Journal of Mathematics and Computing Science, 2023,
Volume 9, No 2, 9-17

Requirements Elicitation Activity for Online Internship System

Noorihan Abdul Rahman[1]*, Nur Marjan Nabilah Ahmad Nizam[2], Nor Asma Mohd Zin[3] and Zuriani Ahmad Zukarnain[4]

[1,2,3,4] College of Computing, Informatics and Mathematics, Universiti Teknologi MARA Cawangan Kelantan, Kampus Machang, 18500 Machang, Kelantan, Malaysia

Authors' email: noorihan@uitm.edu.my*, marjannabilah11@gmail.com, norasma@uitm.edu.my, zurianiaz@uitm.edu.my

*Corresponding author

Received 17 September 2023; Received in revised 10 October 2023; Accepted 8 November 2023
Available online 5 December 2023

Abstract: An internship is a part of a working experience in which students are expected to gain working experience by working at a company or organization for a short amount of time as part of the program. The management of student internships has traditionally been handled manually using Microsoft Word and Microsoft Excel, which has resulted in a significant number of duplications. In addition, human error is one of the issues which lecturers and the students typically encounter. Apparently, hardcopy documents are no longer convenient to students, practical coordinators, and the industry representatives. Therefore, the objective of this study is to conduct requirement elicitation activity for obtaining user requirements for an online internship system known as Computer Science Department Internship Information System (CODIIS). The chosen methodology for CODIIS development is the Waterfall model whereby it consists of five phases namely planning, analysis, design, implementation, and maintenance. The requirement elicitation activity results in clear needs on CODIIS which helps to justify the importance of integrating internship-related information.

Keywords: Elicitation; Internship; Requirements; Software development; Techology

1 Introduction

Internships among university students are highly beneficial as they provide valuable and practical experience which enhance their career prospects [1]. However, lack of centralized data about students and industrial training placement may affect visibility of information from the university coordinator and also the industry representative. Lack of centralized data can also bring delay in getting students details. Before visiting their internship students, academic supervisors need to know more about the students but there is no centralized information to allow the lecturer to search for required information. As the consequences, the lecturer must ask student's information from the internship coordinator or the student himself. During the internship, students need to write in the logbook about what they are doing every day in order to keep track of what they are doing. Students facing the risk of losing data if the logbook were damaged or missing whereby the hardcopy information is no longer practical. In this article, the authors highlight the role of online internship system for improving industrial attachment process where it can assist the university coordinator, industry representative and student in having better coordination of data exchange during internship process. This article follows with Section 2 which discusses on the literature regarding the importance to integrate internship data between universities and industries and also existing technologies for developing online application. Section 3 explain the methodology of the application development. Section 4 discusses the result and Section 5 conclude the article.

2 Related Literature

The related literature for this paper covers the importance to integrate internship data and also related technologies for online application.

A Importance to integrate internship data

It is important to integrate internship data between universities and industries since it helps to bridge the gap between theory and practice [2]. Internships provide students with practical exposure to real-world work environments, allowing them to apply the theoretical knowledge gained in the classroom. Integrating internship data helps universities align their curriculum with industry requirements, ensuring that students develop relevant skills and knowledge that meet the needs of the job market [3]. By designing and developing internship application software, the university can track student performance and outcomes during their internships. This includes evaluating their performance, assessing their skills development, and measuring their overall learning outcomes. Such data can contribute to the university's accreditation processes, program evaluation, and continuous improvement efforts.

In addition, industry collaboration and partnerships between universities and industries helps to establish and maintain relationships with companies and organizations, creating opportunities for joint research, guest lectures, mentorship programs, and industry-sponsored projects [4]. Such collaborations benefit both parties by promoting knowledge exchange, innovation, and industry-relevant research. The opportunity in implementing internship application software can contribute to continuous improvement of internship program by analysing internship data, universities can gain valuable insights into the effectiveness of their internship programs. They can identify patterns, trends, and success factors associated with internships and use this information to improve program design, implementation, and evaluation. This iterative process helps universities refine their internship offerings, ensuring that students receive quality learning experiences.

