



DSLR-Tutor: An Android Application for Essentials in Digital Photography

Azizan Jamingan¹, Abd Kadir Mahamad², Sharifah Saon^{2*}, Tuwoso³,
 Ade Rahmat Iskandar⁴, Muhammad Soleh Hapudin⁴

¹Independent Researcher, Ladang Nenas, Simpang Renggam, 86200, Kluang, Johor, MALAYSIA

²Faculty of Electrical and Electronic Engineering,
 Universiti Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat, Johor, 86400, MALAYSIA

³Universitas Negeri Malang, Jalan Semarang, No. 5, INDONESIA

⁴Telecommunication Engineering Department
 Akademi Telkom Jakarta, Jalan Daan Mogot KM. 11, West Jakarta, 11710, INDONESIA

*Corresponding Author

DOI: <https://doi.org/10.30880/jeva.2020.01.01.001>

Received 00 Month 2000; Accepted 01 Month 2000; Available online 02 Month 2000

Abstract: Modern camera of digital single-lens reflex (DSLR) comes with a variety of features to help the user get a better image quality. For professional photographers, many of them use manual mode to get better control over their camera. However, it may become difficult issue for beginner and amateur photographer as they need to know the basic knowledge of taking a photograph. For this reason, the Android application, DSLR-Tutor was developed to assist the beginner and amateur in digital photography to understand a few modes available for the camera as well as the important three basic rules, which are international standards organization (ISO), aperture and shutter speed. This DSLR- Tutor was developed using Android Studio v3.2.1. with a minimal configuration to set up the application. To give the user examples of the three basic rules combination, the application gives an example of a moving object image under bright daylight shot edited with various combination of the ISO, aperture and shutter speed. Results shows that the best combination of the ISO, aperture and shutter speed were, 640, 1/1.8 and 1/250, respectively. In conclusion, the DSLR-Tutor was able to help the beginner and amateur in digital photography to edit their photos accordingly and expected to be able to help them to use their camera confidently and take the best shot as possible.

Keywords: DSLR, photograph, Android application, ISO, aperture, shutter speed

1. Introduction

In 1936, a real first single-lens reflex (SLR) camera was designed to let the light through the lens and hit a mirror inside the camera body. The image was reflected through a pentaprism onto a glass screen, which the user can look into and see the same image that be exposed on the film after the shutter button is released. Nowadays, digital SLR (DSLR) have been developed which replace the film with a semiconductor device that records light electronically. Later in year 2000, the first cell-phone with built-in camera was produced in Korea; the Samsung SCH-V200. Since then, the evolution of camera phone has started.

*Corresponding author: sharifa@uthm.edu.my

DSLR camera has been available from year 2000 series and still a popular choice over mirrorless camera which were introduced early year of 2010 [1]. The basic function of the camera is to capture an image. However, the price of DSLR is getting higher especially the latest model.

In early stage of camera phones’ era, conventional (film) camera and digital cameras were still not commonly owned, that only a few people used them with a high frequency. During that time, it was known that both digital and conventional cameras were only used in special events or generally situations that need high quality pictures. Nowadays, a smartphones’ camera was mostly used for spontaneous moments of casual daily life. In fact, the users can send the pictures from one device to another, with allows it to be stand out from the rest of the photographic instruments [2] [3].

The two main differences of motives when it comes to capturing photos is either for “affective” versus “functional” purposes. This means the images with sentimental value versus practical values, or rather “social” versus “individual”. Both purposes are meant to be either shared or kept for personal. Table 1 indicates the two categories of pictures particularly aligned with the intentions of the images based on finding of [4] [5].

