

Tampere University of Applied Sciences

19I260E, YEAR 2020

Project Plan

HUMIDITY OUT

KAKASHI Solutions Ltd

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Information page

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Abbreviations

LCD Liquid Crystal Display

Project requirements:

- Product elements: signal box, application circuit, Arduino Mega
- Application input converts signal from signal box to be suitable for Arduino input
- Working application circuit includes LCD print out correct signal, IP, Ethernet module received IP and send the signal to MQTT broker, well-performed button
- Frequency counter

Relative humidity = 40% > frequency = 7.9 KHz

Relative humidity = 100% > frequency = 6.9 KHz

In laboratory A3-16 about = 7.4KHz

$$\Rightarrow RH = -0.0006 * freq + 5.14$$

- Data format: {"humidity_out": "value"}
- Time: one second/ sending
- MQTT: port number 10884
- MQTT topic: ICT4_out_2020
- MQTT broker / Raspberry IP: 10.10.xxx.xxx
- Client ID: 2020_CI_"class"_ "Signal number"
- Device ID: 2020_DI_"class"_ "Signal number"

1. Introduction

The relative humidity in the air should be monitored to maintain an ideal atmosphere. The world ecosystem needs the suitable humidity level to stabilize our environment. The common problems result by inappropriate humidity such as materials becoming detached (for example, paint peeling or bubbling), changes in surface coloration (for example, darkening of parquet floor or black spots forming on tile), visible bacteria growth, or musty odor (could be like a dirt cellar or musty, pungent, etc.). For certain industry such as egg hatching or even the incubation of immature newborn chicken also needs a controlled humidity condition. The wood furniture and food industries are also needed to control humidity level because it can affect the quality of the product. Understanding the crucial involvement of outdoor humidity in human life, our potential software developers aspire to introduce to customer a technology product of lifetime which is the combination of Arduino and web development. This project desire to bring the customers the quickest and most accurate mean of tool for statistical weather data, particular in outdoor humidity level with the best user-friendly web environment associated with multiple useful functions.

Based on the complexity of the technology, the duration of work is approximately 3 months and a half with 100% concentration and efforts of all team members.

2. Project Goals

The goals of this project are to introduce to customers a program that calculate the outside humidity in different weathers' stage.

Specifically, the product must meet the goals of functionality, technology, quality requirements. On the other hand, it should also fulfill the expected business and constraints.

Table 1 Project Goals

Project Goal	Priorit y	Comment/Description/Reference
Functional Goals:	2	
Data is well recorded on the LCD screen	1	Only the necessary and the most important data indicated in Technical_document.docx shown on LCD screen
Website presents the right data	1	We created a website that works more than fine showing the information needed with adding many features to observe the data in different ways.
Rest API website works perfectly	1	All the API websites works effectively
Business Goals:		

Project Goal	Priorit y	Comment/Description/Reference
Low cost	2	Using materials that are not that much expensive, make it more affordable for everyone
Efficiency	1	Our first priority in this project is to make it efficient and perfect in both hardware and software part.
Technological Goals:		
LCD display information	1	
Ethernet is working	1	
Signals are well received by MQTT broker	1	MQTT topic: ICT4_out_2020 deviceId = "2020a1505" clientId = "a1505" deviceSecret = "tamk1505"
Message is sent in each second	1	Sending time is synchronized to clock time
Right structure of data format sending to MQTT broker	1	{"humidity_out": "value"}
Sending JSON data type to databases	1	Backend ip: http://bowd12-api.course.tamk.cloud/v1/weather
Quality Goals:		
Great visual graphs	3	Different filter option will have a specific graph
Appealing frontend website	2	Great combination of color and button arrangements
Constraints:		
Environment standards	1	In laboratory A3-16 about = 7.4KHz Relative humidity = 100% > frequency = 6.9 KHz Relative humidity = 40% > frequency = 7.9 KHz

3. Organization:

Our project contains collaborative efforts. This collaboration is not only the software designer and the hardware designer who need to work together sharing ideas, designs, interfaces and test results but also between all the member of our project and users.

