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TTO

RESEARCH REPORT UMP GRANT
Laporan Prestasi Skim Geran UMP

Universiti Malaysia PAHANG

Final	/	Progress		Progress Period : _____	√ Please tick

PROJECT DETAILS *(Keterangan Projek)*

A		
Grant No	UIC180903
Faculty/CoE	FTKMA
Project Title	BADMINTON AGILITY TRAINING DEVICE
Project Leader	Mohd Hasnun Arif Bin Hassan (01776)
Project Member	1. MUHAMMAD AIZZAT BIN ZAKARIA (01741) 2. MUHAMMAD AMIRUL BIN ABDULLAH (F0214) 3. ANWAR BIN P.P. ABDUL MAJEED (01893)

PROJECT ACHIEVEMENT *(Pencapaian Projek)*

B

ACHIEVEMENT PERCENTAGE				
Project progress according to milestones achieved up to this period	0 - 25%	26 - 50%	51 - 75%	76 - 100%
Percentage (please state %)				/

EXPENDITURE *(Perbelanjaan)*

C

Budget Approved *Peruntukan diluluskan*	**Amount Spent** *Jumlah Perbelanjaan*	**Balance** *Baki*	**% of Amount Spent** *Peratusan Belanja*
RM 20,000	RM 19,870	RM 130	99.35 %

RESEARCH OUTPUT *(Output Penyelidikan)*

D

NO OF PUBLICATION

KPI FOR NO OF PUBLICATION				
	ISI	Scopus	Index Proceedings	Others
KPI				
Achievement				

The contribution of funder (UMP, MOHE, MOSTI, Industry etc.) as the fund provider must be acknowledged at all times in all forms of publications. Please state the grant number (RDU/UIC) and grant name.

Number of articles/ manuscripts/books (Please attach the First Page of Publication)	ISI	Scopus
	1. 2.	1. 2.

Conference Proceeding (Please attach the First	International	National

Page of Publication)	1. 2.		1. 2.	

HUMAN CAPITAL DEVELOPMENT

KPI FOR HUMAN CAPITAL DEVELOPMENT

KPI	PhD Student	Master Student
Achievement		

Human Capital Development	Number				Others (please specify)
	On-going		Graduated		
Citizen	Malaysian	Non Malaysian	Malaysian	Non Malaysian	
PhD Student					
Masters Student					
Undergraduate Student					
Total					

Name of Student:
ID Matric No:
Faculty:
Thesis title:
Graduation Year:

Name of Student:
ID Matric No:
Faculty:
Thesis title:
Graduation Year:
** enter for more space

INTELECTUAL PROPERTIES

KPI FOR INTELECTUAL PROPERTIES
Patent, Copyright, Trademark,Industrial Design: _____

Patent, Copyright, Trademark, Industrial Design ect	

OTHERS

KPI FOR OTHERS
Prototype, Technology,Collaborations etc: _____

Prototype, Technology, Collaborations etc	**A prototype of Badminton Agility Device**

ASSET (Aset)

E	Bil	Peralatan (Equipment)	Model	No Daftar Aset (Asset Tagging No)	Amount (RM)	Lokasi (Location)

PRODUCT DESCRIPTION FOR UMP R&D DIRECTORY (SHORT & BRIEF) *Only for Final Report*

F

This project aims to develop an electronic device for badminton agility training. The idea is to replace the current footwork shadow training in badminton, which normally requires a coach to stand in front of the court and give instructions to the players to move randomly to 6 edges of the court, as shown in the following figure:


