University of Jordan
School of Engineering
Computer Engineering Department

GP01 – Graduation Project Proposal

Supervisor	Dr. Ashraf Suyyagh	Semester / Year	*Fall 2020*

No.	Student Name	ID Number	Dept.	GPA	Signature
2					

Choose all that applies:

Project Type	☐ Hardware	■ Software / App / Web Development	■ Research

Please completely fill all required fields below. Do not change fonts or font size. **The form should not exceed three pages.**

Title of Senior Year Project	Real-Time Meal Analysis and Food Nutrients Value Detection using AI
Project Summary	*In the past 20 years, there has been a rise in the levels of awareness and interest in well-being, better physical and mental health, weight management and eating healthy. Many people pay more attention to the calorie content, or the daily nutrients value per serving. They either consult the Internet or the printed table on the food covering to access this information. Mobile applications like CarbandMove, MyFitnessPal, and FatSecret allow users to access food nutritional value through manual entry. Google's Im2Calories system uses an image of a food object and volume estimation to predict its calorie content. Both techniques have some issues. The manual entry mode is tedious, while Google's service is restricted to a certain menu database. There is ongoing research interest that continually tries to improve on current solutions [1] [2].* *In this project, students are required to build a mobile app through which they can take a picture of their meal, recognize its contents, and provide the associated nutritional value to the user. If time permits, students can factor in the food volume as well for a more accurate prediction. The students will tailor this project whenever possible to foods common in the Arabic or Middle Eastern cuisine. Students must use AI to detect the food items and associate them with their nutritional tables. They can use either Android or iOS for their mobile app development. If students wish to leverage the power of cloud AI and services, they are permitted to do so, or they can develop their own AI models. Students can add features and equations related to BMI, expected daily calorie intake, track their food consumption over a period, and issue alerts.* ***Methodology*** • *Review related work (apps and services) and literature (papers)* • *If students have no prior knowledge in Python, AI, or the cloud, then acquire the necessary skills to be able to implement the project* • *Preview the available datasets, and extend it with Arabic meals* • *Implement the AI engine either using Python or a cloud service*

	• *Build the mobile app* • *Interface the mobile app with the AI engine* • *Thoroughly test the app* ***Objectives**:* • *Provide an easy-to-access, easy-to-use, user-friendly real-time food analysis and nutritional value service to health-aware individuals.* • *Improve current available solutions to include Arabic/Middle Eastern cuisine* • *Help people make conscious decisions about the food they consume or order.* *[1] J. Sun, K. Radecka and Z. Zilic, "Exploring Better Food Detection via Transfer Learning,"* 2019 16th International Conference on Machine Vision Applications (MVA)*, Tokyo, Japan, 2019, pp. 1-6* *[2] arXiv:1909.05994v2, J.Sun, K. Radecka, Z. Zilic, "FoodTracker: A Real-time Food Detection Mobile Application by Deep Convolutional Neural Networks", 2019*
Project Impact	*Health issues related to malnutrition, obesity, and being underweight are a world-wide problem with huge economic burdens on the individual and government [1]. Jordan is no exception. Recent studies show that an average of 15% of Jordanian children between 5 and 17 are obese, 5% are underweight [2], while 7.7% suffer from malnutrition [3]. One study found out that Vitamin D deficiency is exceptionally high in Jordan [4]. Fast food and junk food are one factor, while inability to purchase healthy food is another. Many people often rely on costly vitamin supplements, or weekly visits to dieticians and doctors to help them manage their weight or replenish their nutrients deficiencies. This project targets people who would like to keep track of the food value they consume in terms of calories and nutritional content. It can provide them in real-time if the food they are about to eat has sufficient levels of the vitamins or minerals they need, or if it is high in calories, or saturated fat or sugars. This project helps people control their eating habits, and consequently maintain a healthy lifestyle.* [1] Tremmel, M., Gerdtham, U. G., Nilsson, P. M., & Saha, S. (2017). Economic Burden of Obesity: A Systematic Literature Review. *International journal of environmental research and public health*, *14*(4), 435. https://doi.org/10.3390/ijerph14040435 [2] Zayed, A.A., Beano, A.M., Haddadin, F.I. *et al.* Prevalence of short stature, underweight, overweight, and obesity among school children in Jordan. *BMC Public Health* **16,** 1040 (2016). [3] Sharaf, M.F., Rashad, A.S. Regional inequalities in child malnutrition in Egypt, Jordan, and Yemen: a Blinder-Oaxaca decomposition analysis. *Health Econ Rev* **6,** 23 (2016). [4] El-Khateeb M, Khader Y, Batieha A, et al. Vitamin D deficiency and associated factors in Jordan. *SAGE Open Medicine*. January 2019.
Engineering Standards to be used (if any)	*None*
• **Simulators** • **Cloud Services** • **Operating Systems**	*If Students wish to use a Cloud-AI service: AWS or Azure*

• **Software Tools or IDEs** • **Software or Hardware Programming Languages** • **Libraries/Drivers** • **Databases** • **Data Sets**	• ***For AI Engine Development:*** *Pycharm, Keras, numpy, and Tensor Flow or A Cloud-AI service* • ***For Android Application development:*** *Java, JSON, Android Studio* • ***Dataset*** *Students can research any of the dozens of food datasets available at* ***https://hackernoon.com/machine-learning-food-datasets-collection-db21e38ea225*** *They can manually add and annotate Arabic meals to the datasets*
Project Constraints, if any.	*If the students want to opt for the cloud-AI service. Depending on the cloud-service there might be some costs. Yet, Azure gives a free 100$ credit per student which can offset the cost.* *The Nutritional Value Tables might not be comprehensive for Arabic food.*
Precise Role of each Student	*I prefer my students to divide the work in between them, yet, be knowledgeable of each other's work. They must equally divide these steps in between them:* 1. *Research and Design Requirements (Functional and Qualitative) (Both)* 2. *Collecting or interfacing to services that offer ND Tables* 3. *AI development* 4. *Mobile app development* 5. *Verification and validation*
Final Deliverables	*The committee must see a mobile app that can take a real-time picture of a meal, then provide the user with the nutritional value of its content.*
Compulsory Deliverables:	**1. Project 1 Progress Report** **2. Final Documentation** **3. Presentation Slides**

For graduation project committee use (please do not write below this point):

Final Committee Decision:

☐ Approved

☐ Approved, with **minor** modifications.

☐ Approved, with **major** modifications.

☐ **Rejected**, submit new project idea.

☐ Language modifications required

	Name	Signature	Date
Chair			
Member I			
Member II			

Detailed Committee Members Remarks

	Comments	Recommendation
Chair		☐ Approved ☐ Approved, with

		<u>minor</u> modifications ☐ Approved, with **<u>major</u>** modifications ☐ **Rejected**, submit new project idea.
Member I		☐ Approved ☐ Approved, with **<u>minor</u>** modifications ☐ Approved, with **<u>major</u>** modifications ☐ **Rejected**, submit new project idea.
Member II		☐ Approved ☐ Approved, with **<u>minor</u>** modifications ☐ Approved, with **<u>major</u>** modifications ☐ **Rejected**, submit new project idea.