Accident Reporting System using an iOS Application

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***Abstract*— This paper presents an accident reporting system using an iOS application. Normally, accidents and incidents in workplace could only be reported on a standard paper form but there were often delays in submitting reports and difficulties in retrieving them back for analyzing purpose. Besides, report by using paper also consumes a lot of paper, which is not environmental friendly. This application was developed using Xcode SDK 5.1 focusing on device with iOS 7 as their operating system. The mobile application allows people with iOS devices such as iPhone or iPad to report an accident or incident in the workplace and then send the report via email to the Safety and Health Officer. Hence, this application makes accident reporting task become more efficient for immediate action to be taken.**

Keywords-Xcode, Accident Reporting, Mobile Application

I. INTRODUCTION

Occupational safety and health (OSH) is an area focusing on providing safety working environment and reduce or prevent an occupational hazard at workplace. An occupational hazard is a thing or situation with the potential to harm a worker. Occupational hazards can be divided into two categories safety hazards that cause accidents that physically injure workers, and health hazards, which result in the development of disease. There are many potential hazards at workplace such as working at height, housekeeping, machinery and tools, heavy lifting, confined space entry, dangerous chemical, noise, fire and electrical [1]. Malaysia's occupational safety and health law – the Occupational Safety and Health Act 1994 (Act 514) requires notification from employer to the nearest occupational safety and health office of any accident, dangerous occurrence, occupational poisoning or occupational disease which has occurred or is likely to occur at the place of work [2].

It is important for employer to record and report any accidents, injuries, diseases and dangerous occurrences involving employees, self-employed workers and members of the public. The main purpose of reporting the accident stated under the Occupational Safety and Health Act 1994 section 32 of (Act 514) is for the authority (DOSH) to determine the underlying causes of the accident in order for remedial actions to be taken to prevent similar occurrences in the future [2].

With the information provided through recording and reporting, the enforcing authorities are able to help and provide advice on how to reduce injury, and ill health in the workplace. Such surveillance data can also be used to improve the existing safety guidelines and precautions to prevent accident from repeating.

There are various format of reporting depends on the company. The important details of all reportable incidents, injuries, diseases and dangerous occurrences including the date, time and place of the event, personal details of those involved and a brief description of the nature of the event or disease [3]. Most accidental report is in standard paper form, which is then been submitted to safety and health officer manually by hand for action to be taken.

The common problem faced by using paper form are difficulties in retrieving them back for analyzing purpose, time consuming because the form must be complete manually and often delays in submitting reports. These problems disable a quick response from safety and health officer when accident happens and interfere the smooth analysis process.

The objective of this project is to develop a portable and handy accident reporting system using an iOS application. This mobile application will give impact on the time consumption when reporting electronically compared to the standard paper from. Furthermore, it also offers mobility that enables user to make an accident report efficiently, in timely manner.

II. LITERATURE REVIEW

Occupational safety and health (OSH) is an area concerned with protecting the safety, health and welfare of people at the workplace. The purpose of occupational safety and health programs are to provide safety working environment and reduce or prevent the accidents from occurred at the workplace. It applies to all employers, employees and self-employed people in their workplaces. [1]

In Malaysia, the Department of Occupational Safety and Health (DOSH) is a department under the Ministry of Human Resources responsible for ensuring the safety, health and

welfare of people at work as well as protecting other people from the safety and health hazards arising from the activities sectors. The sectors that are related to OSH are construction, manufacturing, mining and quarrying, utilities, transport, storage, communication, utilities and business services. The mission of DOSH is to ensure safety and health at work. The objectives of the establishment of DOSH are to reducing the rate of fatalities, reducing the rate of reported accidents, increasing the number of enforcement and inspection and increasing the number of OSH competent persons [3]. OSH is essential to ensure employees and employer remains safe at all times during at the workplace. OSH can be important also for moral, legal and financial reasons. There are several places that are consults with OSH in Malaysia. An example of consultant is National Institute of Occupational Safety and Health (NIOSH). Nowadays, most of the company has a safety and health policy to ensure a safety working environment [1].