B Related Technologies for Online Application

i. Web Application Platform

Web applications are a big part of a lot of business tasks in the modern world. It has become a place where businesses can get what they need for their business. There are many different techniques and software tools are used to make web applications. There are also many server-side programming languages for web applications, such as PHP, ASP.NET, JSP, Java, Perl, and Python [5].

ii. AngularJS

JavaScript is an important component of modern web applications. It is used to build many kinds of systems, including web applications with complex user interfaces. Because of this, new technologies and tools, like JavaScript libraries and frameworks, are being made to solve common problems in these applications. A new family of JavaScript frameworks that use the model-view-controller architecture pattern has appeared or variations of it. AngularJS, Back-bone.js, and Ember.js are all examples. The JavaScript framework is quite like the AngularJS framework [6], both of which are open-source and Model-View-Controller frameworks. It is likely that AngularJS is currently one of the most widely used modern web frameworks that are accessible today. Most single-page applications are developed with the assistance of this framework. A team of Google's own software engineers is responsible for developing this framework from the ground up. The framework is always kept up to date thanks to the unwavering support of Google as well as the contributions of ideas from a large community forum.

Angular.js keeps the data layer and the presentation layer in synchronization, so there is no need to write extra JavaScript code to keep the data in the HTML code and the data later in sync. Angular.js will do this automatically. Developers only need to say which part of their model is linked to which control. AngularJS can also move from one view to another, which is called routing. This is the main idea behind single-page applications, in which users can move to different parts of the web

application based on how they interact with it, but they stay on the same page. One of the other benefits of using AngularJS is that it can be tested, both individually and as a whole. It adds to HTML by adding what are called directives, which are new elements. At a high level, directives are markers on a DOM element like an attribute, element name, comment, or CSS class that tell AngularJS's HTML compiler to give that DOM element a certain behavior [7]. These directives help make HTML elements do more by adding to their functions.

iii. Hypertext Pre-processor

Hypertext Pre-processor, PHP, is a widely used open-source general-purpose scripting language that is especially good for web development and can be put into HTML [8]. It is especially good for building websites. PHP runs everything from the blog to the most popular websites in the world. It is easy to use, flexible, and practical. PHP is a web scripting framework that build dynamic websites with features like being easy to use, quick to compile, cross-platform, open-source, flexible, and requiring little setup. PHP is one of the most powerful programming languages that can be used on the Web. Many developers like to use PHP-based frameworks that solve all the problems at once, like data access, business logic, and the layer for displaying data. In fact, this makes development harder, especially for large projects. The MVC architecture pattern, on the other hand, makes it easy to separate code into layers that do different things from each other. This helps solve the problem. Model, View, and Controller are the building blocks of PHP frameworks. The MVC architecture pattern is a good way to build apps like CakePHP, CodeIgniter, Laravel, Symfony and Yii [9]. The main goal of MVC is to break up a program into different layers that can run on their own and still get the same result.

iv. Symfony

Symfony is an Open-Source PHP framework for web applications and a set of reusable PHP components [10]. The developers have access to over 50 Symfony components from which to choose in order to meet the individual requirements of their web development projects. Therefore, repetitive but complex tasks like generating URLs, building forms, debugging code, or implementing a caching system can be quickly included in the application by installing the components seamlessly with the use of Composer. Model View Controller is an architecture pattern that allow to create a website or web application in a way that is much more structured, layered, and logical. It is also abbreviated as MVC, which stands for Model View Controller. The use of MVC in conjunction with PHP results in an environment that is friendlier to developers and makes the process of coding easier to perform. Nevertheless, using Symfony does not require developer to use MVC. If developer do not prefer using MVC for this particular purpose, it is perfectly acceptable given that the primary objective for everyone should be to separate the various concerns being addressed. It is possible to utilize any third-party libraries with Symfony. For example, developer could use Doctrine or Propel for the Model, or Twig for the View.

v. CodeIgniter

CodeIgniter is an open-source web-based application that uses a browser and network to make PHP applications that are dynamic [11]. CodeIgniter is a PHP framework that uses the MVC to make active websites with PHP. This makes it faster for developers to make a web app. CodeIgniter is not only small and fast, but it also has very complete documentation and code implementation examples. There a few benefits of using CodeIgniter framework such as it requires minimal configuration.

