International Journal of Enhanced Research in Management & Computer Applications
ISSN: 2319-7471, Vol. 13 Issue 3, March, 2024, Impact Factor: 8.285

Diet Plate

Sonu S[1], Jinu Joy[2], Aparna Anilkumar[3], Abhijith R[4], Indu V Nair[5]

[1,2,3,4]UG Scholar, Department of Electronics and Communication Engineering, Dr. APJAbdul Kalam Technological University Kerala, India
[5]Assistant Professor, Department of Electronics and Communication Engineering, Dr. APJ Abdul Kalam Technological University Kerala, India

ABSTRACT

Nowadays many individuals struggle with effectively monitoring their calorie consumption, leading to challenges in achieving their health and fitness goals. This issue is particularly prevalent in today's fast paced society, where convenience foods and hectic lifestyle often make it difficult for people to maintain a balanced diet. The lack of a user-friendly and comprehensive solution exacerbate this problem, hindering individuals efforts to manage their calorie intake and make informed dietary choices. For this we are here with a solution called "DIET PLATE". The project commences with a software application designed for users to choose their preferred diet. This software will present comprehensive information, including calorie values, for all necessary food items. Subsequently it interfaces with hardware plate. This specialized plate features designated spaces for each food item and incorporate an OLED screen to visualize the percentage weight of these items. This software application diet plans, displaying the necessary calorie intake for their chosen custom details.

INTRODUCTION

A diet plate is dishware that uses technology to track your food intake and calorie consumption. The composition of a diet plate can vary based on specific diet plan. In a world where individual dietary preferences, health goals, and lifestyles choices vary significantly. It typically has a built- in weighing scale and food recognition software that can identify and weigh the food on your plate. With its ability to identify and weigh the food placed on the plate, this smart solution ensures a seamless integration of technology into everyday nutrition.

LITERATURE SURVEY

Seungheon Shin 2,Je-Hoon Lee and Seong Kun Kim **[1],** Which aims to develop a smart plate system for individuals with Type-2 Diabetes to help them effectively manage their nutrition. This innovative solution will utilize food recognition technology to identify and classify food items placed on the plate, while also providing analysis, ultimately contributing to improved health and diabetes management. The management of type 2 diabetes mellitus (T2DM) is generally not only focused on pharmacological therapy. Medical nutrition therapy is often forgotten by patients for several reasons, such as difficulty determining the right nutritional pattern for themselves, regulating their daily nutritional patterns, or even not heeding nutritional diet recommendations given by doctors. Management of nutritional therapy is one of the important efforts that can be made by diabetic patients to prevent an increase in the complexity of the disease. Setting a diet with proper nutrition will help patients manage a healthy diet. The development of Smart Plate Health to Eat is a technological innovation that helps patients and users know the type of food, weight, and nutrients contained in certain foods. This study involved 50 types of food with a total of 30,800 foods using the YOLOv5s algorithm, where the identification, measurement of weight, and nutrition of food were investigated using a Chenbo load cell weight sensor (1 kg), an HX711. The results of this study showed good identification accuracy in the analysis of four types of food: rice (58%), braised quail eggs in soy sauce (60%), spicy beef soup (62%), and dried radish (31%), with accuracy for weight and nutrition (100%).

S Veni, A Krishna Sameera, V Samuktha and R Anand **[2],** The necessity for monitoring food calorie intake is becoming imperative, in order to prevent obesity and adopt healthy food habits. This work aims in aiding dieticians, physicians, and patients to measure their daily calorie intake by manually capturing multiple fruit images and by feeding them to the calorie measurement system which utilizes Adaptive Neuro- Fuzzy Inference System (ANFIS). This classifier is used for identification and classification of fruit type. The mass of acquired fruits is estimated using image processing techniques to calculate the relative calories present, according to the food portion nutrition tables. Our system displays the type of each of the fruits present in the multiple fruit dataset, as well as their corresponding calories present in it and the total calories of fruits in the multiple fruit image. The results obtained are shown to have better calorie estimation of fruits by utilizing ANFIS classifier and color histogram feature extraction techniques.

