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WEB-BASED CALORIE INFORMATION SYSTEM

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ABSTRACT

The Calorie Information System is a web-based system for a dietetic monitoring and assessment of calculating and controlling the amount of calories taken per day by the user. In this system, the measurement device is developed to measure user's height and weight before the system displays the Body Mass Index (BMI), the Basal Metabolic Rate (BMR), and the amount of calories that should be taken based on a daily basis to the user. The amount of calories will be computed by the system is considering several factors; i.e. age, individual activity and gender of the users. In contrast, the calories consumed by the users will automatically calculate based on the type of food and drinks taken on that particular day. As a result, users can indirectly regulate excessive calorie intake on a daily basis by differentiating the calories required. The entire user's information is stored in the database server, which are able to be accessed every day. In addition, the health information is also provided in the system as well as an additional knowledge for the user to overcome any problem related to obesity and diet control. Thus, this system offers an alternative method to control calories in their daily life, therefore, reduce an obesity problem and improve the quality of human life.

Keywords: calorie control, height and weight monitoring, body mass index, basal metabolic rate.

INTRODUCTION

In recent years, obesity is considered as one of the most serious issues around the world especially in developed and developing countries. Furthermore, obesity is among the leading preventable cause of death worldwide, with increasing rates in adults and children. In Malaysia, 4.4 million Malaysians are found obese based on the public report (Ismail, 2013).

Obesity is a medical condition that is associated with having an excess of body fat that it may have a negative effect on health, this situation relates to the dietary patterns among people, especially with the influx of fast and instant food products and unhealthy lifestyle. This contributes to an increase in obesity cases and also leads to an increase in disease, particularly heart disease, blood circulation and diabetes. Moreover, the lack of awareness of Body Mass Index (BMI) and Basal Metabolic Rate (BMR) cause people do not care about their weight status in either body weight is ideal, overweight or obese.

Thus far, there are many systems that have been developed to prevent obesity. For instance, Shimada *et al.* (2006) developed the dietary menu generating system to promote healthy life. Lopes *et al.* (2011) developed a mobile health application for obesity prevention named as Sapofitness. Based on two vital parameters; the user Personal Health Record (PHR) of its daily food intake and physical activity, the system is able to evaluate the user nutritional state. This application is not only supports continuous user monitoring, but it also sends some sort of notification message to the user concerning his/her diet program. Thus, by delivering the action to the user, it will automatically motivate him for a healthier lifestyle. Kato *et al.* (2012) developed a web system that helps the users to monitor their daily activities and provide suggestions for healthy lifestyle.

Hence, this paper presents the development of web-based Calorie Information System that provides information on calories that have been taken per day by the user. The system is able to calculate the calories based on the user's weight and height, daily food intake and individual activities. By connecting the application to the internet and a web service, users are able to access the web of the system anytime and anywhere surpassing geographical and even temporal barriers. Therefore, the system is expected to help people as an early prevention indicator for an obesity disease.

The paper is organized as follows. The development of the system is explained in section 2. Results are discussed in section 3. Concluding remarks and future works are drawn in section 4.

SYSTEM DEVELOPMENT

The web-based Calorie Information System consists of a measurement unit, a microcontroller, an offline calorie calculator, a database server, and an online calorie information system. Figure-1 shows the architecture of the proposed system.

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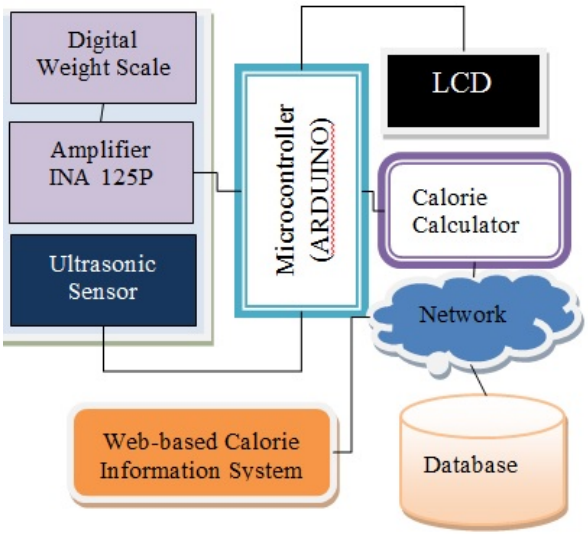

Figure-1. Architecture of proposed system.

