

## The development of hybrid applications to support the elderly health care

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**บทคัดย่อ**—การพัฒนาแอปพลิเคชันนี้ เป็นวัตถุประสงค์หนึ่งของโครงการวิจัยเรื่องพัฒนาแอปพลิเคชันสนับสนุนการดูแลสุขภาพของผู้สูงอายุบนอุปกรณ์ไร้สาย ซึ่งจะต้องสามารถใช้งานได้กับ 3 แพลตฟอร์ม ไอโอเอส แอนดรอยด์ วินโดวส์ และด้วยเทคโนโลยีสมัยใหม่ จึงมีซอฟต์แวร์ที่สามารถพัฒนาแอปพลิเคชันเดียวแล้วสามารถสร้างให้ใช้งานได้หลายแพลตฟอร์ม นั่นคือ ไฮบริด แอปพลิเคชัน สำหรับงานวิจัยนี้ ใช้ซอฟต์แวร์คอร์โดวา ซึ่งเป็นโอเพนซอร์สในการพัฒนาและนำไอโอเอ็นิกเฟรมเวิร์กมาช่วยพัฒนาส่วนติดต่อกับผู้ใช้แอปพลิเคชันที่สร้างขึ้น ประกอบด้วย ส่วนของการจัดการข้อมูลเพื่อดูแลสุขภาพทุกด้านของผู้สูงอายุ และมีการบันทึกข้อมูลในรูปแบบข้อความ ภาพ ภาพเคลื่อนไหว และเสียง ผลการพัฒนาพบว่า แอปพลิเคชันที่ได้จะสามารถใช้งานได้ทั้ง 3 แพลตฟอร์ม การพัฒนาส่วนติดต่อกับผู้ใช้ จะต้องเป็นไปตามมาตรฐานของแต่ละแพลตฟอร์ม เพื่อให้สามารถอัปเดตลงให้แอปสโตร์ หรือเพลสโตร์ เนื่องจากงานวิจัยเน้นการใช้ในแบบเร่งด่วนและต่อเนื่องตลอดเวลา ทำให้แอปพลิเคชันที่พัฒนาควรจัดเก็บข้อมูลภายในอุปกรณ์ไร้สายเหล่านั้น เพื่อให้ฟังก์ชันต่างๆ สามารถทำงานได้เต็มที่ ดังนั้น ทุกฟังก์ชันการทำงานจะติดต่อกับระบบปฏิบัติการภายในอุปกรณ์สมาร์ตโฟนหรือแท็บเล็ตนั้นๆ ยกเว้น การสำรองข้อมูล เพื่อให้ได้ประสิทธิภาพสูงสุดในการใช้งาน

**คำสำคัญ:** ไฮบริด, แอปพลิเคชัน, คอร์โดวา, ไอโอเอ็นิก

**Abstract**— The development of this application was conducted to support the elderly health care on a wireless device. It will be available with three platform: IOS,

Android and Windows. In modern technology the software can works across multiple platforms which is a hybrid application. For this research, Cordova is an open-source software to develop. Ionic framework was also used to improve the user interface. This includes the management of all aspects of health care for the elderly and recording data in text, image, animation and audio. The development of application can be used well for all three platform. The user interface develops in the standards of each platform to upload into the App Store or Play Store. The research focused on the urgent and continuing all the time. The developed application should be store data within those wireless devices. For the most efficiency. So, these functions interact with an operating system which contains in smartphone or tablet except backup data.

**Keywords:** Hybrid; application; Cordova; Ionic

### I. INTRODUCTION

The development of applications supporting the health care of the elderly are usually focused on wireless devices, tablets or smartphones. The benefit of these devices is their portability. These wireless devices can communicate over the Internet with optional applications such as messaging, SMS, calendar, alarm clock, games, Bluetooth, infrared camera, music player, radio and GPS including social media.

In order to develop software applications, it must be taken into account the platforms and operating systems. This research was developed with software Cordova. There are many advantages to develop one application and with functionally for other operating systems such as Android, Windows and IOS. This could work altogether effectively and efficiently.

For the user interface. Cordova develop with HTML, CSS, JavaScript. Ionic framework used to build user interfaces for so fast and very efficient in development.

This development must take into consideration the standards and methods for each platform.



Figure 1. Hybrid Mobile Development with Apache Cordova, AngularJs and ionic [3]

## II. SCOPE OF RESEARCH

The application supports the health care of the elderly. Functions consist of images, animation, sound and text. They are designed and developed to be conveniently used below:

1) Information of the elderly. The relevant information collected to support immediate treatment, such as identity card and registration documents.