An accident is an unplanned event that results in injury, damage to property or some other loss. All accidents to employees, including minor, should be recorded and reported to the local authority or occupational safety and health office. This is a requirement under the Occupational Safety and Health Act 1994 [2].

Reporting and recording procedures vary. Employers need to be sure that they satisfy all legal reporting requirements for employees and non-employees, and take measures to monitor accidents. As part of the monitoring process, accident records are needed to assess whether the existing control are adequate or to identify if trends are developing and to implement new procedures [3]. Most of industrial sector are using standard paper form for accidental report and record process.

The tool to develop the mobile application is the Xcode SDK 5.1. Xcode is an integrated development environment (IDE) containing a suite of software development tools developed by Apple for developing software for OS X and iOS. First released in 2003, the latest stable release is version 5.0 and is available via the Mac App Store free of charge for Mac OS X Lion and OS X Mountain Lion users. Registered developers can download preview releases and previous versions of the suite through the Apple Developer website [4].

The main application of the suite is the integrated development environment (IDE), also named Xcode. The Xcode suite also includes most of Apple's developer documentation, and built-in Interface Builder, an application used to construct graphical user interfaces.

The programming language used in Xcode is Objective C. Objects in Objective-C, as in any other object-oriented language, are the building blocks of the application. They have member variables that describe the object and methods that can manipulate the member variables, as well as any parameters that may be passed to them. Member variables can be public or private [5][6].

Other software used to develop a mobile application is Eclipse. Eclipse used many programming language. Examples of Eclipse's programming language are Ada, ABAP, C, C++, COBOL, Fortran, Haskell, JavaScript, L asso, Natural, Perl,PHP, Prolog, Python and R. Eclipse is well known develop mobile application for Android Platform [7].

III. METHODOLOGY

This project is aimed to operate on iOS devices such as iPhone or iPad. The software used is the Xcode SDK 5.1 that can be downloaded through App Store for free.

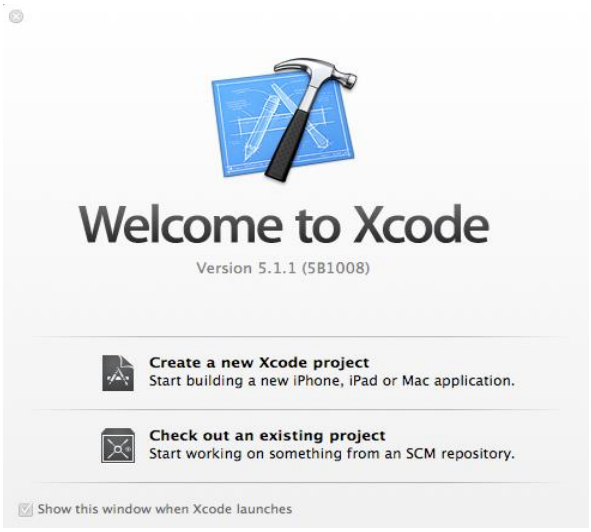

Figure 1: Xcode 5.1.1 software

Xcode is Apple's powerful integrated development environment for creating great apps for Mac, iPhone, and iPad. Xcode includes the Instruments analysis tool, iOS Simulator, and the latest Mac OS X and iOS SDKs. Xcode can only be run on Mac computer. It use Objective-C as it programming language. Objective-C is an extension to the C programming language, which makes C object oriented. It consists of two (2) main files, the header file (.h file) and the implementation file (.m file) [8][9][10].

```
//
//  ViewController.h
//  textfield
//
//  Created by macbook on 5/28/14.
//  Copyright (c) 2014 uitm. All rights reserved.
//

#import <UIKit/UIKit.h>

@interface ViewController : UIViewController
@property (weak, nonatomic) IBOutlet UITextField *name;
@property (weak, nonatomic) IBOutlet UITextField *phone;
@property (weak, nonatomic) IBOutlet UITextField *location;
- (IBAction)submit:(id)sender;
- (IBAction)retractKeyboard:(id)sender;

@end
```