The measurement unit comprises of a digital weight scale, and an ultrasonic sensor (Figure-2). The digital weight scale is configured to connect to an amplifier INA 125P before connecting to the Arduino microcontroller. The digital scale reads the user's weight; meanwhile the ultrasonic sensor reads the user's height. The readings are transferred to the Calorie Calculator via USB cable before save the record in the database server. The readings of user's height and weight are also displayed on the LCD. Therefore, if the measurement unit is not connected to the Calorie Calculator, the user is still able to obtain the readings via the LCD. The system is also designed to allow the user to enter the height and weight via keyboard. This is because this information is crucial to calculate every day amount of calories that should be taken, the Body Mass Index (BMI), and the Basal Metabolic Rate (BMR).

The calculation also considers a factor of age, individual activities and gender. In contrast, the calories consumed by the users will automatically calculate based on the type of foods and drinks which have been chosen by the users. Instead of that, the type of foods in the system can also be maintained by the user. Then, the entire user's data will be stored in the database server. The information stored in the database can be viewed via the Calorie Calculator and the web-based Calorie Information System. The web-based Calorie Information System offers more function compared with the Calorie Calculator. Beside the information on user's calorie intake, the web-based system also contains health information which consists of advice, tips and other related health information.

RESULTS AND DISCUSSIONS

Figure-2 shows the measurement unit that able to read the user's height and weight. The Calorie Calculator is a graphical user interface (GUI) to display the height and weight obtain from the measurement unit, if it is connected. It is also designed to allow the user to enter the value of height and weight via keyboard. This information can be stored in the database server by pressing the Update button (Figure-3). The Read button is used to retrieve user's information from the database based on user id.

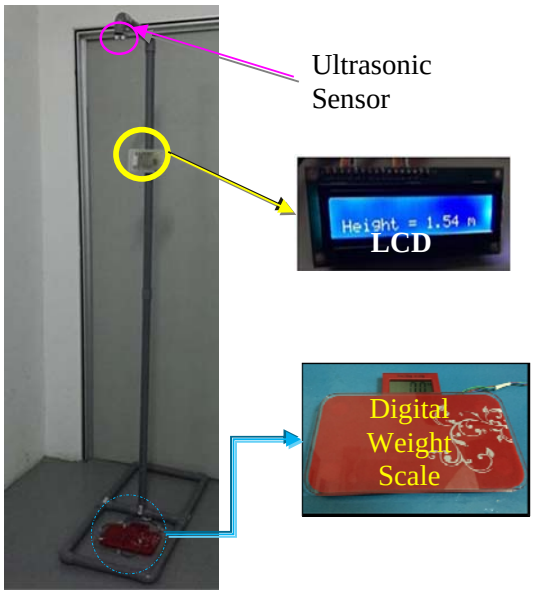

Figure-2. Prototype of measurement unit.

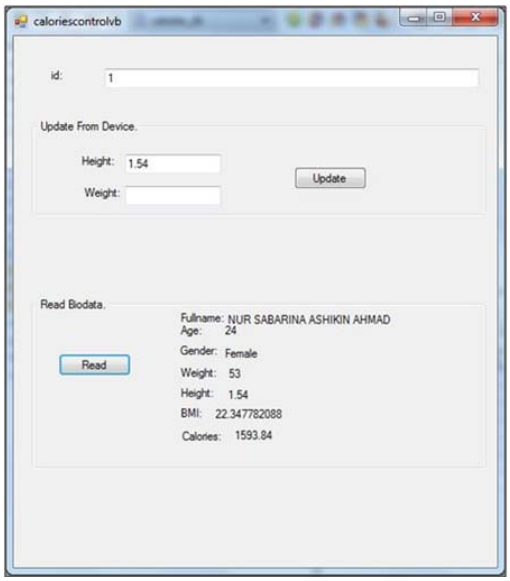

Figure-3. GUI of calorie calculator.

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Figure-4 shows a database called calories_db to store all the information regarding the user's personal information (table of biodata_db), list of meals (table of foods), list of authorized users (table of loginid), list of suggested food (table of suggestion), and details of calories taken (table meal_type, user_date, and user-meals). Figure-5 shows an example of the user's personal information in the database.

