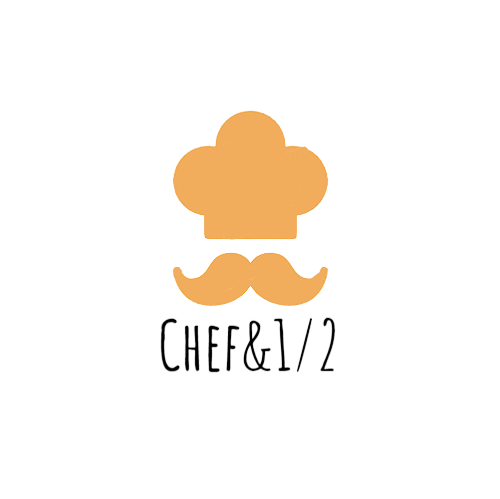


Cairo University

Faculty of Engineering

Department of Computer Engineering

**Chef w Nos**

A Graduation Project Report Submitted

to

Faculty of Engineering, Cairo University

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of

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Abstract

With the fast-paced lifestyle that we are living, eating has become an afterthought, people want to eat to get through the day and don’t want to spend time thinking and planning what to eat, which makes cooking even more difficult to do daily.

Figuring out what to eat every day is needless time wasting whether it’s just you eating alone or your whole family negotiating and discussing what to eat just to settle for an old recipe.

It leads to cooking the same recipes in a cycle which heavily limits recipe discovery and can turn cooking into more of a tedious chore.

After all the thinking and planning when you finally settle on a recipe it’s hard to follow the video’s steps and you end up pausing and rewinding which makes you wonder why I cooked in the first place.

To make the cooking process easier, faster, and more convenient the user should have fast access to recipes that he’s likely to make and that suit his inventory of ingredients, and be able to ask for certain recipes, ingredients, or cravings.

The user should also have a way to conveniently navigate the steps of the recipe that he chose to make.

We propose a system that accompanies the user and helps make cooking a simpler task.

The system should be able to chat with the user to understand their craving and can adjust on the fly to the user’s requests. The user’s request is then sent to a recommendation system that recommends recipes based on user’s request, favorite recipes, and past recipes, this process can go back and forth until the user is satisfied and chooses a recipe.

The recipe is then loaded and presented to the user as a collection of steps he can move through freely.

The system is presented in an application form where users can chat with their chef and can ask for similar recipes, recipes with certain ingredients and characteristics.

The application also provides relevant recommendations based on user’s likes and history.

An inventory system is also added to monitor ingredients and give users insights on their shopping and diet.

Recipe understanding is also presented to segment recipes video to logical steps to allow the user to freely navigate the recipe’s steps.

الملخص

مع نمط الحياة السريع الذي نعيشه، أصبح الأكل مجرد فكرة ثانوية، حيث يرغب الناس في تناول الطعام للمضي قدمًا في يومهم ولا يرغبون في قضاء الوقت في التفكير والتخطيط لما يجب تناوله. وهذا يجعل عملية الطبخ أكثر صعوبة في القيام بها يوميًا.

قرار ما يجب تناوله كل يوم يستهلك الكثير من الوقت عن طريق التفاوض ومناقشة العائلة بشأن ما يجب تناوله فقط للوصول إلى وصفة قديمة. هذا يؤدي إلى تكرار نفس الوصفات بشكل متكرر، مما يقيد اكتشاف وصفات جديدة ويجعل عملية الطبخ مهمة مملة.

بعد كل التفكير والتخطيط عندما تستقر على وصفة معينة، يكون من الصعب اتباع خطوات الفيديو وتجد نفسك توقف وإعادة المشاهدة، مما يجعلك تتساءل لماذا طبخت في المقام الأول.

لجعل عملية الطبخ أسهل وأسرع وأكثر ملائمة، يجب أن يتمكن المستخدم من الوصول السريع إلى وصفات يحتمل أن يقوم بتحضيرها وتتناسب مع مخزونه من المكونات، وأن يكون بإمكانه طلب وصفات معينة أو مكونات أو رغبات.