Figure 2: Header file (.h file)

```
//
//  ViewController.m
//  textfield
//
//  Created by macbook on 5/28/14.
//  Copyright (c) 2014 uitm. All rights reserved.
//

#import "ViewController.h"

@interface ViewController ()

@end

@implementation ViewController

- (IBAction)retractKeyboard:(id)sender;
{
    [sender resignFirstResponder];
}

- (IBAction)a:(id)sender {
}
- (void)viewDidLoad
{
    [super viewDidLoad];
    // Do any additional setup after loading the view, typically from a nib.
}

- (void)didReceiveMemoryWarning
{
    [super didReceiveMemoryWarning];
    // Dispose of any resources that can be recreated.
}

- (IBAction)submit:(id)sender {
}
@end
```

Figure 3: Implementation File (.m file)

Another important component of Xcode is the storyboards. A UIStoryboard is comprised of sequence of scenes that represent the view controller. Each view controller are connected by segue for the interaction between two view controllers. The storyboard is the graphical user interface. User can graphically adding views to the application such as button, table view, text view and picker view onto view controller. It is also connect interface to the source within the Xcode editor. Storyboard allows developer to visualize the interface and flow of the application in design canvas. Figure 3 shows how the storyboard linked to each view controller [11][12][13].

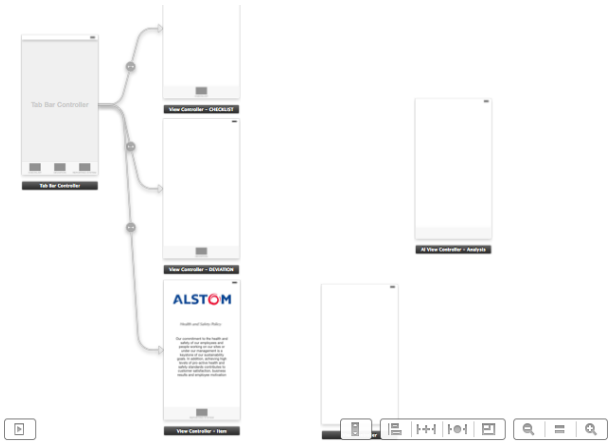

Figure 4: Xcode Storyboard

Developer also may not use the storyboard and only use the coding method but this method usually used by an expert Xcode programmer because it require a deep knowledge in Objective-C programming language. Therefore, using storyboard is preferable in the development of this application.

The application consists of three categories of safety and health procedure, which include Inspection, Deviation Analysis and Accident Reporting. This project covers the Accident Reporting that convert the standard paper form of accident reporting into an accident reporting mobile application using iOS devices. The development of the mobile application begins with the designing of the user interface, intial view controller.

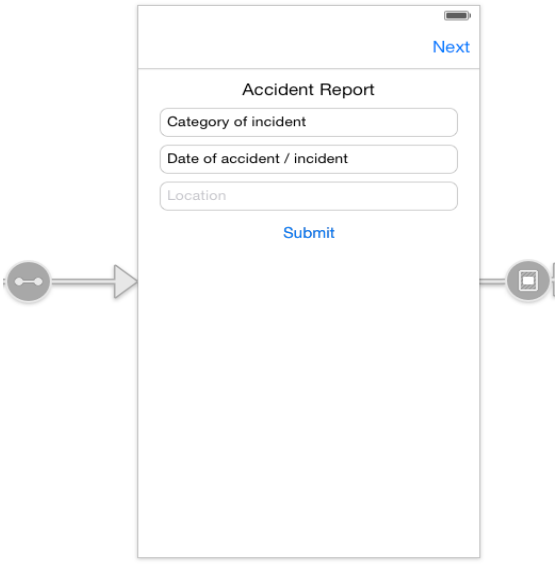

Figure 5: Initial View Controller

The process of designing the application involves placing the label, text field, button and other suitable element onto the view controller. The button and field can be adjusted accordingly [14][15]. A simple mouse drag from a UI control to header file creates a connection between code and interface as shown in Figure 5.