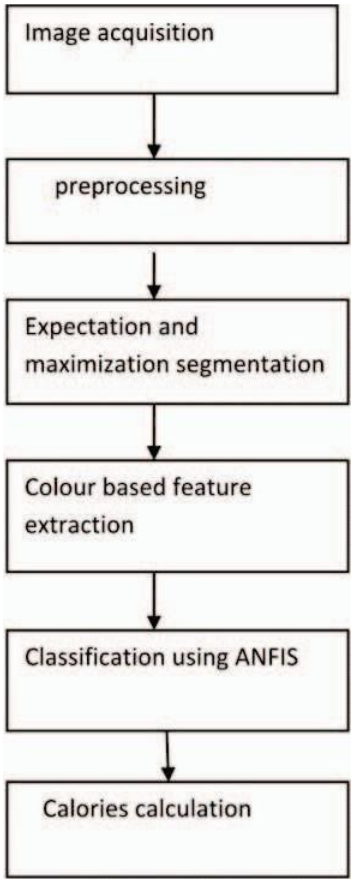

Fig 1 : Block Diagram

***Akash Digambar, Murumkar, Anamika Singh and Bhakti Rohidas Chachar* [3],** There is a growing awareness of a good lifestyle among people today. People tend to follow different diets and exercise. However, consulting a nutritionist is not for everyone. Diet Advisor is an artificial intelligence application about human nutrition. Act as a nutritionist, just like a real nutritionist. This system is very similar to that of a nutritionist. Individuals, due to busy schedules, people in the modern period are unable to focus on their welfare. As a result, a diet should be suggested to manage health. A balanced diet is required to grow. A machine with intelligence who specialises in health is called an AI nutritionist. supplies providing its consumers with a suitable diet plan based on some evaluation parameters. This AI powered technology could really create a nutrition plan that emphasises a balanced, healthy diet. Fruits, vegetables, grains, skim milk and other low- fat dairy products, beans, lean protein Meals that have been suggested by experts. However, since each user appears to have a distinctive eating intake varying medical problems, a nutritionist generates an eating plan tailored to each individual. The web-based virtual nutritionist is an artificial intelligence- powered human implementation focused on diet. It functions as a nutrition advisor, much like an actual health professional. Participants who want a nutrition plan must give different information, like their height, BMI, and work schedules.

***Wageesha, Bangamuarachchi, Anju Chamantha and Lakmal Meegahapola* [4],** While the task of automatically detecting eating events has been examined in prior work using various wearable devices, the use of smartphones as standalone devices to infer eating events remains an open issue. This paper proposes a framework that infers eating vs. non-eating events from passive smartphone sensing and evaluates it on a dataset of 58 college students. First, we show that time of the day and features from modalities such as screen usage, accelerometer, app usage, and location are indicative of eating and non-eating events. Then, we show that eating events can be inferred with an AUROC (area under the receiver operating characteristics curve) of 0.65 using subject- independent machine learning models, which can be further improved up to 0.81 for subject-dependent and 0.81 for hybrid models using personalization techniques. Moreover, we show that users have different behavioral and contextual routines around eating episodes requiring specific feature groups to train fully personalized models. These findings are of potential value for future mobile food diary apps that are context-aware by enabling scalable sensing-based eating studies using only smartphones; detecting under- reported eating events, thus increasing data quality in self report-based studies; providing functionality to track food consumption and generate reminders for on- time collection of food diaries; and supporting mobile interventions towards healthy eating practices.

Patrick McAllister, Huiru Zheng and Raymond Bond [5], Obesity is increasing globally. Obesity brings with it many

chronic conditions. There has been increasing research in the use of ICT interventions to combat obesity using food logging and image calorie analysis. These interventions allow users to document their calorie intake to help promote healthy living. However using food logs may lead to inaccurate readings as the user may incorrectly calculate portion size when recording nutritional information. This paper discusses the use of image nutritional analysis techniques to ascertain a more accurate calorie reading from photographs of food items. The methods employed involve determining a ground truth data set by correlating weight of a food item with its area in cm^2.