Table 1 - A taxonomy of image capture and proportion of images by category [5]

		Social		Individual		
Affective	Mutual Experience. Images used to enrich a shared, so-present experience (either in the moment of later as a memento).	35%	Absent Friends or Family. Images used to communicate with absent friends or family (either in the moment or later).	21%	Personal Reflection. Images used for personal reflection or reminiscing.	41%
Functional	Mutual Task. Images shared with people co-present in support of task (either in the moment or after the event).	4%	Remote Task. Images used to help accomplish a task by sharing with remote family, friends or colleagues (either in the moment or later).	8%	Personal Task. Images used to support some future task not involving sharing.	10%

For whatever reasons behind each photograph, a study identified four ways that people went about to use their camera. This includes managing social relationships, constructing memory, self-presentation, and self-expression [6]. Each photograph has a story behind it. In comparison with digital and conventional cameras, smartphones’ camera has a higher mobility. Therefore, it was often present when needed [6]. Thus, images especially from camera smartphones were not mainly to capture momentary memories, but also to be kept and built as sort of one’s life visual diary.

Before taking a good picture, there are few parameters that we need to know. By using DSLR or any modern camera, we can customize these parameters so that we could take a nice quality of images. The main parameters involved is International Standards Organization (ISO), shutter speed and aperture.

ISO numbers in photography is used to indicate the sensitivity of the camera sensor towards the light. Low ISO number means that the sensors is not so sensitive towards the light while higher ISO number means the sensor is very sensitive towards the light [7][8].

The shutter speed measured in seconds (or more often fractions of a second) is the time taken for the shutter to stay open when taking a photograph [7] [8]. The longer the time of the shutter to stay open, the more light will be captured by the sensor.

Meanwhile, aperture is the size of opening in the lens through which light is allowed to pass whenever the shutter is opened [7] [8]. In other word, the larger the aperture, the more light can pass through. This can influence the amount of image that in focus. Aperture measured in “f-number”, which is a ratio of focal length over diameter of the opening. For example, to isolate the subject from the background, small f-number can be used.

Either tools of taking a photo, the importance of skill to take a photo is crucial. There are available courses from professional photographer to learn this skill, whether it is an online or offline course. Based on the internet reviews, there are lots of available learning platform to be a professional photographer. Most of them are free. The key to success is to keep practicing until the satisfaction is achieved.

Besides website, an Android application for basic tutorial of DSLR is also available. For example, the Photography Trainer™ provides guides step-by-step how to do setting for DSLR to take the perfect shot. Top rated app with over 50,000 downloads across multiple countries and devices include IOS and Android. Even though nowadays smartphones’ camera become more popular, the working principle of taking photography is still the same as DSLR.

Motivated to explain the essential in photography, this project aims to create a simple version of tutorial on our own way. One of the most popular tools to design an Android application is Android Studio. An Android Studio is the official integrated development environment (IDE) for developing an Android Apps by Google. The other popular IDE is called Eclipse but the support for it has been terminated by Google.

In this work, Android Studio IDE is used to create an application to demonstrate the basic modes available on DSLR and information about the effect of ISO, shutter speed and aperture to the image.

2. Android Application Development

To ensure the success of DSLR-Tutor development, simple method was proposed in order to assist the user with the information on the basic knowledge of photograph and the simple features of image editing. The proposed method uses an intent. An intent is an object that provides runtime binding between separate components, such as two activities. The intent represents an app's "intent to do something".

Fig. 1 demonstrated the overall flow of the application design, with the android application package (APK) file for DSLR-Tutor which was created using Android Studio v3.2.1.