يجب أيضًا أن يكون للمستخدم وسيلة للتنقل بسهولة في خطوات الوصفة التي اختارها.

نقترح نظامًا يرافق المستخدم ويساعده على جعل الطبخ مهمة أبسط.

يجب أن يكون النظام قادرًا على محادثة المستخدم لفهم رغباته ويمكنه التكيف مع طلبات المستخدم. يتم إرسال طلب المستخدم إلى نظام توصية يوصي بوصفات استنادًا إلى طلب المستخدم والوصفات المفضلة والوصفات السابقة للمستخدم، ويمكن أن يتم هذا العمل ذهابًا وإيابًا حتى يكون المستخدم راضيًا ويختار وصفة.

ثم يتم تحميل الوصفة وتقديمها للمستخدم على هيئة مجموعة من الخطوات التي يمكنه التنقل فيها بحرية.

يتم تقديم النظام في شكل تطبيق حيث يمكن للمستخدمين التحدث مع طاهيهم وطلب وصفات مماثلة أو وصفات تحتوي على مكونات وخصائص معينة.

يوفر التطبيق أيضًا توصيات ذات صلة استنادًا إلى تفضيلات المستخدم وتاريخه.

يتم أيضًا إضافة نظام للجرد لمراقبة المكونات وتزويد المستخدمين بإرشادات حول التسوق والنظام الغذائي.

كما يتم تقديم فهم الوصفة لتقسيم فيديو الوصفة إلى خطوات منطقية للسماح للمستخدم بالتنقل بحرية في خطوات الوصفة.

ACKNOWLEDGMENT

First, we would like to thank God for helping us through this long and challenging journey. We would also like to thank our supervisors Dr. Magda Fayek for her support, guidance, and advice. During this journey we got a lot of support from our family and friends for which we are very thankful.

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List of Abbreviation

[The abbreviations should be put in an alphabetical order]

AI Artificial Intelligence

EA Evolutionary Algorithms

GA Genetic Algorithms

SA Simulated Annealing

VLSI Very Large Scale Integration

List of Symbols

[The symbols should be put in an alphabetical order. Greek symbols come first, followed by English symbols]

σ Noise standard deviation

B Buffer size

fop Operating frequency

Contacts

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# Introduction

The foods you choose to eat can have a direct impact on your ability to enjoy life to fullest. Perhaps the most obvious positive effect of food is the pleasurable feeling you get from eating a good-tasting meal, but to get there we have to go through a long process from first deciding what to cook until we sit down with our loved ones to eat what you have made.

Making food is no easy task it requires planning, knowledge and skill to cook something great we want to cut out the most boring parts of the experience so you can focus on the actual cooking and leave the rest out of your mind.

We all take part in cooking some way or another, whether we are the ones doing the actual cooking or being part of the discussion on what to eat today, a question that each one of us in exposed to daily and takes way more time than it is needed.

A smart cooking assistant would take care of these tedious details and would encourage people to try more recipes and discover whole new cooking styles, and would pull people back into cooking.

Having relevant recommendations in front of you and being able to ask for specific ingredients/characteristics and having all that within the items in your kitchen would greatly improve the cooking process.

We set out to simplify the planning and knowledge needed to start cooking by providing the users with tailored recipe recommendations based on their history, preferences and specific requests, while making following a recipe’s video more manageable while cooking.

The system proposed can interact with the users to get their specific requests if any using a chatbot that answers that understand requests and queries a recommendation system.

After choosing the right recipe the recipe’s video is analyzed and divided to steps to allow for smoother navigation.

## Motivation and Justification

Cooking is a not an easy task by any means due to the amount of planning, knowledge and skills needed to pull off a successful recipe and we are living in a fast-paced environment where food, groceries and taxies are being ordered by a push of a button, modernizing the cooking process would take out the boring parts leaving you with the pleasure of cooking a dish and the satisfaction that follows.

During late 2020 and early 2021 one of the common trends across the world was cooking at home[1] and that coincides with COVID-19 pandemic, people were at home and used this as an opportunity to level up their cooking skills.

Moreover, people between the age of 25-34 years old cook with either their smartphones or tablets[2] and the smartphone is becoming the ultimate sous-chef for millennials as they prefer to experience the whole culinary process from start to finish.