Base Point
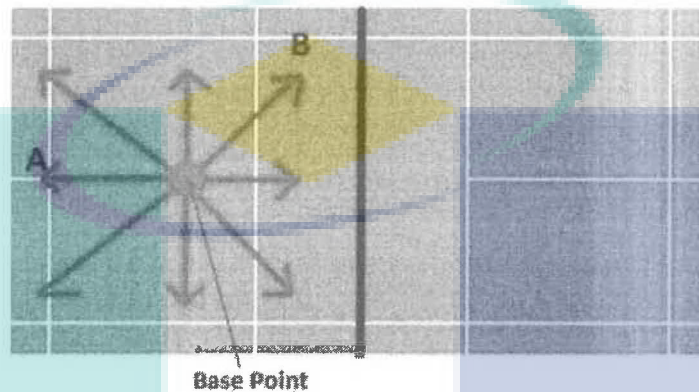
In this new era of Industrial Revolution 4.0, it is best to replace the need of a coach with an intelligent device. This will allow the players to train on their own, as well as monitor their performance through the mobile application.

The Badminton Agility Device comprises of 6 units to be placed on 6 edges on the badminton court. The device consists of an ultrasonic sensor to sense the player, an LED light and a buzzer to notify the player which unit they should approach, and a Bluetooth module to communicate between all 6 units and an Android smartphone. All of these sensors are connected to an Arduino Pro-Mini microcontroller. Each unit is powered on using a Lithium-Polymer battery.

In addition to the 6 units, an Android application was also developed as the control centre of the device. The time which a player takes approach one unit to another is recorded in the mobile application and can be downloaded in form of spreadsheet for further analysis.

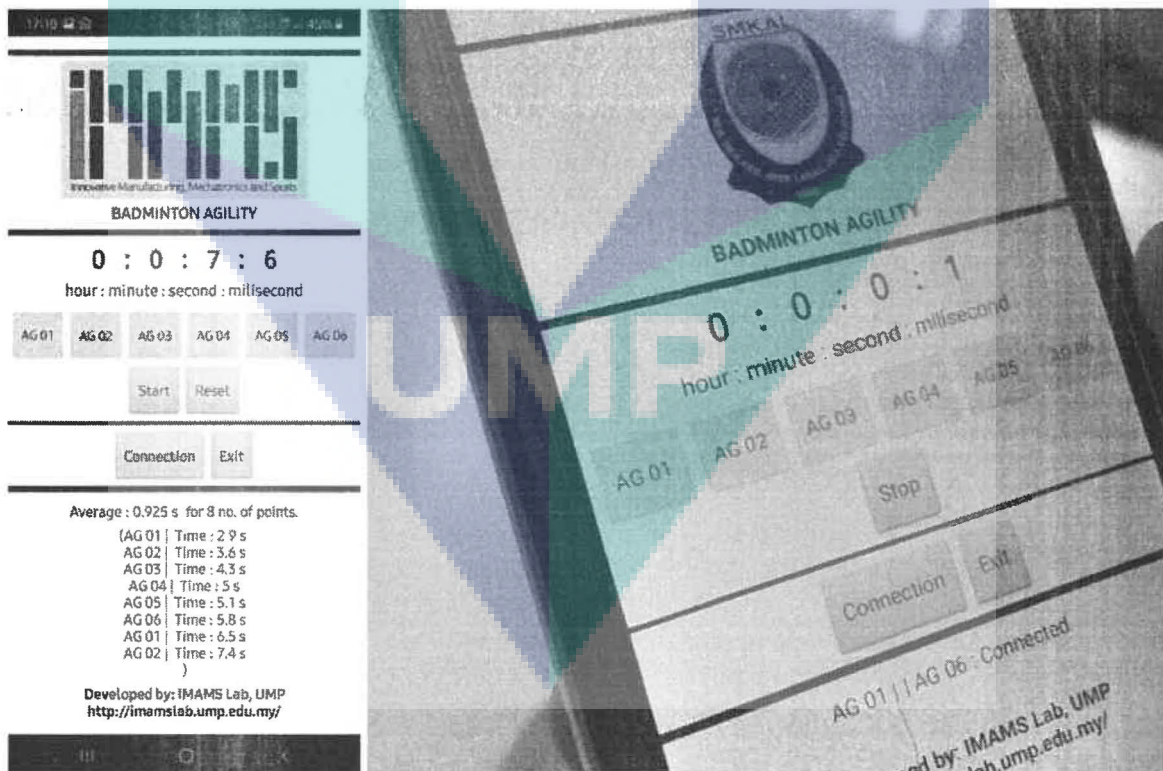## PRODUCT PICTURE FOR UMP R&D DIRECTORY *Only for Final Report*