Wan-Jung Chang, Liang-Bi Chen and I-Chen Lin [6], This article proposes an intelligent calorie management system, named iBuffet, based on artificial intelligence over the Internet of Things (AIoT) techniques for eating buffet meals with calorie intake control. The proposed iBuffet system consists of intelligent buffet table modules, an artificial intelligence (AI) Wi- Fi base station, a mobile device application (app), and a cloud-based health management platform. The goal of the proposed iBuffet system is to improve consumer dining health through suitable calorie intake control by recording daily meals with calorie intake calculations via the proposed mobile device app. Furthermore, the related information is sent to the cloud-based platform for user health management. The experimental results show that the proposed iBuffet system can recognize 30 kinds of meals within 1 s, which can meet the requirements of actual buffet restaurants.

Junghyo Lee, Ayan Banerjee and Sandeep K. S. Gupta [7]. This article propose MT-Diet, a smartphone-based automated diet monitoring system that interfaces a thermal camera with a smartphone and identifies types of food consumed at the click of a button. The system uses thermal maps of a food plate to increase accuracy of segmentation and extraction of food parts, and combines thermal and visual images to improve accuracy in the detection of cooked food. Test results on 80 different types of cooked food show that MT-Diet can isolate food parts with an accuracy of 97.5% and determine the type of food with an accuracy of 88.93%, which is a significant improvement (nearly 25%) over the state-of-the-art.

Joseph Milazzo,Priyanka Bagade, Ayan Banerjee and Sandeep K. S. Gupta [8]. This article demonstrate bHealthy, a physiological feedback-based mobile wellness application suite. bHealthy, monitors physiological signals using electrocardiogram, electroencephalogram, and accelerometer sensors; uses a suite of assessment applications to detect mental state of the user; suggests apps to enhance wellbeing; and tracks the performance of the user in the suggested apps. bHealthy also provides wellness reports based on the user's activity in apps over a period of time.

Ayan Banerjee, Sandeep K.S. Gupta and Junghyo Lee [9]. Smart mobile medical computing systems (SMDCSes), e.g., mobile medical applications use context information from the environment to provide useful and often critical healthcare services such as continuous monitoring and control of blood glucose levels by infusion of insulin. Given the unsupervised nature of operation of SMDCS.

Analysis of SMDCSes for testing requirements violations necessitates consideration of context dependent interactions between the SMDCS software, represented by discrete operating modes and its environment, represented by non-linear partial differential equations over space and time. An intractable number of context change sequence and lack of closed form solutions to differential equations makes the requirements analysis of SMDCSes a challenging task. This paper proposes a novel technique to analyze SMDCSes taking into account the dynamic changes in the context and the constant interaction of the computing systems with the physical environment.

Stephanie E Bonn, Anna Bergström, Katarina Bälter and Olle Bälter [10], Childhood obesity is an increasing health problem globally. Obesity may be established already at pre- school age. Further research in this area requires accurate and easy-to-use methods for assessing the intake of energy and foods. Traditional methods have limited accuracy, and place large demands on the study participants and researchers. Mobile phones offer possibilities for methodological advancements in this area since they are readily available, enable instant digitalization of collected data, and also contain a camera to photograph pre- and post- meal food items. We have recently developed a new tool for assessing energy and food intake in children using mobile phones called the Tool for Energy Balance in Children (TECH).

Ye He; Chang Xu, Nitin Khanna and Carol J. Boushey [11]. This article developing a dietary assessment system that records daily food intake through the use of food images taken at a meal. The food images are then analyzed to extract the nutrient content in the food. In this paper, we describe the image analysis tools to determine the regions where a particular food is located (image segmentation), identify the food type (feature classification) and estimate the weight of the food item (weight estimation). An image segmentation and classification system is proposed to improve the food segmentation and identification accuracy. We then estimate the weight of food to extract the nutrient content from a single image using a shape template for foods with regular shapes and area-based weight estimation for foods with irregular shapes.