Lastly, the iOS simulator simulates the connected storyboard with the header and the implementation file. The simulator display the user interfaces almost the same like in actual device. The function of the iOS simulator is to testing and debugging a program until successfully executed.

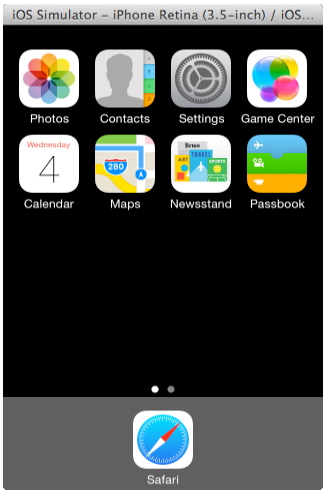

Figure 6: Xcode Simulator in a 3.5 inch iPhone

After completing the mobile application, all results and discussion is recorded in order to show the functionality of the mobile application. All the steps and process of the final year project development are summarized as in flow chart in Figure 7.

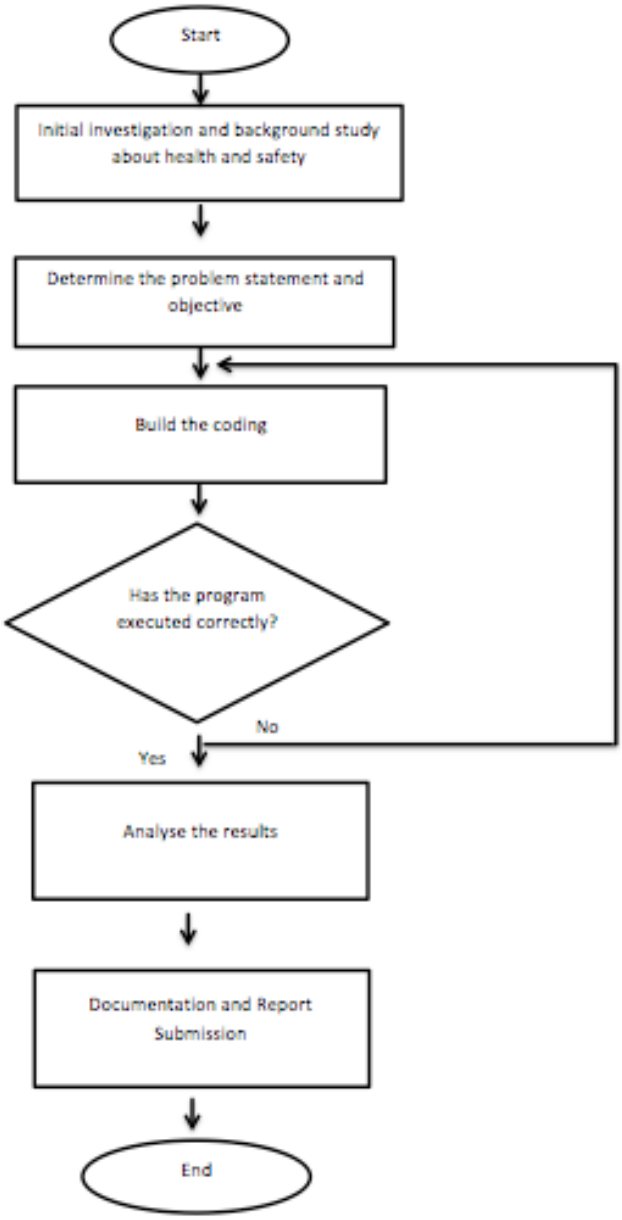

Figure 7: Flowchart of the Final Year Project

IV. RESULT & DISCUSSION

The mobile application is successfully developed for iOS devices specifically for iPhone. All the results are shown by using iOS simulator, which represented the user interface in the actual device application.