G
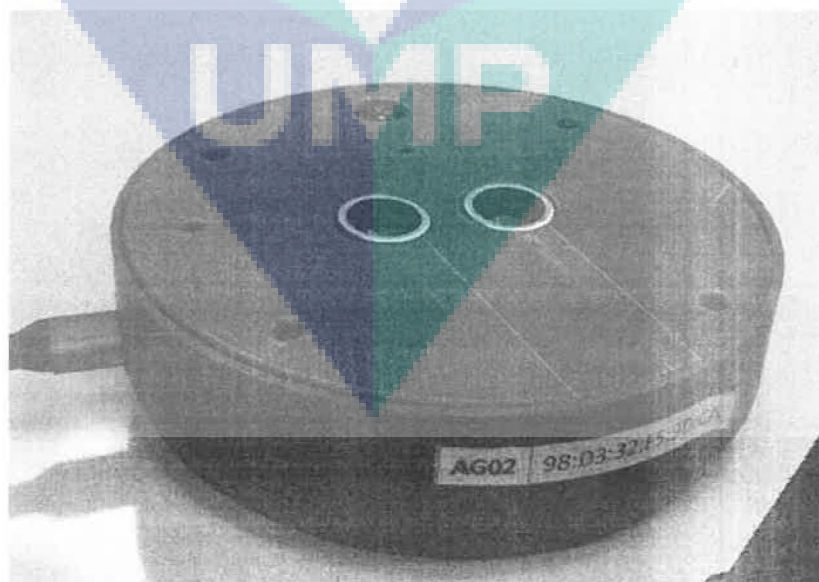
The casing of the unit is made of ABS plastic and produced using 3D printer.
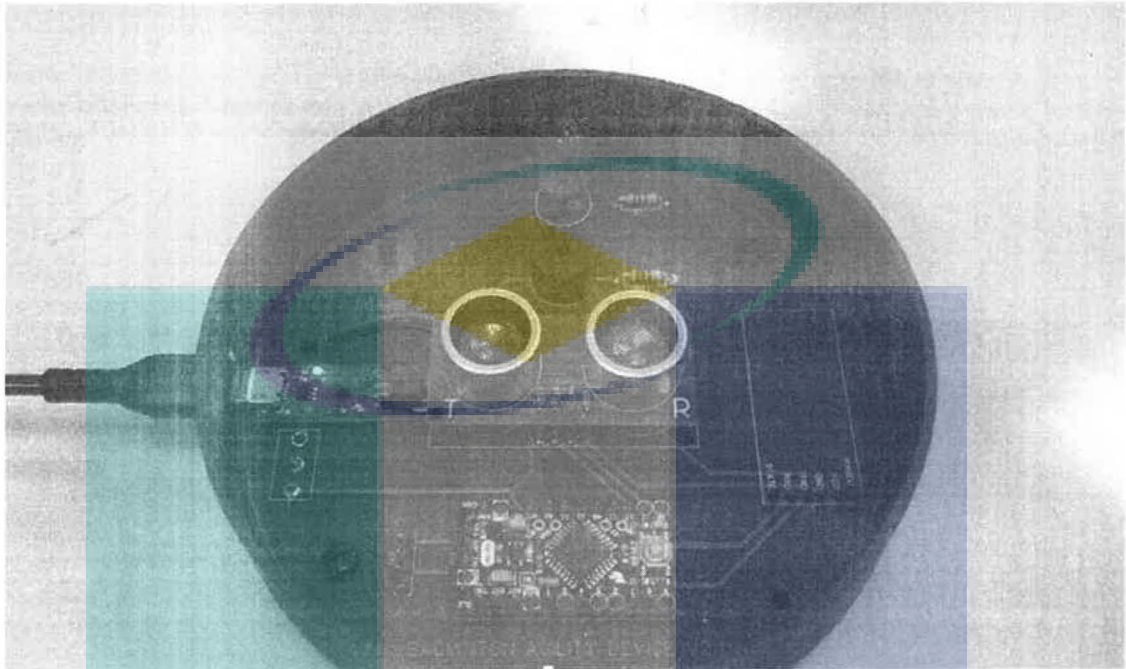
Inside each unit, there is a custom-made printed circuit board (PCB) with UMP logo. All electronics components are soldered on this PCB. Using PCB eliminates the use of jumper wire, thus provides a clean and professional look.