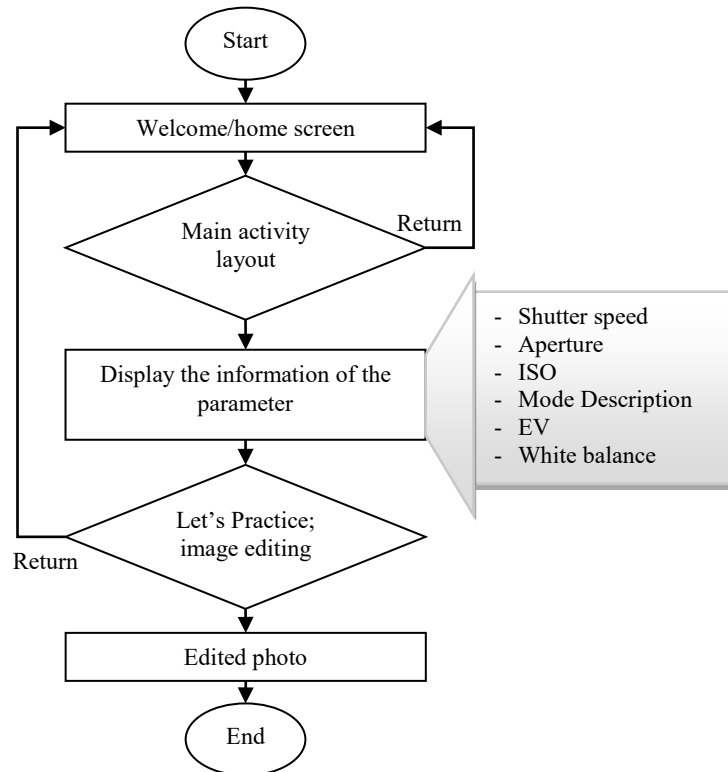


Fig. 1 - Overall flow of the Android application of DSLR-Tutor

Upon creating a project, Android Studio developer automatically create important features of (i) MainActivity.java, (ii) Activity_main.xml, (iii) AndroidManifest.xml and (iv) Build.gradle.

MainActivity.java is the main activity file that will be executed right after the apps is launched. In other word, this is the entry point of the apps. Whenever the apps is started, the system launch an instance of this Activity and loads its layout.

Activity_main.xml, is the XML (Extensible Markup Language) file contains the layout of the activity's UI (User Interface). This file can contain various elements including, TextView to display a text, ImageView to display an image, and WebView to display a web page. Android Studio v3.2.1 makes designing a layout a lot easier with visual graphic by just drag and drop items from the Pallet tab.

AndroidManifest.xml describes the fundamental characteristics of the apps and defines each of its components to the Android build tools, the Android operating system, and Google Play.

Drawable class of Android Studio v3.2.1 provides a generic API for handling an underlying visual resource that may take a variety of forms. In simpler word, this class provide visual resource needed by the apps. For this project, the drawable only contains images that used for this application. A drawable resource is also a general concept for a graphic that can be drawn to the screen, which all images are stored in the folder including the final app logo. For this project, the default logo was used for android apps.

Whereby the build.gradle file is used to configure the Gradle tools compile and build the apps. Gradle is an advanced build toolkit used by Android Studio to automate and manage the build process, while allowing the developer to define flexible custom build configurations. In addition, the custom build configuration can be configured without

modifying the app’s core source files. To get better understanding on what the Gradle function in Android Studio, the build process of an Android Application Package (APK) is shown as in Fig. 2.

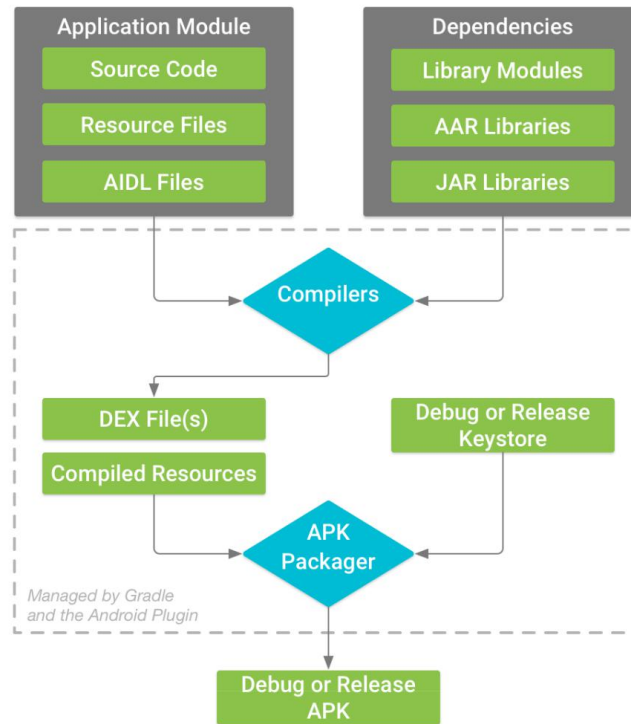


Fig. 2 - Build process of typical Android app module

Based on Fig. 2, the general steps are as follows:

