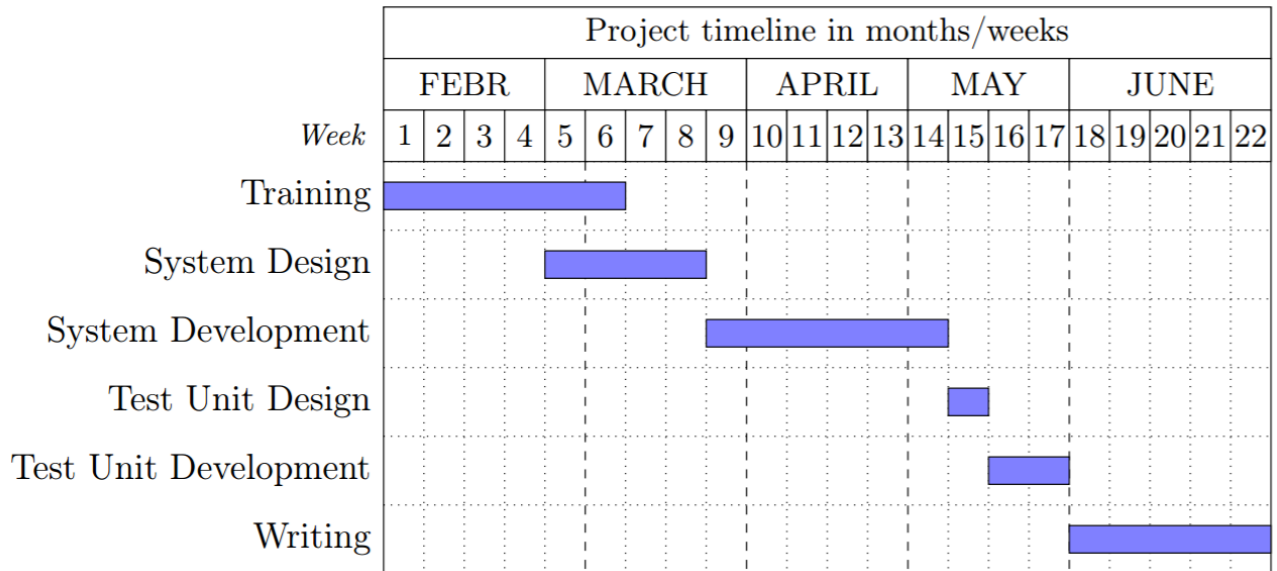
Document: proposal_wp.pdf	Project Proposal and Work Plan Prototype of a Cashless System	 
Date: 1/03/2016		
Rev: 01		
Page 10 of 13		



Project: Prototype of a cashless system	WP ref: WP6	
Major constituent: Writing	Sheet 6 of 6	
Short description: Write down the final degree project	Planned start date: 29/05/2016 Planned end date: 27/06/2016	
	Start event: T1 End event: T1	
Internal task T1: Write the final document	Deliverables: Final degree project	Dates: 27/06/2016

Milestones

WP#	Task#	Short title	Milestone / deliverable	Date (week)
2	4	Proofs of concept	Validated Design	26/02/2016
3	3	System development	System developed	07/05/2016
5	2	Test Unit Development	System tested on test unit	28/05/2016
6	1	Final Degree Project	Document	23/06/2016

4.3. Time Plan (Gantt diagram)





Document: proposal_wp.pdf	Project Proposal and Work Plan Prototype of a Cashless System	 
Date: 1/03/2016		
Rev: 01		
Page 12 of 13		

4.4. *Meeting and communication plan*

- Planned meetings with the supervisor:

Meeting	Date
Project Proposal and Work Plan approval	16/02/2016
Critical Review	02/05/2016
Final Review	20/06/2016

Document: proposal_wp.pdf	Project Proposal and Work Plan Prototype of a Cashless System	 
Date: 1/03/2016		
Rev: 01		
Page 13 of 13		

5. GENERIC SKILLS

The following generic skills will be promoted and assessed during the development of the project:

(Mark at least three, being GS4 one of them)

Be aware that if you have some of the third level generic skills not scored yet with A or B, you can work them in your TFG in order to obtain your Bachelor degree with the set of generic skills completely acquired.

#	Generic Skill	Assessed
1	Innovation and entrepreneurship	
2	Societal and environmental context	
3	Communication in a foreign language	X
4	Oral and written communication	X
5	Teamwork	
6	Survey of information resources	
7	Autonomous learning	X
8	Ability to identify, formulate and solve engineering problems	X
9	Ability to Conceive, Design, Implement and Operate complex systems in the ICT context	X
10	Experimental behaviour and ability to manage instruments	