2) Backup information. Backup is done into Dropbox or iCloud.

3) Pharmaceutical drug management. Information is recorded in text, images, audio and timing the amount of each drug review with a notification in due time.

4) Appointment management such as doctor's appointments, blood tests, and appointments with the notification in due time and in accordance with such advice should be done before the appointment time.

5) Exercise Management or physical therapy with an image or animation, sound or notification in due time.

6) Memo and notes management as the doctor's questions. The measurement of weight and blood sugar content can be measured.

7) Menu food management can record the food items that are defined as appropriate or as recommended by doctor.

## III. RESEARCH OBJECTIVES

Cordova is an open source tool that lets users create apps for wireless devices such as smart phones or tablets, by using HTML, CSS and JavaScript. They can then be used for the development of operating systems such as IOS, Android, Windows.



Figure 2. The structure of Cordova [11]

### A. The structure of Cordova

Cordova structure can be divided into three main sections:

1) *The web application* : application for developers to create app functions.

2) *Web View*: the act of bringing a web application function to display, and is also used to communicate with the Cordova Plug-in.

3) *The Cordova Plug-in*: serves as a channel to connect with various hardware and operating systems of portable devices such as cameras and GPS.

### B. Cordova User Interface

The user interface for the app function Cordova is built with HTML, CSS and JavaScript on the level of the user interface of the application functionality. Cordova is a web browser in the form of 100 percent width and height of device.

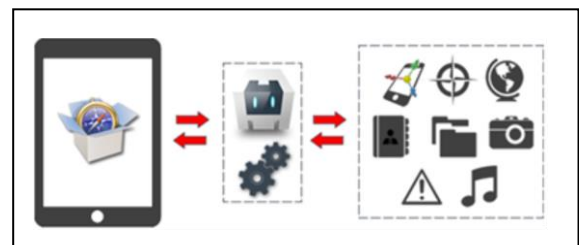


Figure 3. Cordova API [12]

### C. Cordova API

Application Programming Interface (API) functions help in accessing information. They import data into or out of the site or computer language that allows computers to communicate and exchange information freely.

Cordova API allows access to the functions of the operating system using JavaScript with Cordova API serves to manipulate the operating system to communicate with a native.

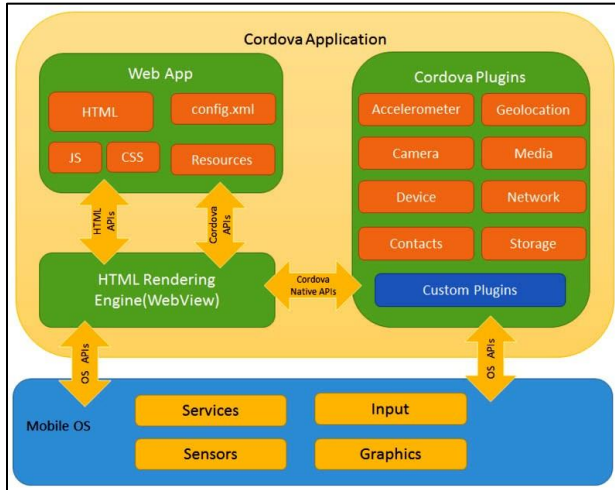


Figure 4. Features of Ionic framework [5]

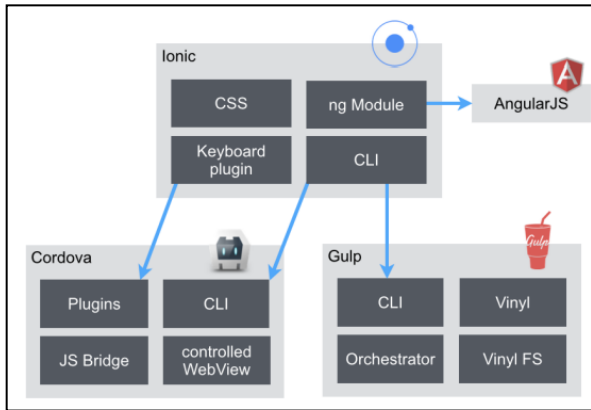


Figure 5. Ionic architecture [4]

#### D. Ionic

Frontend used to develop with HTML, CSS, JavaScript. Then create an application with Cordova. Ionic architecture consists of four main part

1) *A Stylesheet or Cascading Style Sheets (CSS)*: work with the HTML determine to display on the web, such beautiful colors, font colors, font sizes and manage layout.