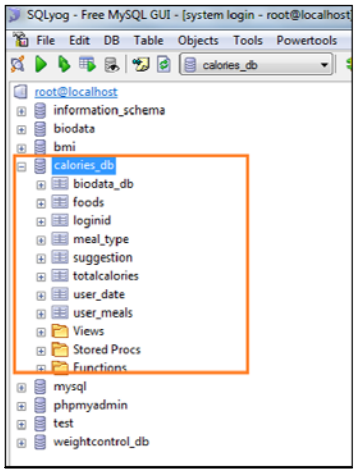
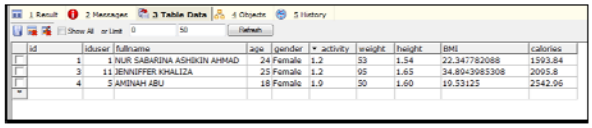


Figure-4. Database of the proposed system.



id	iduser	fullname	age	gender	activity	weight	height	BMI	calories
1	1	NUR SABARINA ASHIKIN AHMAD	24	Female	1.2	53	1.54	22.347782088	1593.84
3	11	JENNIFFER KHALIZA	25	Female	1.2	95	1.65	34.894985308	2095.8
4	5	AMINAH ABU	18	Female	1.9	50	1.60	19.53125	2542.06

Figure-5. Registered user in the database.

Once the user successfully accesses the system, there will be two option buttons appear on the web page; Personal Information, and Calories Diary. The Personal Information button links the user to the Graphical User Interface (GUI) as shown in Figure-6. In order to calculate user's BMI and save the records in the database server, the Calculate and Save button should be clicked. This information is important to provide an accurate amount of calories needed every day.

The Calories Diary allows the user to enter the menu that has been taken on that particular day as shown in Figure-7.

Figure-8 shows the system displays the calculated calories in drinks that have been selected by the user.

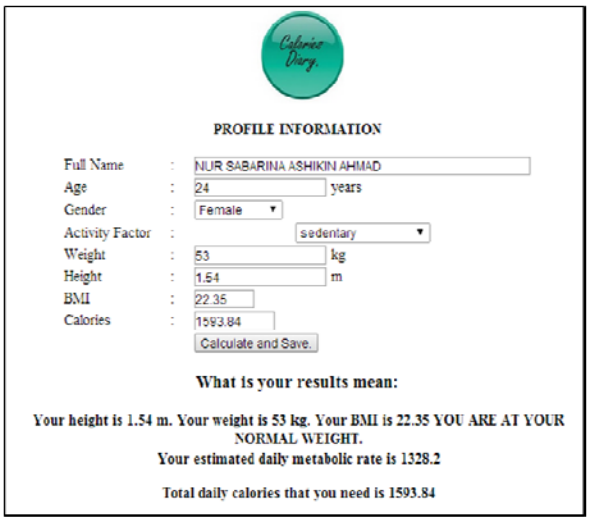


Figure-6. Personal information.

Figure-7. List of menu available in the system.

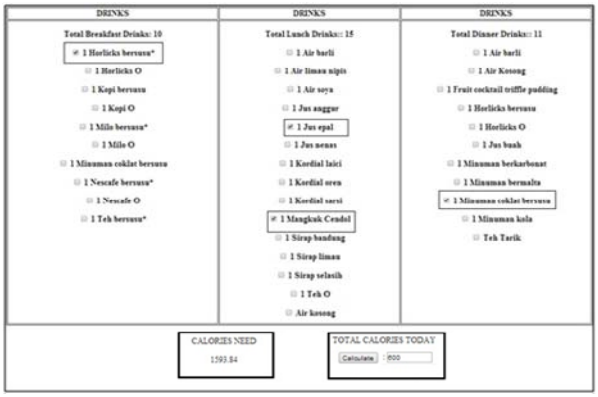


Figure-8. Calculated calorie based on selected drinks.

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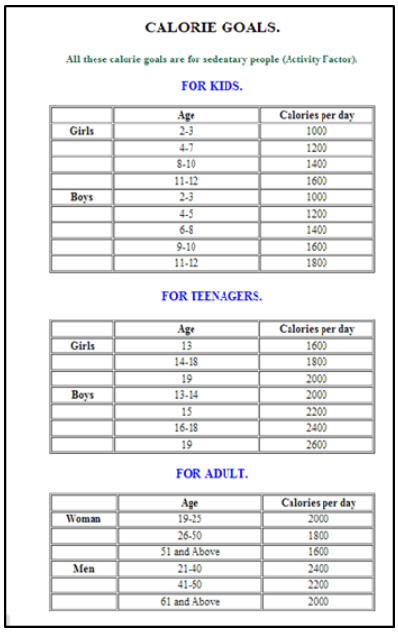
Besides the calorie calculator, the proposed system provides suggestion on dietary information at Calorie Goals link. The Calorie Goals provide information on the amount of calories that should be taken on a daily basis for kid, teenager, and adult with respect to the different age and gender as shown in Figure-9.