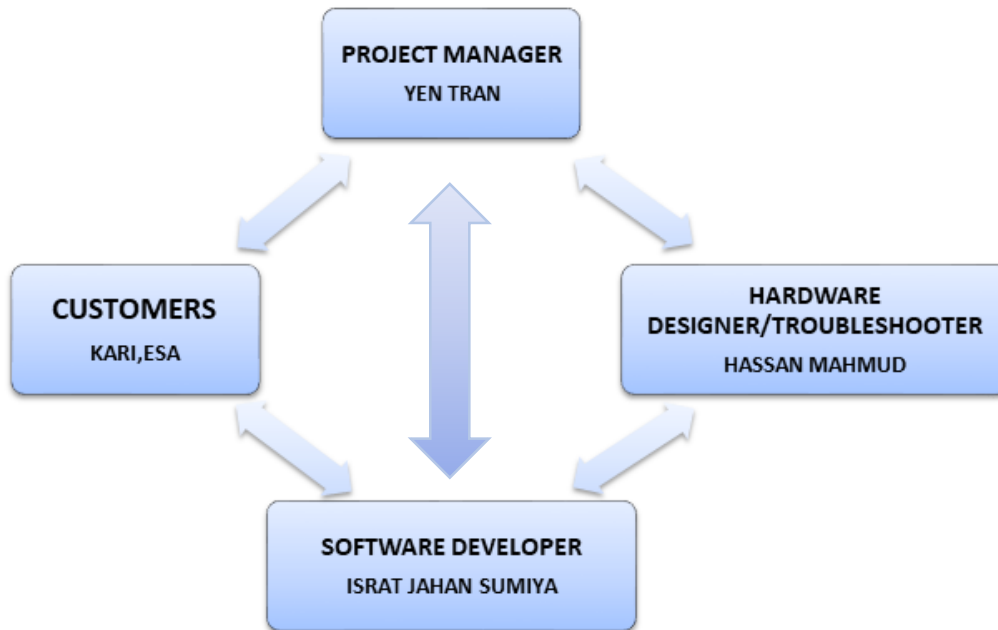


Figure 1 Company Structure

Detail Task

Board and Web Software

Weeks	Column1	Tasks	Yen Tran	Israt Sumiya	Hasan
3	board	Arduino testing 1	2	1	1
	web	Create git repository	1	1	1
		Create dockers	1	1	1
4	board	Arduino testing 2	1	2	1
		lcd testing 1	2	1	2
	web	fixing dockers	1	1	1
5	board	lcd testing 2	3	3	3
	web	fix git repository	3	3	4
		Dockerize frontend and publish into the web	2	2	2
6	board	Ethernet coding	2	1	1
		add database into API	4	4	4
	web	fix docker containers	3	3	3
7	board	Ethernet testing 1	3	2	2
		frequency counter setting	1	1	1
	web	Rest API	4	4	4
8	board	Ethernet testing 2	3	2	2
		frequency counter test with test signals	1	1	1
	web	API local testing			
9	board software	frequency counter test with test signals	2	1	1
	web	API server testing	3	3	3
10	board software	test ethernet shield testing	2	2	1
	web	first establishment of data fetching	1	2	1
11	board software	Subscribe to MQTT broker and Publish message (testing)	3	3	3
	web	Create more endpoints	2	1	2
		Create frontpages	1	2	2
12	board software	Subscribe to MQTT broker and Publish message (testing)	1	1	1
	web	linked to tamk backend IP to frontend page	1	1	1
		Create features	3	4	3
13	board software	Start sending and receiving Json messages	5	5	5
		bug fixings	0	1	1
	web	Create features	5	4	4
		bug fixings	0	1	1
14	board software	Finalize	0	5	5
	web	bug fixings	4	0	0
		sum	70	69	68

Table 2 Software Task (in hours)

Board Hardware

Role	Timing	person in charge	Estimated Work hours	Note
Install Arduino and other board's components (breadboard,cable	20.1.2020 - 31.1.2020	Hasan	5h	
Wiring		Yen and Israt	5h	
Install LCD modules	29.1.2020 - 5.2.2020	Yen	3h	LCD needs pin soldering
Wiring		Hasan and Israt	4h	
Install Ethernet module	10.2.2019 - 19.2.2019	Yen	1h	
Wiring		Hasan and Israt	2h	

Table 3 Hardware Task

4. Work Breakdown Structure

	Period 1(6/1/2020-9/2/2020)					Period 2(10/2/2020-29/3/2020)							Period 3(30/3/2020-10/4/2020)	
Task	week 1	week 2	week 3	week 4	week 5	week 6	week 7	week 8	week 9	week 10	week 11	week 12	week 13	week 14
Milestone	Ms 1					Ms 2							Ms 3	Ms 4
Project Plan	6	6	6	6	6	6	6	6	6	6	6	6		
Hardware Development														
-arduino install			3											
arduino coding			5	2										
testing arduino			2	2										
-lcd install				1										
lcd coding				4	4									
testing lcd					3									
-ethernet module install						1								
ethernet coding						5	5							
testing ethernet							3	3						
Signal transformation														
-Freequency counter							3	3						
testing with test signals							2	2						
-Mosquitto										3	3	3	3	
-MQTT broker									3	3	3	3	5	
MQTT and JSON									3	3	3	3	3	
-testing with the test signals									2	2				
-doing real signals											3	3	3	3
Software Development														
backend:														
-docker containers					3	4	4							
docker testing						3	3							
-rest APIs							4	4	4	4	4	6		
API testing								3	3					
-pipeline fixing				4	4	4	4	4	4	4	4	4		
frontend:														
Running pipelines		1	1	1	1	1	1	1	1	1	1	1		
Database						3	3	3	3	3	3	3		
Data implementation							5	5	5	5	5	5	5	5
Data testing						2	2	2	2	2	2	2		
final check														
Finalize production documentation													20	
Final														10
Total hours		1	11	10	15	23	43	38	30	30	36	33	39	18