The first user interface for the application is the login page that prompts the user to enter username and password as shown in Figure 8.

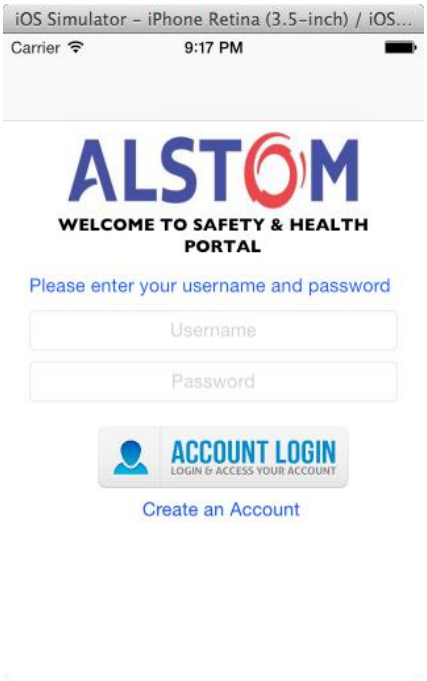

Figure 8: Login page interface

User that has been registered only can access the application and proceed to the next page. If user does not have an account error will pop out as shown in Figure 9 and must registered first to proceed.

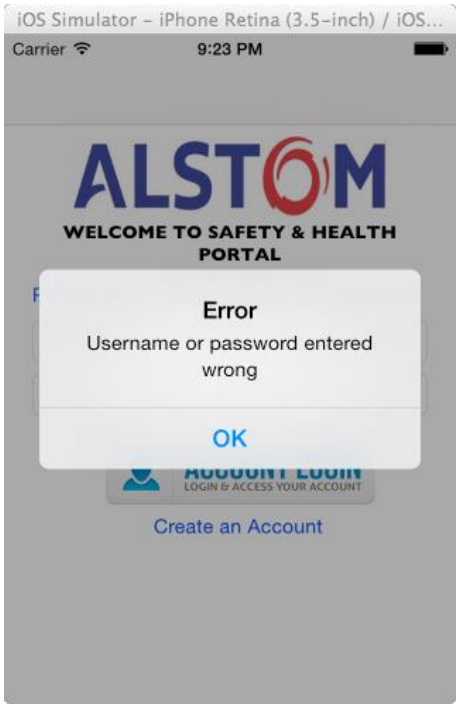

Figure 9: Alert view pop out shows error

To register user must tap on the create an account button. User will be directed to the create a new account page as Figure 10. Here user needs to fill the required information. After successfully create an account, user can now login using registered username and password. Once login button is tapped, user will be directed to the Main Menu of the application as shown in Figure 11. The application consists of three (3) options for the user to choose namely Inspection, Deviation and Reporting. For this project, it is focusing on Reporting section which contain a report form to be used by user to lodge reports when accident happen. Deviation is the section, which generate graph based on the input entered by user for analyzing purposes. The checklist section contains the safety checklist [9].

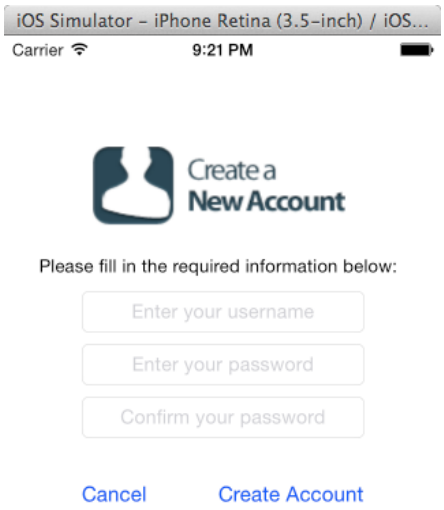

Figure 10: Main page of the application.