The system also provides another link to a web page called Advice as shown in Figure-10. The Advice contains useful tips on solving problems related to obesity and diet control. By providing this information, it is a hope that the users can apply the knowledge to maintain a good health.



CALORIE GOALS.

All these calorie goals are for sedentary people (Activity Factor).

FOR KIDS.

	Age	Calories per day
Girls	2-3	1000
	4-7	1200
	8-10	1400
	11-12	1600
Boys	2-3	1000
	4-5	1200
	6-8	1400
	9-10	1600
	11-12	1800

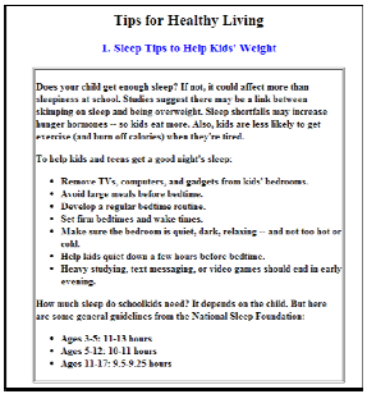
FOR TEENAGERS.

	Age	Calories per day
Girls	13	1600
	14-18	1800
	19	2000
Boys	13-14	2000
	15	2200
	16-18	2400
	19	2600

FOR ADULT.

	Age	Calories per day
Woman	19-25	2000
	26-50	1800
	51 and Above	1600
Men	21-40	2400
	41-50	2200
	61 and Above	2000

Figure-9. Calorie goals based on age, gender and user's activity.



Tips for Healthy Living

1. Sleep Tips to Help Kids' Weight

Does your child get enough sleep? If not, it could affect more than sleepiness at school. Studies suggest there may be a link between skimping on sleep and being overweight. Sleep shortfalls may increase hunger hormones -- so kids eat more. Also, kids are less likely to get exercise (and burn off calories) when they're tired.

To help kids and teens get a good night's sleep:

- Remove TVs, computers, and gadgets from kids' bedrooms.
- Avoid large meals before bedtime.
- Develop a regular bedtime routine.
- Set firm bedtimes and wake times.
- Make sure the bedroom is quiet, dark, relaxing -- and not too hot or cold.
- Help kids quiet down a few hours before bedtime.
- Heavy studying, text messaging, or video games should end in early evening.

How much sleep do schoolkids need? It depends on the child. But here are some general guidelines from the National Sleep Foundation:

- Ages 3-5: 11-13 hours
- Ages 5-12: 10-11 hours
- Ages 11-17: 8.5-9.25 hours

Figure-10. Advices web page.

Figure-11 shows three buttons that provide three types of calculator available in the system. The BMI calculator button is used to calculate the user's BMI. The BMR calculator button is used to calculate the user's BMR. Both GUI for the calculators is shown in Figure-11. Meanwhile, the GUI for the Calories Calculator is shown in Figure-8.

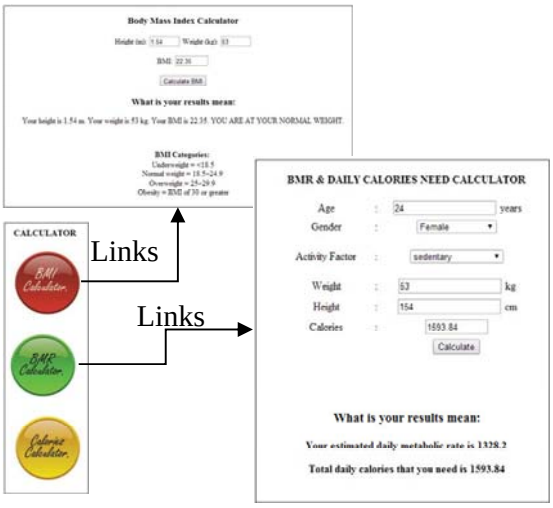


Figure-11. Calculator web page.

CONCLUSION AND FUTURE WORK

In this study, the amount of calories for each registered user has successfully calculated based on height, weight, daily food intake, and individual daily activities. Based on this system, users can indirectly regulate excessive calorie intake on a daily basis by differentiating the calories required. It also allows the user to get the ideal body weight and can reduce weight for users experiencing excess weight or obesity.

In future, the system will be improved by adding more information of the users in terms of heart rate and level of fat in the body, so that the calculation and obesity identification can be done precisely. It will be more beneficial if this system is developed as a smartphone application.

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