Figure 2 Task Flow Chart 2020

5. Risk Management:

Table 4 Risk Management

Risks	Severity	Mitigation
Project Delays	Medium to Critical- the project requires knowledge from another course: Basic web development course. Matching and timing knowledge between two courses are significant	Project delays can only truly be avoided by making sure everyone is working effectively and everyone is on the same page regarding the project plan and the state of the project. If it becomes clear that a work package is not seeing any progress, other members of the team can provide assistance.
Team member unavailable to meetings due to different schedules	Low to Medium- the team compose of 3 members. Having a team member unable to work for a significant period of the time allotted to the project will mean that everyone else has to comparatively work harder to stay on track.	The risk of this happening is quite low. Due to the nature of major, all members have the same study schedule for each week. However, some meetings besides classes will not fully attended by all members since some have part-time jobs, therefore, the abstract of the meeting should be sent into group chat
Components missing	Low to Medium- Since all the equipment are provided by TAMK laboratory each group must take care well of the components. Especially the Arduino or LCD since they are limited at the moment when every group is in use	It can happen that some components are not well reserved. In case the components are lost or broken, immediately tell the teachers to ask for spare ones. Overall, all members should be concern of taking well care of the provided components
Teammate conflictions and misunderstanding	Low to Medium- English is used to communicate during the project and it's our first time working together therefore, there are some ideas we might contradict to each other	Learning English vocabulary and try to speak and explain to each other. Moreover, each member should sympathize and try to listen not arguing.
Pandemic	Medium to High – 2020 the world has been stroke by	Stay home and put more concentration on the work.

	corona virus and the influences are quite severe because laboratory work is banned and working in distance is the huge challenging for our team	Online discussions should be done more and each member should try to meet their own deadlines
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6. Communication and Reporting

To communicate effectively with our client or stakeholders it's important to have a communication plan. It sets clear guidelines for how information will be shared, as well as individual responsibilities and what need to be done for each team member. The communication plan included internal and external sections is stated as below.

Table 5 Communication Plan

Communication	Method	Frequency	Goal	Responsible	Audience
Project status report	Email	Weekly	Review project status and discuss potential issues or delays	Project manager, Project team	Project Team and project sponsor
Team standup	Meeting / WhatsApp	Daily	Discuss what each member did yesterday and what will be done tomorrow	Project Manager, Project Team	Project Team
Project Review	Meeting	At Milestones	Present Project Deliverables, gather feedback and discuss next steps	Project Manager, Project Team	Project Team and Project sponsor
Task progress updates	Meeting	Daily	Share daily progress made on project tasks	Project manager	Project Team

Final meeting	Meeting	At the end of the project	Assess what worked and what did not work and discuss actionable takeaways	Project manager and the team	Project Team
Emergency meeting	Meeting	Any time during the project	Working on anything important that was done wrong or missed before	Project manager and the team	Project team
Conference call	Calling	Any time during the project	Deal with the current issues and try to solve it with everyone's approval	Project manager and the team	Project team

7. Delivery Plan

The goal of this project is to produce a result that serves a specific purpose. Deliverables are the most important part of any project. All the delivery dates are in this project are submitted as below.

Table 6 Delivery Plan

Deliverable	Planned Date	Receiver
1.Project plan (version 1) 2.Project requirements	Week 6 and week 7	Customer
1.Test plan 2.Technical design documentation (version 1)	Week 10	Customer
1.Project plan (version 2) 2.Test plan (version 1) 3. Technical design documentation (version 1) 4.Test Report	Week 13	Customer
1.Project plan (version 2) 2.Test plan (version 2) 3. Technical design documentation (version 2) 4.Test Report	Week 14	Customer
1. Project follow-up	Week 15	Customer

8. Conclusion

Overall, the project has completed in 3.5 months from the beginning of January to the middle of April 2020. Due to the virus pandemic therefore, the group meetings as well as code implementation have to be done online. Some steps were delayed from the first planed time and real signal input cannot be tested. However, as expected the basic functionalities like well performed Arduino, LCD, Ethernet module have been fulfilled and met the requirements. The system has connected with machine IP: 192.158.0.100 to the server IP: 193.167.167.59, data has been sent successfully to backend IP : <http://bowd12-api.course.tamk.cloud/v1/weather> in the right format.

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