- 1) The compilers convert the source code into DEX (Dalvik Executable) files that contains everything including the bytecode that runs on Android devices.
- 2) The APK Packager combines DEX files and compiled resources into a single APK.
- 3) The APK Packager signs the APK using either debug (the apps intended for testing profiling) or release (the apps intended to be release externally) keystore.
- 4) Before final release, the packager uses zipalign tool for optimization of the apps so that it uses less memory when running on a device.

Once the build process completed, the APK of the apps is ready to be used for test or release.

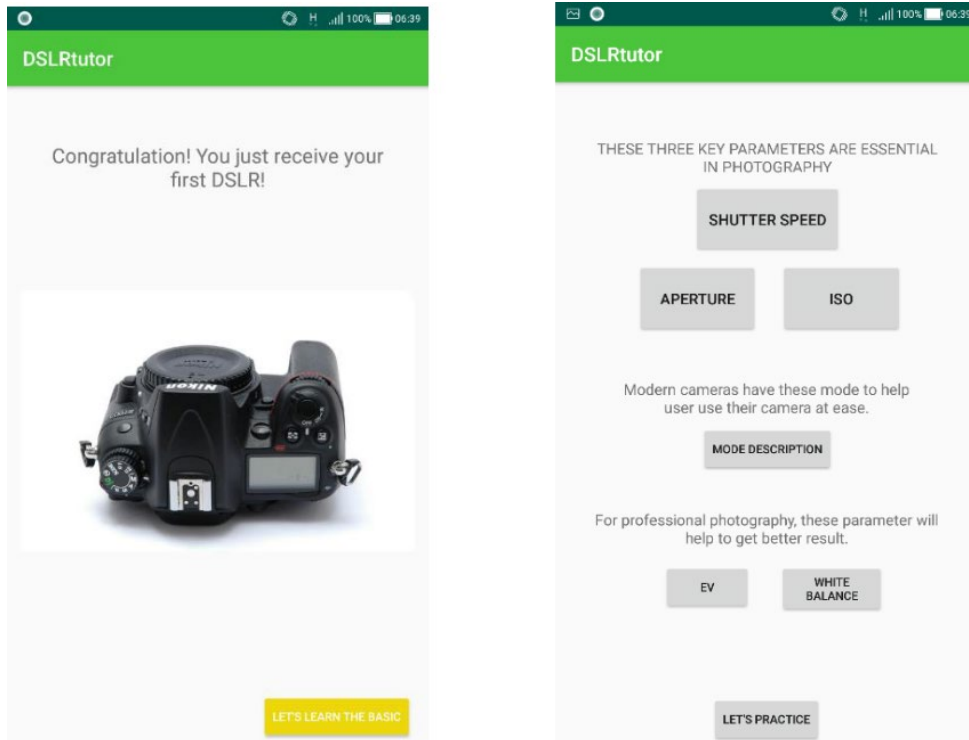
3. DSLR-Tutor

Successfully designed DSLR-Tutor, includes the main activity layout, explanation layout and the results from the combination of three different ISO (100, 640, 2500), aperture (f/1.8, f/5, f/16) and shutter speed (1/30, 1/250, 1/2500) setting are discussed.

3.1 Main Activity Layout

Upon opening the DSLR-Tutor apps, the user is welcomed with the Welcome screen as demonstrated in Fig. 3 (a), which contains a message of “Congratulation! You just receive your first DSLR” and a DSLR image is at the center of the screen. At the bottom right corner of the screen, there is a button “Let’s learn the basic” which then guides the user to the main activity.