2) *The AngularJS module*: JavaScript model MVC is developing fast. Because there is a clear separation of functions.

3) *Command line tool (CLI)*: Tools get fastness and sort proxy to Cordova CLI and Gulp CLI.

4) *Keyboard plugin*: plugin that provides information about the current status of the application functionality.

#### E. Development of an application using Cordova

1) *The development of applications with data transmission over the network*

The development of this application can be easily run. It is convenient because it does not need to interact with the operating system's interface with many portable devices. Its main function is when applications need to run other applications or store data, to make a request to

the Web service to run instead. This is similar to the functionality of the site, for example, when a typical application session wants to save the register the application will send them to the Web service. Web services store data as well as the apps functions such as the information display will request information from the Web to display the apps function.

Data can be delivered either in XML and JSON, but is more popular as a JSON data transfer is slower than XML.

##### a) Advantages:

- Makes application functionality faster.
- All data is stored on the Web. No problem when removing apps flight data if lost.
- Application functionality faster because some work was done on the Web.

##### b) Disadvantages:

- Requires a network connection to use the app's functionality. When you cannot connect to the network, you cannot use the app functions.
- Since the data is sent back to the Web Service always. The data may be to theft.

2) *The application offers no data transmission over the network*

The application of this function. There will be difficulties since all information is stored in the memory of the portable device. The need to activate various functions the operating system, such as reading and writing files from internal memory. The internal storage memory of the device can be divided into two types

- Storage sqlite to store data through the database language SQL, which supports easy administration, whether adding, deleting and editing.
- Storage writing files. The collection of data by writing files directly through the system.

##### a) Advantages:

- Does not require a network connection to use the app's functionality.
- Most of the data stored within the app's functionality and provides safety against theft.

##### b) Disadvantages:

- The performance of the application functionality is slow in the case of the function of many operating systems.
- Takes a long time to develop apps for flight.
- Since the data is stored within the device. Data is loss when deleting apps function, if the data is not backed up before.

#### IV. CONCLUSIONS

This research is conducted to support the health care of the elderly. The information will be stored on portable devices but not on the networks. The system could work. Even without network signal. It affects the lives of the elderly. Emergency follows:

##### A. Design

The design is provided the user interface. Complicated due to the design but provides support for multiple operating systems. Enabling the design might suffer as well.

The design is operated for Android system. When visiting any page in the app's functionality, to return to the previous page, just press the back button on the device. It does not require a back button on the app's functionality. Unlike Cisco, IOS devices, which require no back button a back button on the app's functionality will be able to return to the previous page.

The user interface is designed to take into account the experience of the user. Each user's operating system is different such as Android. There must be familiarity with the design material to bring this design to the user operating system IOS will affect the user experience. It feel difficult to use. It is likely that Apple applications are not validated when put in the Appstore. The operating system has a standard design and requires action

##### B. Interface hardware and the operating system

###### 1) To control photography

When taking photographs in the application, the application will be running Cordova Plug-in to assist in connection with the camera hardware. The main problem is that the picture is taken through Cordova Plug-in and will send the pictures back to Apple applications. Each operating system is different. Some operating systems are protected and access files directly. This can cause problems in bringing them to work. This must be managed. The pictures that are stored within the app functionality are easily put to further use.

###### 2) To control the recording and playback sound.

After recording, each operating system will store the audio files together. There is no need to access files directly copied, stored in the app functions. There must be monitoring devices that use any operating system. so that the audio files are stored anywhere.

###### 3) Alerts

Scheduling this notification process is a cumbersome process since the notifications must contain the unique ID. This is a problem that can be solved two ways.

- Storage alerts in the database. Add a new notification and pull the ID to add an additional one each time.
- ID management make it unique by bringing Unix Time used to provide a unique ID.

Setting the date, time, notification must specify the type date, time only identified as a String, so that if you want to set notifications every Tuesday. It must be calculated for that Tuesday, the day it was set up.

##### 4) Storage

Stored data will run through Cordova Plug-in to the operating system. Most problems can occur here. During storage, the error was due to the fact that there was not have the right to use the storage. The original grant application will be set after the application functionality. Change is on the run functions that need access. A window will come up informing the user whether to turn right or not.

##### 5) The flow of application functionality

The performance of applications is over the Web View functionality work, but for the operating system. It was found that the conditions or calculating it on the page. The app will not function smoothly and twitches, apparently due to heavy Web View functionality. It must be designed to calculate a separate page to create or add to Web View and less work.

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