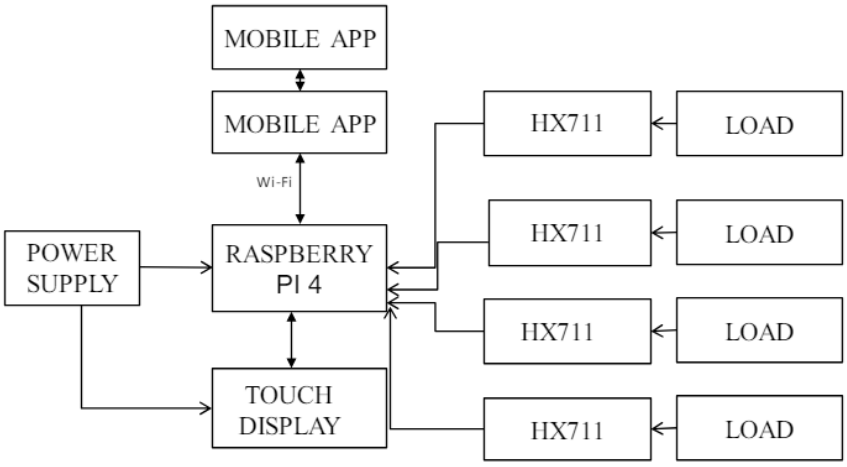

Fig 2: Block diagram

PAPER COMPARISON		
AUTHOR & DATE	**PURPOSE**	**DIFFERENCES**
Seungheon Shin 2,Je-Hoon Lee and Seong Kun Kim	The Smart Plate Health to Eat system—an innovative solution designed to assist individuals with Type-2 Diabetes in effectively managing their nutrition.	The presented results indicate promising outcomes, particularly in food identification, weight measurement, and nutritional analysis. The primary objective is to position the Smart Plate Health to Eat as a userfriendly, innovative tool that could significantly contribute to enhanced health and improved management of Type-2 Diabetes.
S Veni, A Krishna Sameera, V Samuktha and R Anand	The necessity for monitoring food calorie intake is becoming imperative, to the calorie measurement system which utilizes Adaptive Neuro- Fuzzy Inference System (ANFIS).	The work aims to assist dieticians, physicians, and patients in measuring daily calorie intake using an Adaptive Neuro-Fuzzy Inference System (ANFIS) and image processing techniques. It specifically focuses on identifying and classifying fruit types and estimating fruit mass for precise calorie calculation based on food portion nutrition tables.
Akash Digambar, Murumkar, Anamika Singh and Bhakti Rohidas Chachar	The purpose of the provided information is to introduce and emphasize the relevance of the Diet Advisor, an artificial intelligence application serving as an AI nutritionist.	The introduction of the Diet Advisor AI application. It highlights the application's role as an AI nutritionist catering to modern lifestyles, suggesting balanced diet plans based on evaluation parameters and promoting overall health. focusing on introducing the Diet Advisor as an AI nutritionist to address the challenges of consulting traditional nutritionists.
Wageesha, Bangamuarachchi, Anju Chamantha and Lakmal Meegahapola	The primary objectives include highlighting the indicative features for eating and non-eating events, demonstrating machine.	The use of smartphones as standalone devices for inferring eating events, addressing a gap in prior research. The proposed fra work is evaluated on a dataset of college students, demonstrating its effectiveness and potential applications in contextaware food diary apps and interventions for healthy eating practices.
Patrick McAllister, Huiru Zheng and Raymond Bond	The limitations of traditional food logging methods and introduces the use of image nutritional analysis techniques.	The global increase in obesity, the utilization of ICT interventions for combating it, and the limitations of food logging. The primary focus is on the introduction of image

		nutritional analysis techniques, with a specific method involving the creation of a ground truth dataset.
Wan-Jung Chang, Liang-Bi Chen and I-Chen Lin	Artificial Intelligence over the Internet of Things (AIoT) techniques, aims to control calorie intake during buffet meals.	An intelligent calorie management system using AIoT techniques for controlling calorie intake during buffet meals. The components, objectives, and experimental results of the iBuffet system are outlined. the purpose of introducing iBuffet to improve consumer dining health by managing calorie intake during buffet meals.