The mobile application is used to connect and operate all 6 units of the device.

SUMMARY OF RESEARCH FINDINGS *(Ringkasan Penemuan Projek Penyelidikan)*

H	
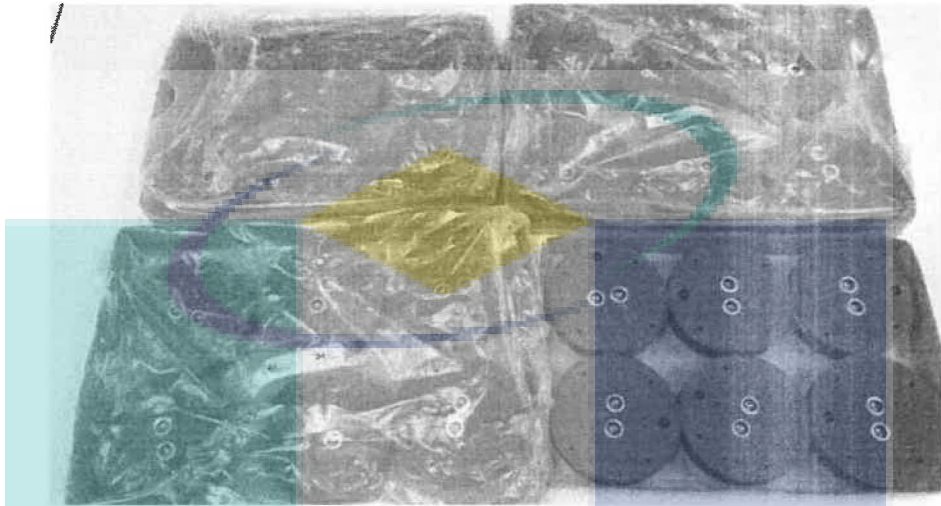
The project has been successfully conducted. 4 sets of the agility training device (each set = 6 units) were successfully developed. We have also discussed with the Pejabat Pendidikan Daerah (PPD) Pekan to deliver 2 units to selected schools in Pekan to be used by their district badminton players.

PROBLEMS / CONSTRAINTS IF ANY *(Masalah/ Kekangan sekiranya ada)*

I	

A discussion with PPD Pekan was done in to deliver 2 sets to be used by Pekan school's badminton team. However due to issues with late delivery of electronics components, the development was delayed. Further, due to the Movement Control Order (MCO), the delivery of the device to PPD Pekan is still pending.

Date : **20 June 2020**
Tarikh

Project Leader's Signature:
Tandatangan Ketua Projek

COMMENTS, IF ANY/ ENDORSEMENT BY FACULTY (*Komen, sekiranya ada / Pengesahan oleh Fakulti*)

J	Recommend / Not Recommend / KIV / Need Ammendment

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....