Figure 11: Main menu of the application

To make an accident reporting, user has to choose Reporting option from the menu. Once the Reporting button is tapped, the application will be directed to accident reporting page as shown in Figure 12.

This page consists of the important details of the accident for user to choose and enter. The important details including the category of accident, date, time and location of the event, name of person injured, nature of accident, nature of injury, and affected body part. Category of accident is important to classify the seriousness of the accident, nature of accident is used to determine the caused of accident, nature of injury is used to identify the dangerous level of the injury and affected body part is used to know which body part got harmed. User must enter all the detail during the reporting process [9].

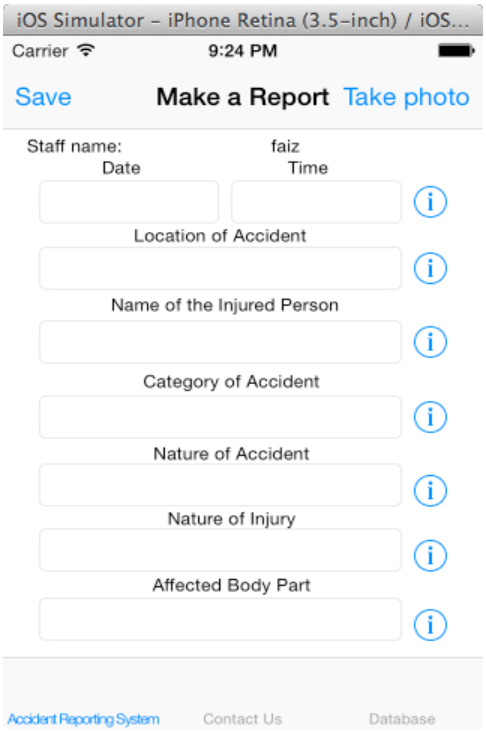

Figure 12: Accident Reporting Page.

Info button is provided on the right of the text field to assist user to complete the form. In case user do not know what information needed in the text field, user can refer to the info button. Once the button tapped, list of information needed will be pop out in alert view form as in Figure 13.

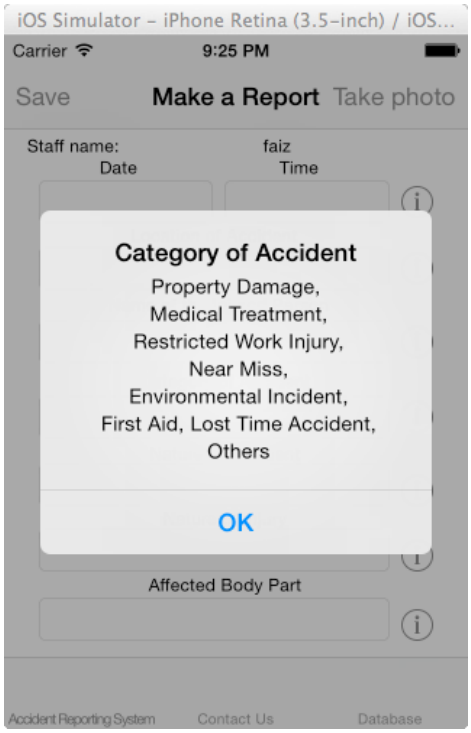

Figure 13 Alert view pop out list of information needed in Category of Accident field.

After completing the form, user can save the form by tapping the save button. The form is then send to the database.