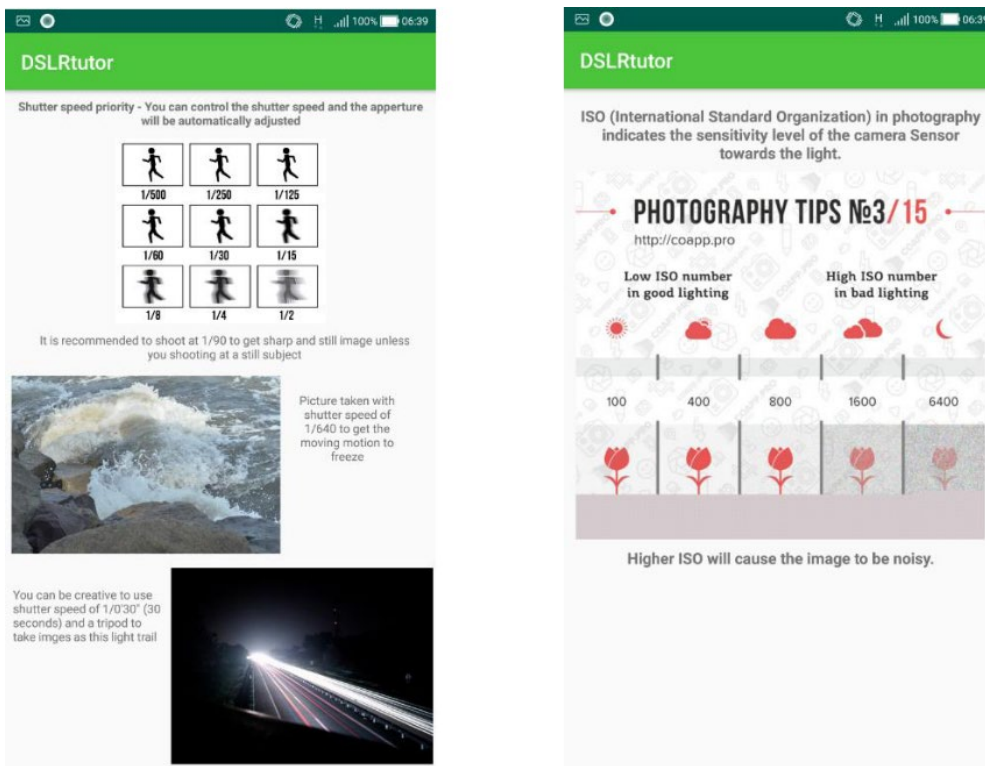
The main activity layout, as in Fig. 3 (b), displays the three parameters that are essentials in digital photography, the camera modes description and the additional parameter to get better result. The three parameters are shutter speed, aperture and ISO. Each of this parameter has an explanation and it is displayed after the corresponding button is pressed. The same thing occurred to the “Modes Description”, “EV” and “White Balance” when button is pressed.



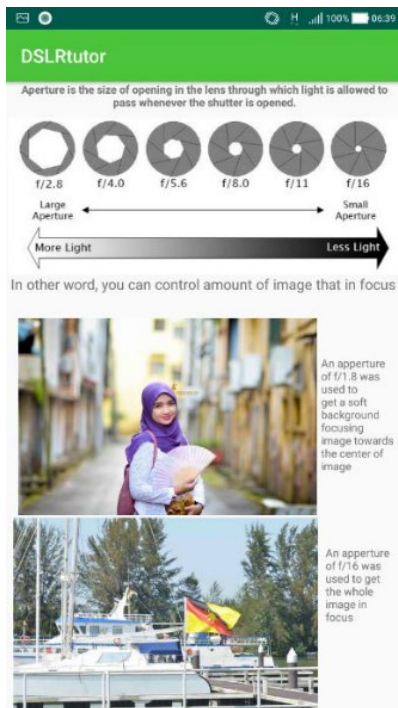
(a) (b)
Fig. 3 - (a) Welcome screen; (b) main activity layout