So, it’s apparent that people are already on their phones to look for the next recipes to make and the proposed application would fit perfectly into this category of helping people focus on cooking and exploring.

## The Essential Question

We all end up eating at the end of the day whether by cooking or ordering food but the question that we repeat to ourselves everyday is what to eat today?

And eventually the main problem we are tackling, we want to eliminate this question and keep it to a minimum and we believe as engineers we should always look to make people’s life easier and more convenient by automating tedious tasks using technology.

And this mission perfectly aligns with the problem at hand it takes such an important aspect of our lives and simplifies it and make it more modern.

## Project Objectives and Problem Definition

We set out to simplify the planning and knowledge needed to start cooking so our users can focus on the cooking process itself.

The system should take care of the decision-making process as much as possible so the user can quickly start making the recipe, it also needs to react to feedback from user and receive specific requests to be as accurate as possible.

Keeping in mind the changing taste of the users the system should be able to adapt overtime to the users’ taste.

Its important also that the recipes presented to the user are feasible, meaning that the ingredients are available in the kitchen.

In line with simplifying the knowledge needed to cook we’ll use videos that show step by step the recipe and the user can navigate easily through the video whilst following it.

Chef W Nos’s main focus is to help you decide your recipe for the day, we assume that the chatbot will only be used to ask for recipes and get positive or negative feedback not for general chatting or explaining steps of the recipe.

## Project Outcomes

The outcome of this project is a software application that accompanies the user on their android phone with a simple graphical user interface.

The user can see right away his recommended recipes that he can browse through, view their steps and attached videos.

If the user has a specific craving, he can then use the chatbot to ask for recommendation based on that craving, after choosing the recipe he’ll be directed to the recipe’s steps and segmented video that he can then navigate through.

## Document Organization

In this section, you have to give the organization of the report and a quick description of the following chapters.

# Market Feasibility Study

In this chapter we’ll discuss the market feasibility study, going into details into the targeted customers, market survey and talk about the business case and financial analysis.

Cooking assistants are pretty common in the market, when we first started to develop this idea, we looked at what other applications offered, gaining valuable insights that helped us come up with the set of features present in our applications.

## 2.1 Targeted Customers

As we discussed in the last chapter more people now are using their smartphones to help them in cooking, research from McGarry Bowen and Kraft Foods, the found that 59% of 25–34-year-olds cook with their smartphones[2].

So young people that are already using their smartphones for everything are one of our targeted customers.

Another group that we are very interested in is household parents, families tend to have the most discussion about what to eat today and with varying tastes and ingredients they would be benefit greatly from the application’s features.

**2.2. Market Survey**

In this section we’ll explore similar applications that provide cooking assistance to the user.

### 2.2.1. BASYL

Basyl is an AI cooking assistant that generates recipes based on ingredients entered and can save generated recipes in a cookbook.

**Features:**

* Generate delicious custom recipes based on your preferences
* Save your favorite recipes to your personalized cookbook

**Drawbacks:**

* No recipe recommendations.
* No inventory system

**2.2.2. Competitive Project 2**

Explain and discuss each competitive project

**2.3**. **Business** **Case** **and** **Financial** **Analysis**

In this section you describe the success of establishing a company to sell your product (or service)

Two Aspects must be addressed

Business Case: Based on Market survey above you should anticipate how many products you will sell over the next 5 years and how will you set your price to counter the competition.

Financial Analysis: Based on the business case we must anticipate

1. The Capex (Capital Expenditure): These are one-time spending that you pay for development and buying things for the company
2. The Opex (Operational Expenses): These are recurring payments for salaries and marketing and … etc.

Then you create what we call a cash flow table (on an excel sheet). In this sheet you put down your monthly capex and opex on a set of rows and your reveneus (money you get back from selling product/services) on another set of rows.

The difference between both sums is your profit before tax.

It is likely that this difference is negative at beginning until your sales increase and counter the expenses.

From this cash flow analysis you find the date of the break even point wbich is the date at which all the money you get back equals the money you spent. From that date onward you will be making true profit ☺.

