

# Motion Detection and Sound Effect Game for Daily Jogging

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**Abstract.** The benefits of daily jogging are already proved by many researchers. But, it is challenging to get people to keep working out. We made a motion detection and sound effect based game *-Escape Runner: Junk Buster-* to make more fun and interesting daily jogging. The game will add fun into exercise, helping the user to lose body fat and maintain good health. Because *Escape Runner* provides auditory information rather than visual information, it reduces the risk of accidents caused by inattention. The level of intensity is determined based on the individual's BMI (Body Mass Index), calculated using one's height and weight, and the intensity of the exercise increases appropriately as the user proceeds through the stages, while the user's fitness also gradually improves. The sound of junk food monsters attacking from every side makes the user feel as if they are in the virtual gaming space, which in turn increases absorption in the game and makes the exercise more effective. And the sound of junk foods comically rushing to provide entertainment, which even small children can experience. Although it is not visual, one can experience thrilling by dodging the junk foods rushing in through sound. The user will face increasing levels of difficulty according to the 8 week jogging program. The user will soon find himself in a much healthier shape. The final score can be uploaded online to share with friends. The user can compete with friends to see who has the highest score. Goal of *Escape Runner* is to complete all the courses of the 8-Week Beginner's Program. This method was proven by many other research. And *Escape Runner: Junk Buster* has been entered a competition *Game 4 Health 2015* in Utah.

**Keywords:** Game · Jogging · Smartphone · Health

## 1 Introduction

A sound-based game system is rather incorporated into the dull process of jogging, making jogging more fun and interesting. The game will add fun into exercise, helping the user to lose body fat and maintain good health. Because it provides auditory information rather than visual information, it reduces the risk of accidents caused by inattention. The level of intensity is determined based on the individual's BMI (Body Mass Index), calculated using one's height and weight, and the intensity of the exercise

increases appropriately as the user proceeds through the stages, while the user's fitness also gradually improves. Each time a target score is reached, the user can proceed upwards in the ranking system, and soon the user will find themselves in a much healthier shape. In addition, the game can be connected with an SNS to compete with friends.

## 2 Previous Study

Our work was motivated by *Shake It Up: Exercise Intensity Recognizing System*. It is smartphone-based exercise intensity recognizing system that we made for the HCI International poster session. After finishing our work, we focused on making exercise game with these materials. However, there are several similar ideas already in the market. We develop and use a surround sound based motion detecting system.

## 3 Design and Implementation

Our goal of the game is using surround sound system to fill like Junk foods are rushing into the user. The user must run away from the attack of junk foods coming in from all sides like a swarm of bees. The final goal of this game is to jog in order to run away from the attack of the junk foods sound. When attacked by junk food, fat point is accumulated in the body, and the fat can be removed through a given mission.

### 3.1 Design

We use *The 8-Week Beginner's Program* by *Runner's World*. It is one of the most common and effective way to keep healthy (Table 1).

We have 8 enemies expended upon junk food. Each character has taken off the original snacks name. Russian character MMM is Chocolate, Japanese character Kendai Suitsu is Candy, American character Pop C is Coke, Argentinian Springle Rays is Potato Chip. And there is also ice cream, Ruskin Barbars (US), Doughnut, Mrs. Dounafire (Netherlands), Pizza, Papa Domingo Jonhnes (Italy), and hamburger, Buggie Kim (Fig. 1).

The *ER: Junk Buster* is an iOS8-based application that can be used on the iPhone. We used smartphone gyroscope sensor to detect the swing of the arm same as our previous work *Shake it up* [2]. This algorithm is measuring man's movement similar to the pedometer. It is a device that counts each step a person takes by detecting the motion of the person's body. Our goal is detecting the moment of the motion and reflecting the game situation (Fig. 2).