3.2 Information Pages

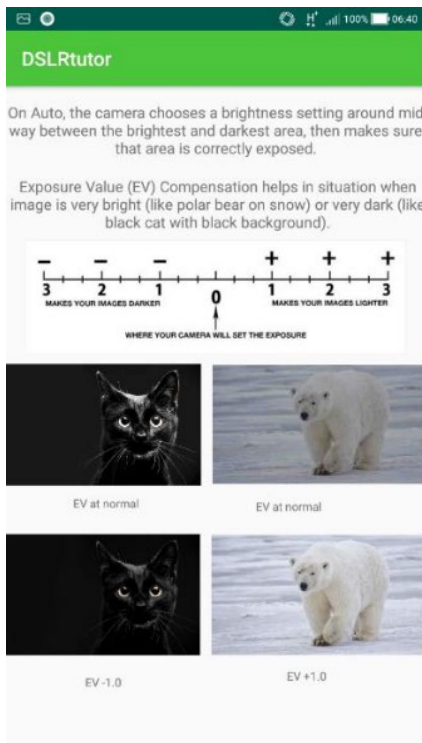
Once button on the Fig. 3 (b) is pressed, the information of each parameter is displayed as shown in Fig. 4 to 6. User can simply click the “Back” or “Return” button on their smartphone to return to main activity pages.



(a) (b)
Fig. 4 - (a) Shutter speed; (b) ISO explanation



(a) (b)
Fig. 5 - (a) Aperture; (b) camera modes explanation



(a) (b)
Fig. 6 - (a) EV; (b) white balance explanation

3.3 Let's Practice Layout

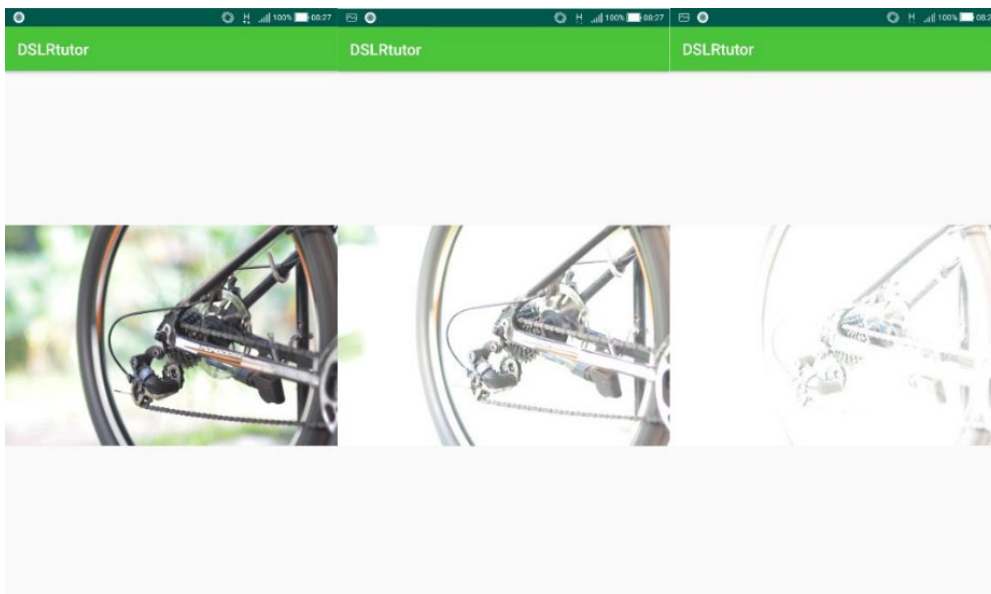
This result screen, Fig. 7 is shown after the “Let’s Practice” button from main activity is pressed. In this screen, the aim is to display the final image result if the settings are set from the combination of the three parameters. Each button displays the corresponding result in a new activity. So, the user may focus on the detail of each result. To give the user

a hint of the result, the colour of the button was filled with green, yellow and red to represent the quality of the result as shown in Fig. 8:

- Green = Great, the image indicates balanced of lighting and it looks alive.
- Yellow = Average, the image has unbalanced lighting, a bit over exposed (light) or under exposed (dark).
- Red = Bad, the image is a lot over exposed (light) or under exposed (dark).