CONCLUSION

In conclusion, Smart plates have the potential to be a valuable tool for people who are looking to improve their diet and overall health. They can provide more accurate calorie tracking, increased awareness of eating habits, and convenience. The transformative impact of Smart Plates extends far beyond conventional dishware. With the potential to revolutionize dietary habits and enhance overall well-being, these intelligent companions emerge as invaluable tools for those on a journey to improve their health. Through their ability to deliver precise calorie tracking, foster heightened awareness of eating habits, and offer unparalleled convenience, Smart Plates usher in a new era of health-conscious living. By seamlessly integrating technology into the dining experience, they empower individuals with real- time insights and personalized feedback, transforming the way we approach nutrition. Their precise calorie tracking capabilities provide users with a data- driven understanding of their dietary intake, enabling more informed decision- making. This, coupled with the ability to cultivate a heightened awareness of eating habits, contributes to a more mindful and intentional approach to nutrition. By offering real-time insights into portion sizes, nutritional content, and meal patterns, Smart Plates empower individuals to make healthier choices, facilitating long-term positive changes in lifestyle.

REFERENCES

[1]. D. Santani, T.-M.-T. Do, F. Labhart, S. Landolt, E. Kuntsche, and D. Gatica-Perez, ‘‘DrinkSense: Characterizing youth drinking behavior using smartphones,’’ IEEE Trans. Mobile Comput., vol. 17, no. 10, pp. 2279–2292, Oct. 2018.

[2]. T. Rahman, M. Czerwinski, R. Gilad-Bachrach, and P. Johns, ‘‘Predicting ‘about- to-eat’ moments for just- in-time eating intervention,’’ in Proc. 6th Int. Conf. Digit. Health Conf., New York, NY, USA, 2016, pp. 141–150.

[3]. J. Milazzo, P. Bagade, A. Banerjee and S. K. S. Gupta, "bhealthy: A physiological feedback-based mobile wellness application suite", Proceedings of the 4th Conference on Wireless Health ser. WH '13, pp. 14:1-14:2, 2013.

[4]. A. Banerjee and S. Gupta, "Analysis of smart mobile applications for healthcare under dynamic context changes", Mobile Computing IEEE Transactions, vol. 14, no. 5, pp. 904- 919, May 2015.

[5]. H. Henriksson, S. E. Bonn, A. Bergström, K. Balter, O. Bälter, C. Delisle, et al., "A new mobile phone-based tool for assessing energy and certain food intakes in young children: A validation study", JMIR mHealth and uHealth, vol. 3, no. 2, 2015.

[6]. Y. He, C. Xu, N. Khanna, C. J. Boushey and E. J. Delp, "Food image analysis: Segmentation identification and weight estimation", Multimedia and Expo (ICME) 2013 IEEE International Conference, pp. 1-6, 2013.

[7]. S. Yang, M. Chen, D. Pomerleau and R. Sukthankar, "Food recognition using statistics of pairwise local features", Computer Vision and Pattern Recognition (CVPR) IEEE, pp. 2249-2256, 2010.

[8]. P. Pouladzadeh, P. Kuhad, S. V. B. Peddi, A. Yassine and S. Shirmohammadi, "Mobile cloud based food calorie measurement", Multimedia and Expo Workshops (ICMEW), pp. 1-6, 2014.

[9]. N. Dalal and B. Triggs, "Histograms of oriented gradients for human detection", Computer Vision and Pattern Recognition. CVPR, vol. 1, pp. 886-893, 2005.

[10]. B. S. Manjunath and W.-Y. Ma, "Texture features for browsing and retrieval of image data", Pattern Analysis and Machine Intelligence IEEE Transactions, vol. 18, no. 8, pp. 837-842, 1996.