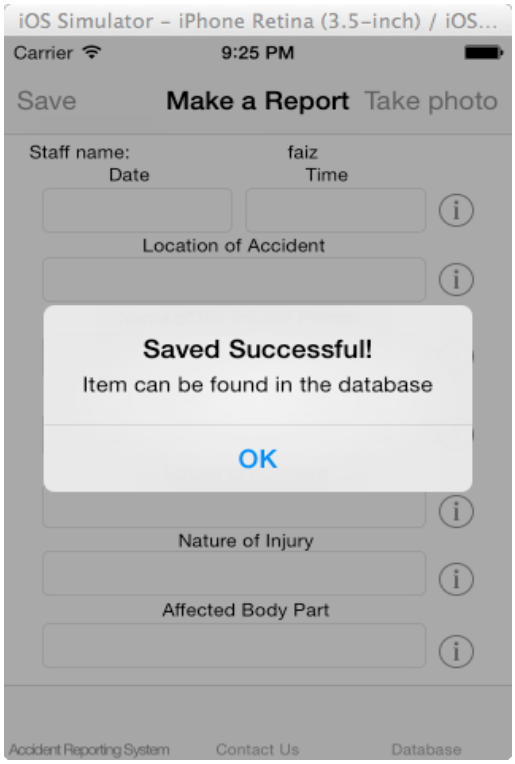

Figure 14: Alert view pop out after save button is tapped

Next, this application also has features to take picture of the accident as evidence. Once the take picture button is tapped, the page will be directed to a new page. Here user can snap picture and get the current location. This is to ensure the location of the person who make the report is accurate and make it easy for the safety officer to find the location of the person reporting. This is shown as in Figure 15.

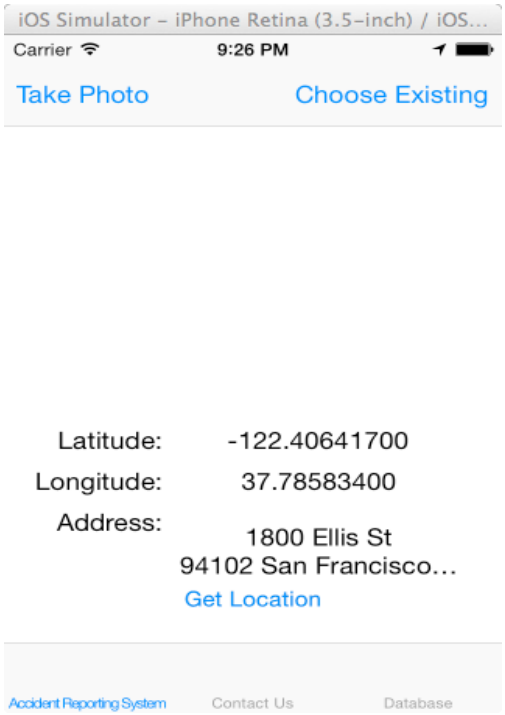

Figure 15: Take photo and Get Location page.

On the bottom of the page, there are three (3) tabbed bar button namely Accident Reporting System, Contact Us and Database. The tabbed bar button is used for an easy access to any page wanted by the user. Accident Reporting button will direct user to the Accident Reporting page. Contact Us button shows the page on how to contact Alstom company. There are 3 method to contact Alstom company which are by call, SMS and also by surf the website. This is shown as Figure 16.

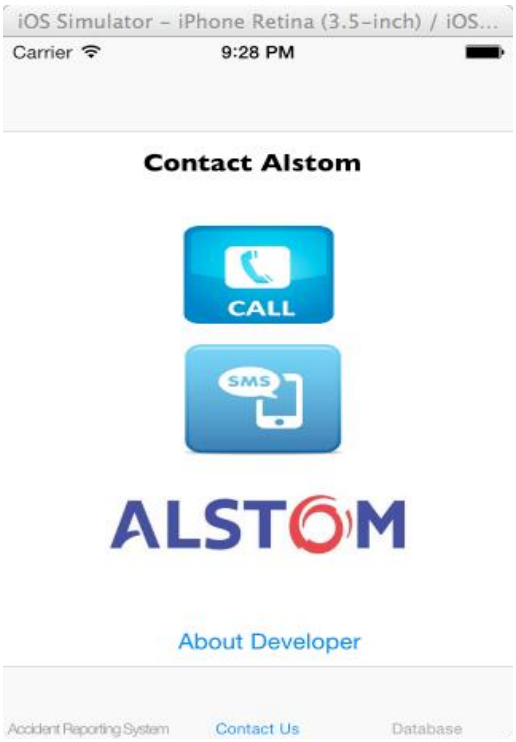

Figure 16: Contact Us page.

