

Mobile Application to Support Learning Process in Manado State Polytechnic

Maksy Sendiang
Information Technology Dept
Manado State Polytechnic
North Sulawesi - Indonesia

Robby Tangkudung
Electrical Engineering Dept
Manado State Polytechnic
North Sulawesi - Indonesia

ABSTRACT

Investigating how to use mobile technology to enhance learning has become the main challenge facing instructional designers and educators in recent years. The widespread usage of mobile devices is extremely significant in many facets of our life, as seen by their recent advancements and diverse capabilities. These days, education is one of the most significant industries where mobile devices are essential. The kinematics mobile learning system design, one of the mobile applications that Manado State Polytechnic will use, will be covered in this article. This study used a combination of qualitative and quantitative methods, and the Relational Unified Process (RUP) was employed in the software development process. The Unified Modelling Language is used for analysis and modeling of data collected by direct observation, interviews, and field research (UML). This system's architecture includes both physical and architectural design, and it is intended to be used on cross-platform mobile devices.

General Terms

Engineering, software, development tool

Keywords

Mobile learning, RUP, Manado State Polytechnic

1. INTRODUCTION

In the current era of expanding computer networks and electronic devices (PCs, tablets, and smartphones), every person and business aims to obtain knowledge and make use of these tools for personal growth and enhanced productivity. A large portion of the global population has access to electronic information. Our reliance on mobile devices has grown to the point where we use them for everything. Mobile devices are being used extensively for both entertainment and education, and we might think of them as the next generation of personal computers. The market for mobile devices is expanding quickly, but that doesn't mean desktop PCs are becoming obsolete. They are less expensive, more portable than PCs, and frequently more helpful due to geolocation.

The primary duty for developing competent young workers in their specialized professions rests with vocational schools, including those in Manado City. It is undeniable that Manado State Polytechnic's kinematics curriculum still uses a traditional learning approach, which limits dominance based on location and time. The learning process should have as few location and time constraints as feasible in order to foster a greater spirit of innovation and learning among students. It is necessary to create systems that give vocational students the freedom to learn at any time or location. The use of informatics technology is one of the options to undergo this case.

The impact of technology on increasing students' enthusiasm to learn is one of the main benefits of its use in the classroom. Younger generations that grew up with computers in their daily life are more aware of this phenomenon. Traditional methods of education may not always be appealing to this generation because they are accustomed to the enjoyable activities and many learning resources found in the digital world. However, learning doesn't have to be dull when technology is used. Interactive and enjoyable activities can be implemented in the context of mobile learning. Furthermore, since young learners typically have relatively short attention spans, engaging activities that encourage active participation from them are more successful. (Koo, 2008).

This study focuses on the design of the mobile application that Manado State Polytechnic will utilize to teach kinematics.

2. LITERATURE REVIEW

2.1 Mobile Learning

The use of mobile devices—such as laptops, cell phones, PCs, tablets, PDAs, and other handheld devices—in combination with a wireless internet network to provide multimedia communication using text, voice, video, and graphics data is known as mobile learning. Through the use of the internet, M-Learning enables students to communicate richly with one another by exchanging texts, sounds, and photos (Cavus & Ibrahim, 2009; Shen, Wang & Pan, 2008). According to Sanchez (2015) mobile learning is defined as “Any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies”.

Numerous benefits come with mobile learning for students, including equal access to opportunities, constant connectivity, support for users of all generations, services for mobile workers, and services for mobile learners (Wagner & Wilson, 2010). M-learning provides opportunity for learning independent of time and space, and allows for greater freedom of movement that may be essential for certain learning experiences. With the use of m-learning, distance education can effectively incorporate students from different backgrounds with diverse learning styles including people who may have certain disabilities or specific learning difficulties. M-learning offers new opportunity to learners who rely on mobile computer solutions that other devices cannot provide, such as ability take pictures and share these in real-time with other learners, guided maps, and global positioning systems (GPS. M-learning would offer improved teaching and learning experiences with the growing integration of wireless networks, mobile devices, and other networking technologies (Vasiliou & Economides, 2011). The largest issue with relation to the drawbacks of m-learning was thought to be the mobile devices' small keyboard and viewing capacity. Verifying the learning

process from the perspective of the learner seems to be a challenging task.