Fig. 7 - Let's practice layout









(a) (b) (c)
 Fig. 8 - Results of (a) good; (b) average; (c) bad image editing

The input image is a moving object that was captured using Manual mode of DSLR under bright daylight with EV and White Balance is set to auto. In this project, three different setting for each parameter combination was used for image editing as indicated by result in Table 2.

Table 2 - Result of image editing

No	ISO	Aperture (f/stops)	Shutter speed (seconds)	Result of image editing
1	100	1/1.8	1/30	
2	640	1/1.8	1/30	
3	2500	1/1.8	1/30	
4	100	1/1.8	1/250	
5	640	1/1.8	1/250	
6	2500	1/1.8	1/250	
7	100	1/1.8	1/2500	

No	ISO	Aperture (f/stops)	Shutter speed (seconds)	Result of image editing
8	640	1/1.8	1/2500	
9	250	1/1.8	1/2500	
10	100	1/5	1/30	
12	100	1/5	1/250	
12	100	1/16	1/30	
13	100	1/16	1/250	

Based on Table 2, there are several combinations of ISO, aperture and shutter speed that show the best result; in this case, the combination of image editing in No. 1, 4, 5 and 9. However, the ISO of 640 was the best choice when the light source was plenty such as in bright daylight. As the ISO increases, the image become overexposed. Aperture of f/1.8 really helps the subject to stand out from the background. As the aperture set is higher, the background becomes more focused. In this case, the shutter speed of 1/250 seconds was useful to get some motion of the object. The faster the shutter speed, the less light entering the camera which results a still object with darker background. In general, user must set their goal image before taking a picture. Therefore, this apps help the beginners to plan the suitable shooting setting.

4. Conclusion

DSLR-Tutor application was successfully created using Android Studio v3.2.1 that could help the beginners in digital photography to get better understanding of their gears (DSLR or smartphone's camera). Using this apps, the user is expected to understand the three main parameters that affect digital photography, which are ISO, aperture and shutter speed. Furthermore, as for demonstration, the example of moving object under broad daylight was captured. The result

shows a various combination of the three parameters. From the combinations, the setting of ISO of 640, aperture of f/1.8, and shutter speed of 1/250 seconds shows the best result under this original image condition.

Acknowledgement

This work was partially supported by the Faculty of Electrical and Electronic Engineering (FKEE) and Research Management Center (RMC), Universiti Tun Hussein Onn Malaysia.

References

- [1] Tatsuno, K. (2006). Current trends in digital cameras and camera-phones. *Science & Technology Trends*, 18, 35-44.
- [2] Gray, R. (2012). The rise of mobile phone photography. *Guardian Photography Guide*, The Guardian, 53.
- [3] Zurn, X., Damen, K., Leiden, F.V., Broekhuijsen, M., and Markopoulos, P. (2018). Photo curation practices on smartphones. *International Conference on Advances in Computer Entertainment*, 406-414.
- [4] Abbott, W., Donaghey, J., Hare, J., and Hopkins, P.J., (2014). The perfect storm: The convergence of social, mobile and photo technologies in libraries. *VALA: Streaming with possibilities*, Melbourne, Vactoria, 1-20.
- [5] Kindberg, T., Spasojevic, M., Fleck, R., and Sellen, A. (2004). How and why people use camera phones. *Technical Report of Hewlett-Packard Laboratories Bristol*, 1-15.
- [6] Van House, N., Davis, M., Ames, M., Finn, M., and Viswanathan, V. (2005). The uses of personal networked digital imaging: an empirical study of camera-phone photos and sharing. *Conference on Human Factors in Computing Systems*, 1853-1856.
- [7] Hall, M. (2015). *Digital photography: Mastering aperture, shutter speed, ISO and exposure*. CreateSpace Independent Publishing Platform, USA.
- [8] Fairbanks, D. (2016). *DSLR photography: The beginners guide to understanding aperture, shutter speed, ISO and Exposure*. CreateSpace Independent Publishing Platform, USA.