Name:
Nama: PROFESOR DR. MAHADZIR BIN ISHAK @ MUHAMMAD
DEKAN
Date: FAKULTI TEKNOLOGI KEJURUTERAAN MEKANIKAL
Tarikh: DAN AUTOMOTIF
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26600 PEKAN, PAHANG DARUL MAKMUR
TEL 05-424 6222 / 09-424 6222

Signature:
Tandatangan:

** Dean/TDR/Director/Deputy Director

COMMENTS, IF ANY/ ENDORSEMENT BY RMC PNI (*Komen, sekiranya ada / Pengesahan oleh RMC PNI*)

K	Recommend / Not Recommend / KIV / Need Ammendment

....

....

....

Name:
Nama: PROF. MADYA DR. AHMAD TARMIZI BIN HARON
Date: Dekan Pengkomersialan
Tarikh: Jabatan Penyelidikan & Inovasi
Universiti Malaysia Pahang

Signature:
Tandatangan:

FINAL REPORT
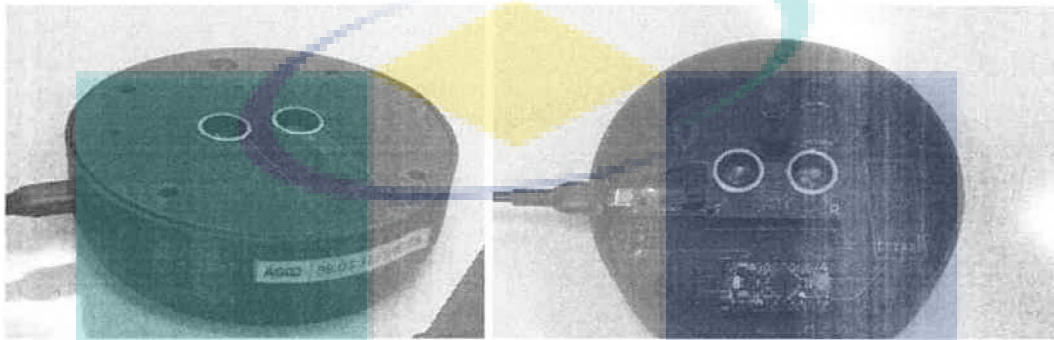
BADMINTON AGILITY TRAINING DEVICE

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Muhammad Aizzat Zakaria[b]
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Sports Technology, Instrumentation

ABSTRACT

Badminton is one of the most popular sports in Malaysia. This sport requires the athlete to be agile, running around the court to return the shuttlecock. One of the most important training in badminton is the footwork training. This training is conducted on the court without using any shuttlecock. In this drill, the coach stands in front of the players and shows the location where the player needs to go. The players will go to the instructed location, perform an action of a badminton shot, and return to the centre point. This drill is done for a few minutes. This project aims to replace the need of the coach to stand in front by creating an intelligent electronic training device.

1. INTRODUCTION

Shadow footwork training in badminton is one of the most effective badminton training drill to improve agility. It is very beneficial in a lot aspects in the game if it's done properly. It will improve court endurance, speed, anticipation, timing and physical condition. One athlete can run for hours nonstop, but when he or she enters the badminton court he/she can be exausted in a matter of minutes. This is mostly because of one did not exercise or practice the muscle used in badminton. By doing the shadow exercises regularly, the player will gain extra physical ability to stay fit and agile throughout the game.
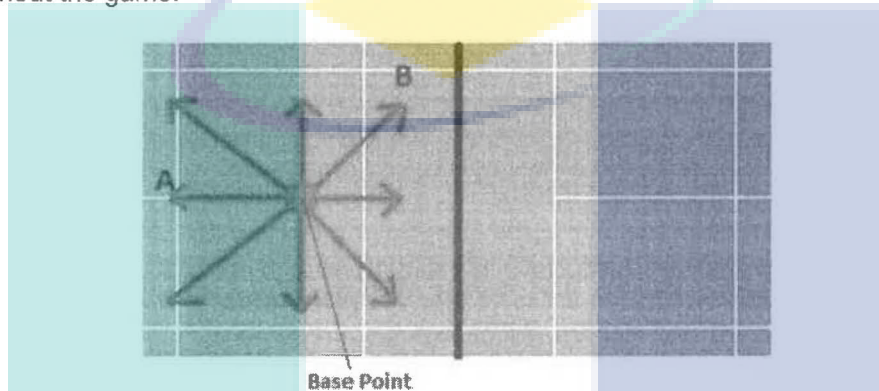

Figure 1. Badminton footwork training drill.