2.2 Mobile Platform

There are different operating systems that are used in the mobile market : Symbian, Blackberry, iOS, Android, Windows Phone and Plam's webOS.

- iOS: It is necessary to create for the iPhone, iPod, Intel-based Mac computers running OS X or later. The IDE, iPhone simulator, and a number of other tools for app creation are all included in the iPhone SDK that Apple provides. The App Store gives users the ability to look for and download apps created with the iOS SDK.
- Android: It was developed on Linux and released under the Apache license. Android's core programming language is Java, and apps may be developed for Android on Windows, Mac, or Linux. Dalvik virtual machines run Java classes that have been recompiled into Dalvik byte code. Android Studio and Eclipse are the most widely used editors on the platform; J2ME is not supported by Android. C or C++ can be used by developers to construct native libraries. The official website and entry point for Android apps is the Google Play Store..
- Blackberry: The BlackBerry smartphone platform supports Java application development using MIDP, CLDC, and RIM proprietary APIs, as well as HTML, CSS, and JavaScript for web development. Support for 32-bit Windows OS for Java development of Blackberry apps
- Windows Mobile: It offers a user experience closer to a desktop. For developing applications and games, Silverlight and XNA are utilized in addition to C++ and C#. Visual Studio is used for Windows mobile development. Requirements include the Net Framework, Windows Mobile SDK, and Developer Kit..
- Symbian: Siemens, Samsung, Sony Ericsson, Nokia, and Ericsson all use the Symbian OS. Python is a language that Symbian OS supports. Linux, Windows, and Mac can all run Python.

2.3 Mobile Application

Mobile applications are applications that are run using a mobile device [5]. Mobile applications can be divided into three categories which include:

- **Native** ; Native apps are applications that are built specifically for certain operating systems. If this application is built for the iOS operating system, then the application will not be able to run on other operating systems. The main advantage of this type of application is its high performance and good user experience because the developer develops this application using UI from native devices. Overall, this application offers a better user experience because it can work quickly, responsively, and distributed through the app store
- **Web**; The web app runs using a browser and is usually written in HTML5, JavaScript or CSS. Because the application targets the browser, the web app can run on various operating systems. In addition, this application is also designed responsively so that the web display can adjust the screen size on the device used by the user.
- **Hybrid** ; Hybrid app can be said as a combination of two kinds of applications, namely native and web. Hybrid applications have two main parts. The first part is back-end code, and the second is a native shell which can be

downloaded. Hybrid applications are considered easier and faster to develop compared to native apps. But the speed of hybrid applications works slower than native applications because it depends on the user's browser speed.

3. METHODOLOGY

3.1 Problem Approach

This research uses mixed method between qualitative and quantitative method. The use of this research method is based on Creswell (2008:5) "The goal of mixed methods as a methodology is to gather, examine, and combine quantitative and qualitative data in a single study or set of related studies. Its main tenet is that combining quantitative and qualitative methods yields a more comprehensive understanding of research issues than using either method alone. "

The mixed method is a research approach that concentrates on gathering, evaluating, and combining quantitative and qualitative data in a one-time or ongoing study. The fundamental premise is that combining qualitative and quantitative approaches in a single study can yield more insightful results regarding the research problem than using just one. In order to build the mobile learning system, the data obtained from mixed method above is modelled by using object oriented approach and in its development using RUP (Relationale Unified Process) method. This method is used because considering the many parameters that will affect the development of this system and also this system will undergo improvements during the development process. Object oriented approach and RUP is very suitable for use in these conditions. Relationale Unified Process is a software development method that is executed repeatedly and architecture-centric focus. RUP is a software engineering process with good definition and structuring. The RUP provides a good structural definition for the software project's lifeflow (Chen Q, "Compare and study about owing to the three kinds important softwares develop process", Proceeding of the International Conference on Education Technology and Economic Management (ICETEM). 450-451. 2015).

3.2 Data Collection and Analysis

Qualitative and quantitative data collection techniques were used in this research. Yin (2006:103) formulates six sources of evidence that can be used to collect qualitative data such as documents, records, interviews, direct observation, participant observation and physical evidence. Techniques for gathering quantitative data are applied in field studies or in direct relation to stakeholders. In particular, the data for this study were gathered through fieldwork, interviews, and direct observation. Manado State Vocational High School, which consists of six schools, is the subject of the study.