**Table 1.** The 8-Week Beginner’s Program by Runner’s World [1]

Wk	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
1	Run & Walk	Walk	Run & Walk	Walk	Run & Walk	Run & Walk	Rest
	Run 1 min	Walk easy 30 min	Run 1 min	Walk easy 30 min	Run 1 min	Run 1 min	
	Walk 2 min		Walk 2 min		Walk 2 min	Walk 2 min	
Repeat 10X		Repeat 10X		Repeat 10X		Repeat 10X	
2	Run & Walk	Walk	Run & Walk	Walk	Run & Walk	Run & Walk	Rest
	Run 2 min	Walk easy 30 min	Run 3 min	Walk easy 30 min	Run 4 min	Run 4 min	
	Walk 1 min		Walk 1 min		Walk 1 min	Walk 1 min	
	Repeat 10X		Repeat 7X		Repeat 6X	Repeat 6X	
		Run 2 min					
3	Run & Walk	Walk	Run & Walk	Walk	Run & Walk	Run & Walk	Rest
	Run 5 min	Walk easy 30 min	Run 5 min	Walk easy 30 min	Run 6 min	Run 6 min	
	Walk 1 min		Walk 1 min		Walk 1 min	Walk 1 min	
	Repeat 5X		Repeat 5X		Repeat 4X	Repeat 4X	
				Run 2 min	Run 2 min		
4	Run & Walk	Walk	Run & Walk	Walk	Run & Walk	Run & Walk	Rest
	Run 8 min	Walk easy 30 min	Run 9 min	Walk easy 30 min	Run 10 min	Run 11 min	
	Walk 1 min		Walk 1 min		Walk 1 min	Walk 1 min	
	Repeat 3X		Repeat 3X		Repeat 2X	Repeat 2X	
				Run 8 min	Run 6 min		
5	Run & Walk	Walk	Run & Walk	Walk	Run & Walk	Run & Walk	Rest
	Run 12 min	Walk easy 30 min	Run 13 min	Walk easy 30 min	Run 14 min	Run 15 min	
	Walk 1 min		Walk 1 min		Walk 1 min	Walk 1 min	
	Repeat 2X		Repeat 2X		Repeat 2X	Run 14 min	
		Run 2 min					
6	Run & Walk	Walk	Run & Walk	Walk	Run & Walk	Run & Walk	Rest
	Run 16 min	Walk easy 30 min	Run 17 min	Walk easy 30 min	Run 18 min	Run 19 min	
	Walk 1 min		Walk 1 min		Walk 1 min	Walk 1 min	
Run 13 min		Run 12 min		Run 11 min	Run 10 min		
7	Run & Walk	Run & Walk	Run & Walk	Walk	Run & Walk	Run & Walk	Rest
	Run 20 min	Run 20 min	Run 22 min	Walk easy 30 min	Run 24 min	Run 26 min	
	Walk 1 min	Walk 1 min	Walk 1 min		Walk 1 min	Walk 1 min	
Run 9 min		Run 9 min	Run 7 min	Run 5 min		Run 3 min	
8	Run & Walk	Walk	Run & Walk	Walk	Run & Walk	Run & Walk	Rest
	Run 27 min	Run 20 min	Run 28 min	Walk easy 30 min	Run 29 min	Run 30 min	
	Walk 1 min	Walk 1 min	Walk 1 min		Walk 1 min		
Run 2 min		Run 9 min	Run 1 min				



**Fig. 1.** 8 enemies from *ER: Junk Buster*



**Fig. 2.** User can play *ER: Junk Buster* both indoor and outdoor [3]

### 3.2 Scenario

The sound of junk foods attacking from every side makes the user feel as if they are in the virtual gaming space, which in turn increases absorption in the game and makes the exercise more effective. The final score can be uploaded online to share with friends. The user can compete with friends to see who has the highest score.

The sound of junk foods comically rushing in provides entertainment, which even small children can experience. Although it is not visual, one can experience thrilling by dodging the junk foods rushing in through sound.

Because the user must jog while playing the game, without knowing, the user will soon find themselves in a much healthier shape. The user will face increasing levels of difficulty according to the 8-week jogging program. User can build themselves to dodge the incoming rush of junk foods becoming stronger every stage. The game applies a system that recognizes body motion using smartphone sensors.

## 4 Evaluation and Conclusion

A free trial version of *Escape Runner: Junk Buster* will first be made available on the Apple appstore to increase brand recognition among users. Afterwards, a paid pro-version will be released with newly added features, and the revenue generated from the

pro-version will become the main source of revenue. The pro-version will not only measure walking speed and the number of steps, but it will also have features that measure ECG and EMG by coupling with Smart Band, which allows us to collect medical data. An Item Market will be added, where users can buy add-in features such as tracking oxygen consumption through sensors, which will make additional profits. As a result, users will be able to obtain various data, and by presenting a detailed explanation of the changes in the users' body in objective measures, we will be able to provide reliability to the users. Furthermore, a millage system will be available, and when the users play the game and reach a certain level, health food discount coupons will be issued. Some examples of healthy food would be tea, salad, nuts, and fruit, which are desserts that are low in fat and high in nutrition. We will generate additional profit from commission on the sales in health food franchises. Lastly, cute characters appearing in the app will later be made into animation, or made into figures, cups, and plates through 3D printing, available for purchase.

## References

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