This training drill requires the coach to stand in front of the net, while the player stands at the centre of the court. The coach will then show to location where the player needs to approach using his hand or racket. The player then approach the shown location (normally there are 6 locations, back right and left, centre right and left, and front right and left). At each location, the player will perform a mock badminton shot, as if he/she is hitting the shuttlecock, although in this drill, no shuttlecock is involved, hence some call it as 'shadow' training.

Nevertheless, this method requires the coach to be present at all times. On the other hand, the player or the coach cannot monitor the improvement of the player's agility. The objective of this project is to develop an electronic device, which can be placed at the 6 locations on the court. Once activated, one of the six units will be activated randomly. The player is notified by an LED light and a buzzer sound. The player then approches the sensor unit. Once the player arrives (this is detected by the ultrasonic sensor), the unit is deactivated and another unit will be activated in a few milliseconds. The player then return to the centre court and proceed to the next activated sensor unit.

2. RESEARCH METHODOLOGY

The device was developed using the following sensor modules:
- ultrasonic sensor
- Bluetooth module
- LED light
- buzzer
- Arduino Pro-Mini microcontroller
- LiPo battery

All components are soldered on a custom-ordered printed circuit board (PCB). Each set consists of 6 units. The units communicate with each other through Bluetooth

connectivity. All units are paired to a smartphone. The smartphone uses an Android mobile application developed specifically for the device. Figure 2 shows the Android mobile application.
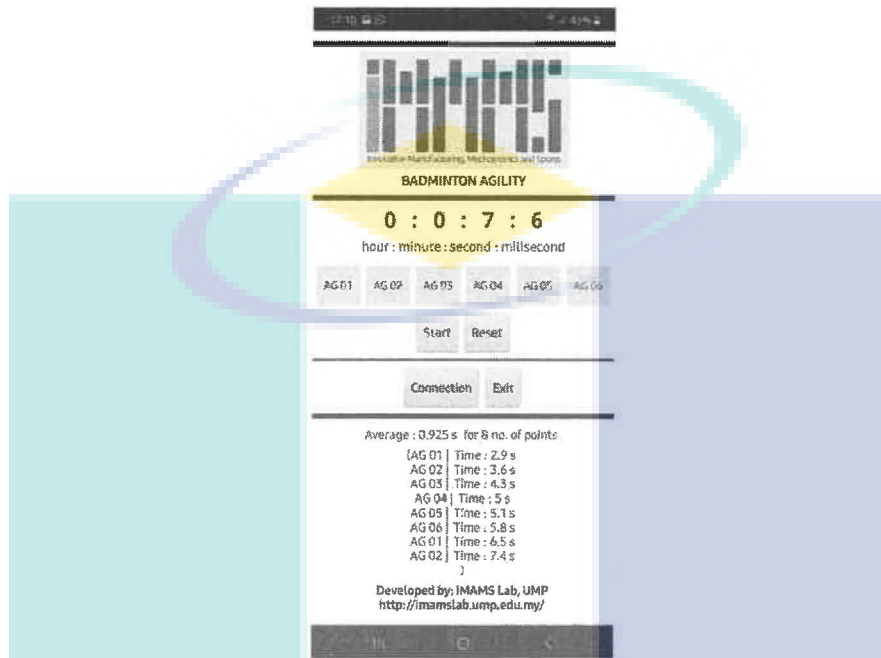

Figure 2. Android mobile application.

3. CONCLUSION

Four devices were successfully fabricated. Its functionality and how it can improve the training is yet to be corroborated. The device will be given to a few schools in Pekan district through the partnership with PPD Pekan for testing.