The method of qualitative data analysis is applied to information gathered prior to, during, and following the design of an information system. To obtain high-quality research results, data from field studies, interviews, and direct observation will be carefully examined and reviewed. When analyzing data on a fixed basis, a constant comparative method is employed to compare the data with other data sets. The outcomes of this data analysis will subsequently be modeled using the Unified Modelling Language (UML), a program that facilitates an object-oriented methodology. .

4. RESULT AND DISCUSSION

4.1 Functional Requirement

In software engineering, a functional requirement is a statement of a system or one of its components. It outlines the duties that

a piece of software must do (Roger S. Pressman, 2014). Just inputs, conduct, and outputs make up a feature. It can be a computation, information processing, business procedure, user interface, or any other specific feature that indicates the expected behavior of a system. Also called Functional Specification are functional requirements. Functional requirement assists us capture the system's intended behavior. This conduct can be articulated as functions, services or tasks, or which system needs to be performed (Roger S. Pressman, 2014).

The functional requirements for this simulation software are as follows:

| No | Functional Requirement Description |
|-------|---|
| FR 1 | Program that can connect to every joint simulation screen for kinematics |
| FR 2 | Based on the type of selected joint, a software system can simulate kinematics motion. |
| FR 3 | Software system can move from one simulation window to others |
| FR 4 | Software system can show rotary motion of a member in a mechanism when pivot or revolute joint is used |
| FR 5 | Software system can simulate fixed distance of two members connected using distance joint. One of the member doing kinematic motion but the member's distance remains constant |
| FR 6 | Software system must simulate restricted motion along vertical axis when piston joint is selected into a mechanism |
| FR 7 | Software system can simulate translational (directional) friction as well as angular (rotational) friction between two objects when friction joint is selected |
| FR 8 | System software can simulate kinematic motion like piston joint, except that the attached body can rotate freely |
| FR 9 | Software can mimic the mechanism of motion in which other objects can adjust to compensate for the mechanism when a pulley joint is used to pull or push an object with a specific force. |
| FR 10 | Software can simulate the gear mechanism |

4.2 Non Functional Requirement

A non-functional requirement defines a software system's quality attribute. They are a set of standards by which to evaluate the specific functioning of a system. A non-functional requirement is essential to ensure the overall software system's usability and effectiveness. Systems failure could result from non-functional requirements not being met (Roger S. Pressman, 2014).

The non-functional requirement of this system are :

- The software should be portable
- The software is easy to learn, operate through interaction with interface.
- The software can be executed in mobile device with 1GB memory.

4.3 System Modelling

The process of developing abstract models of a system, each of which offers a unique perspective or understanding of the system, is known as system modeling. It has to do with using graphical notation to represent a system; these days, UML (Unified Modeling Language) notations are nearly always used. [8]. Models help the analyst comprehend the system's features; they are used for customer communication.

Models can describe the system from different views:

- An external viewpoint where analysts mold the environment or context of the system.
- An internal perspective where analysts model the relationships between the system and its environment or between the system parts..
- A structural perspective in which analysts model the system organisation or information structure processed by the system.
- A behavioral perspective in which analysts model the system's dynamic conduct and how it reacts to occurrences.

The design of this mobile learning platform, which consists of a mobile app, is modeled using a use case diagram and a class diagram (which only includes a few methods and properties for each class):.