**Chapter 3: Literature Survey**

This chapter consists of two parts. In part one, give any necessary engineering and non-engineering backgrounds that you see important for the complete understanding of your project. These backgrounds include, but are not limited to, facts, theory, formulas, algorithms and techniques. In other words, any pivotal knowledge to your project should be given, discussed, and properly defined. In part two give a short literature review of the latest publications related to your project within past three years if applicable. Specially in this chapter, avoid lengthy unrelated discussion. More important, copy-and-paste should never be used. You have to write everything with your style and wording.

In this space, before the first section, write an introductory paragraph to describe the topics and organization of the chapter

**3.1. Background on Topic 1**

Give this section a title related to the topic you cover and then write the related information as explained above.

**3.1. Background on Topic 2**

Similar to the previous section, give this section a title related to the topic you cover and then write the related information as explained above.

Just choose the most two important topics however you make sure to cover all necessary facts, theory, formulas, algorithms and techniques.

**3.1. Comparative Study of Previous Work**

In this section give a comparative, classified short literature review of the latest publications the latest publications related to your project within past three years if applicable

**3.1. Implemented Approach**

Conclude this chapter by this section stating the approach chosen from those reviewed, **but more important your justification why you chose this approach** along with any modifications added to the approach.

Notice, you may be implementing several techniques however you must illustrate the general framework for your approach.

**Chapter 4: System Design and Architecture**

This chapter represents the main body of your project. It should describe the project in full details. This chapter should answer the questions: “what has been done?” and “how it has been done?”. As such, the steps you went through to realize the project should be highlighted and properly discussed. Your scientific approaches and methodologies should be clarified. The discussion should adopt a logical flow starting from the whole block diagram, to coarse modules, and finally to fine modules. While writing this chapter, try to give as much details as possible, such that an interested reader could easily replicate your work and improve it.

In this space, before the first section, write an introductory paragraph on how you design and build your project

**4.1. Overview and Assumptions**

In this section, introduce how you design you system and develop its underlying architecture. Any employed assumptions should be clearly enumerated and justified.

**4.2. System Architecture**

The architecture of your system should be given in this section. This architecture should be first represented as a block diagram (subsection 5.2.1), which clarifies different project modules and the connections between them. You may add more subsections to properly explain your design. If possible, flowcharts are better included to ensure that the big picture and the interaction between different modules are very clear to the reader. Thereafter, each module should have a separate subsequent section to clearly describe and discuss it.

Asd3 [3]

**4.2.1. Block Diagram**

Draw the block diagram of your architecture and generally discuss its modules. After reading this subsection, interested audience should have understood the big picture of your system design and architecture. The interaction between modules should also be conveyed in this subsection

Ad3[4]

**4.3. Module 1**

Each module within your architecture should have a distinct section to explain the design of the module itself. Again, give as much details as possible, so that the reader could easily understand how the module is designed and what are the constraints that affect its design?

**4.3.1. Functional Description**

Explain the functional description of the module

**4.3.2. Modular Decomposition**

Explain the modular decomposition of the coarse module into smaller fine ones

**4.3.3. Design Constraints**

Explain the constraints that affect the design of the module

**4.3.4. Other Description of Module 1**

Give any other necessary discussion of the module to ensure that it is clearly described.

**4.4. Module 2**

Each module within your architecture should have a distinct section to explain the design of the module itself. Again, give as much details as possible, so that the reader could easily understand how the module is designed and what are the constraints that affect its design?

**4.4.1. Functional Description**

Explain the functional description of the module

**4.4.2. Modular Decomposition**

Explain the modular decomposition of the coarse module into smaller fine ones

**4.4.3. Design Constraints**

Explain the constraints that affect the design of the module

**4.4.4. Other Description of Module 2**

Give any other necessary discussion of the module to ensure that it is clearly described.

**Chapter 5: System Testing and Verification**

In this chapter, you have to explain all the steps you carried out to ensure that project outcomes are realized correctly. Your testing setup, strategy and environment should therefore be described. Your efforts for unit testing as well as integrated system testing should be given. Finally, the results from different testing scenarios should be highlighted and discussed.