Figure 17: Database page.

In the Database tabbed button, user will be direct to the page where they can access the previously saved form and also the picture taken as evidence. Then the save file and picture can be email directly the safety officer for action to be taken. This is shown as in Figure 17.

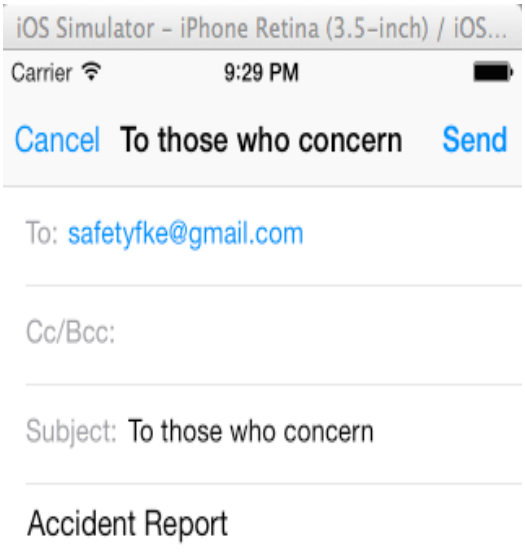

Figure 18: Email interface

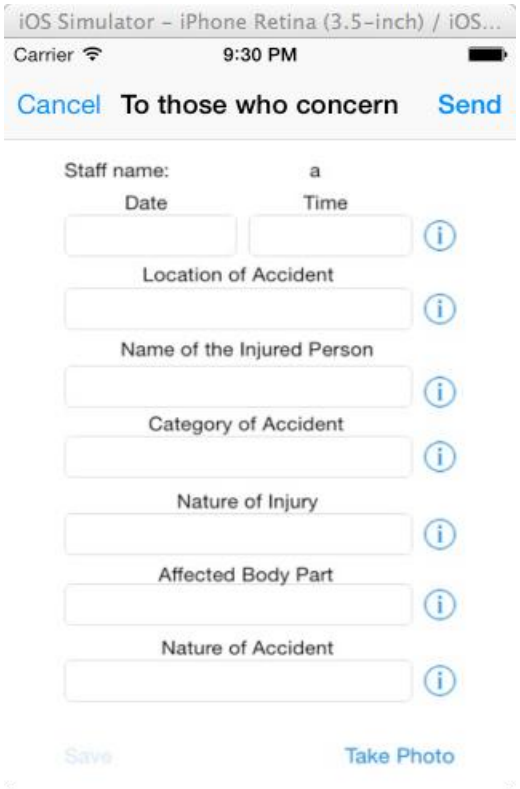

Figure 19: The final report form to be send to safety officer via Email.

Figure 18 shows the email interface when the email button is tapped. Figure 19 shows the final report form to be sent to safety officer via email.

V. CONCLUSION

In this paper, the design and the simulation of the application have been successfully presented. This application does not cover all the detail of accident reporting as in standard paper form. However, this application consists of important detail which is sufficient for summary of accident reporting. Besides, this application offers a lot of benefits compared to the manual reporting by using paper form. The benefits include fewer delays, transmission to several departments simultaneously, easier to write the report and can easily be emailed. Therefore, with the development of the application, it significantly improves the timeliness of reporting as it encourages prompt reporting and investigation for quick action. This application is important and useful for occupational safety and health sector.

VI. RECOMMENDATION

For future recommendation, the accident reporting system accident detail covers in depth detail as in standard paper form. Other than that, the system also has features to provide a drop down when selecting the text field to make user easier to choose from the list. Hence, make accident reporting task become more efficient.

VII. ACKNOWLEDGEMENT

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