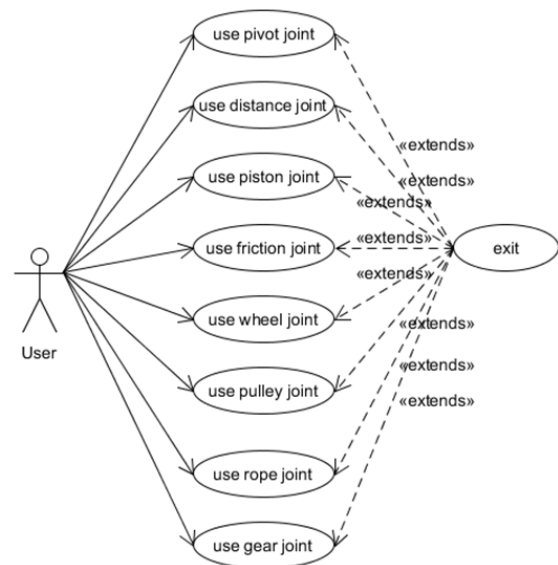


Fig 1. Use Case Diagram

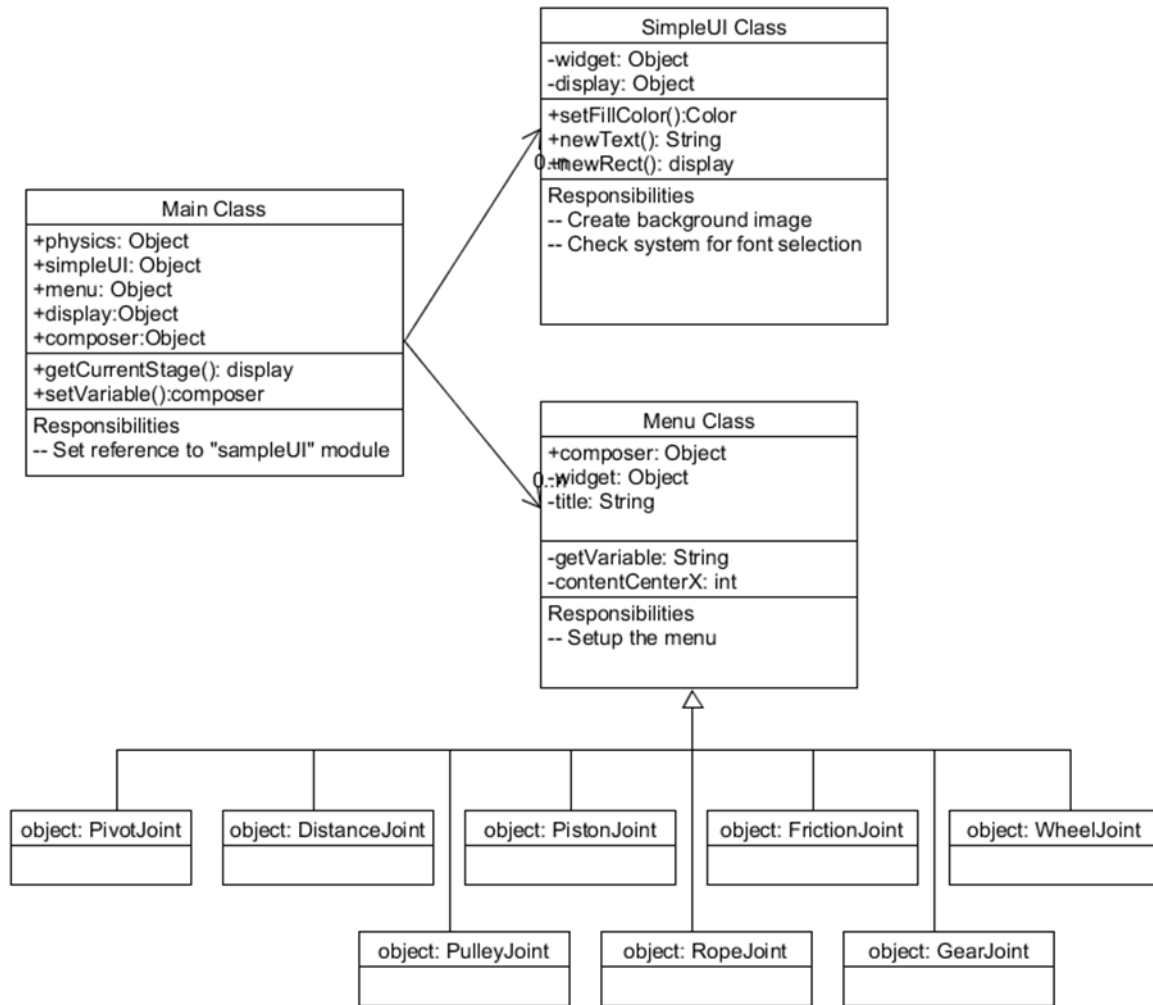


Fig 2. Class Diagram

5. CONCLUSION

For teaching motion and accelerating joint kinematics, a mobile application that mimics kinematic mobile learning can be a very useful tool. By using this mobile application, students can see kinematic motion and learn about kinematics as a part of mechanics. On the other hand, practitioners can use this software to help them create machines and designs. The RUP process was used to create this program, and UML was used to model the system as a whole..

6. REFERENCES

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