In this space, before the first section, write an introductory paragraph on how you test and verify the correct operation of your system

**5.1. Testing Setup**

Explain the setup you are using in testing your project

**5.2. Testing Plan and Strategy**

Explain the methodology you follow while testing your project in details

**5.2.1. Module Testing**

Explain the steps you carried out to test different modules within the project. Give and discuss the results obtained from the testing of these modules

**5.2.2. Integration Testing**

Explain the steps you carried out to test the integrated system of your project. Give and discuss the results obtained from this whole project testing

**5.3. Testing Schedule**

Mention your testing schedule

**5.4. Comparative Results to Previous Work**

Give a summary of comparative results to previous work in Tabulated and or Graphical form along with a short commentary.

**Chapter 6: Conclusions and Future Work**

This chapter should summarize the whole project, it features and limitation. Moreover, you should give directions for future work

In this space, before the first section, write an introductory paragraph for the chapter

**6.1. Faced Challenges**

Mention all the problems/challenges that you faced while working with the project and how you overcome them

**6.2. Gained Experience**

Mentioned the experience/skills that you gained from working with the project

**6.3. Conclusions**

Write your conclusions regarding the project. Mention its features and limitations

**6.4. Future Work**

Give possible extensions, enhancements and future work of you project, such that subsequent students could build on your work and develop larger systems/platforms.

**References**

The references should be ordered according to their appearance in the text. Ensure that all references are cited throughout your report text. The following are examples of how to write different types of references “[1] Book, [2] Journal/magazine articles, [3] conference paper, [4] website, [5] thesis”. Replace the fields with those of your used references. Question marks “??” should be replaced by the corresponding number

1. Author1, Author 2,…, “Book title,” name of publishing firm, edition, year
2. Author1, Author2,…., “Title of journal article,” name of the journal, vol. ??, no. ??, pp. ??, year of publication
3. Author1, Author2,…, “Title of conference paper,” in proceedings of conference name, city, country, date, year, pp. ??
4. Author or Corporation name, “Title,” year, link for the website, last accessed: date of last access
5. Author, “Thesis title,” M.Sc./Ph.D. thesis, Department, University, year

[1] “Global food trends 2021: How our habits have changed, as told by social images | YouScan.” https://youscan.io/blog/food-trends/ (accessed May 23, 2023).

[2] J. Cooper, “Cooking trends: The Digital Kitchen - Think with Google,” 2015.

[3] E. Guo *et al.*, “Learning to Measure Change: Fully Convolutional Siamese Metric Networks for Scene Change Detection,” Oct. 2018, [Online]. Available: http://arxiv.org/abs/1810.09111

[4] L. Zhou, C. Xu, and J. J. Corso, “Towards automatic learning of procedures from web instructional videos,” in *32nd AAAI Conference on Artificial Intelligence, AAAI 2018*, AAAI press, 2018, pp. 7590–7598. doi: 10.1609/aaai.v32i1.12342.

**Appendix A: Development Platforms**

**and Tools**

This appendix explains used tools, platforms, and hardware kits. Any ready-made module should be mentioned and discussed in this appendix. The appendix is divided into two main sections; one for the hardware and the other is for software. Within each section, you could add as much subsections as needed, according to the number of tools and platforms that you use in your project.

In this space, before the first section, write an introductory paragraph to the appendix

**A.1. Hardware Platforms**

A description of any used hardware platforms/kit should be written in this section. Each platform/kit is better described in a separate subsection. (A1.1..)

**A.2. Software Tools**

A description of any used software tool/package should be written in this section. Each tool/package is better described in a separate subsection (A2.1,..)

**Appendix B: Use Cases**

Include all your use cases

**Appendix C: User Guide**

Prepare a user guide for your project. Ensure that the guide is clear, detailed and easy for an ordinary customer to use your project. Employ figures and charts as needed to facilitate the use of your guide

**Appendix D: Code Documentation**

Your code or parts of the code you feel necessary could be included here (optional) however for one copy of this report an attached CD with all of the code is a must.

Remember you will deliver three copies of this report.

**Appendix D: Feasibility Study**

Give a detailed feasibility study of your project