3 Methodology

The chosen software methodology for developing online internship system (CODIIS) is Software Development Life Cycle (SDLC). There are two types of SDLC which is predictive approach and adaptive approach[12]. One of the most common predictive models is the Waterfall model. In this project, waterfall model is chosen because of its straightforward and ease of implementation. Each

phase takes a lot of time because the developer is unable to move on to the next phase until the problems are solved. In the early phase, when planning phase, the first work should be done. The planning should be clear so that the developer can move on to the next step without worrying about the problem. Figure 1 shows there are five phases in system developing which are planning, analysis, design, implementation, and maintenance.

Figure 1: System Development Life Cycle [12]

A Planning

The first phase in waterfall model is system planning phase. In this phase, the developer planned a meeting with the Internship Coordinator to brainstorm idea for CODIIS system. The users were identified during this phase which are students and lecturers, industry supervisor and internship coordinator as the admin. The main technologies and tools associates with CODIIS are PHP using Laravel framework, HTML, bootstrap, CSS, MySQL and JSP. Diagram drawing tools such as Draw.IO and Canva are identified in this stage. Each of the technologies that are freeware, and the required technical skills are manageable.

B Analysis

During analysis phase, the requirements are elicited to obtain user requirements from the stakeholders. To gather the requirements for the CODIIS, interview is conducted with the internship coordinators. The purpose of this data collection was to get the validated requirement for CODIIS. After gathering all the information, accurate set of requirements is finalized to support the problem statements and the whole CODIIS system development.

C Design

After writing down the requirements, the next step is to design the system. Before implementation begins, the plan is made. Once the requirements have been modelled in the previous phase, CODIIS is visualized into several diagrams such as Context Diagram (CD), Entity Relational Diagram (ERD) and User Case Diagram (UCD)[13] by using Draw.io [14] and Microsoft Word and the database is designed and developed to cater the requirements for CODIIS.

D Implementation

During implementation phase, the design specifications is transformed into physical model which is the system development or software component through programming and deployment[15]. During this phase, the real code is written and compiled into an application that works. During this phase, CODIIS is implemented according to the system's sub-module needs. This system development is created with PHP using Laravel Framework, Visual Studio Code, MySQL Workbench and XAMPP as the local host server.

E Maintenance

During the maintenance phase, necessary modifications is made to CODIIS based on the user modification request. Its primary function is to enhance system performance while ensuring that the program output is as accurate as possible. These changes result from either customer-initiated change requests or flaws found when the system is being used in real life. The developed software is regularly maintained and supported for the client. Next, this article discusses the results of requirements elicitation in data integration activity of CODIIS development.

This paper also elicits the contribution of Waterfall model as a classic software methodology for developing Web-based application. This paper gives insights of the importance of adopting Waterfall model with the recent Web-based development framework such as AngularJS, Symfony and CodeIgnitier since Waterfall model is suitable for a clear set of requirements and non-volatile requirements. Next section explains the results on the requirements elicitation activities as the initial phase of the software development process.

4 Results and Discussion

This section explains the results of requirements elicitation activities performed for CODIIS development activity and also the user perception on CODIIS based on Google Forms feedback.

A Requirements Elicitation Activities for CODIIS

Question: Can you explain tell me about UiTM's internship management?
Answer: First and second phase which is placement application and selection of placement phase contain a lot of submission form and document between the internship coordinator students. I need to process a lot of form submitted by student. Next, during the internship, student will write daily report in logbook which will be checked by their supervisor at the end of the week. The lecturer will check the logbook at the end of internship. When the internship ended, student internship performance will be evaluated. Supervisor will submit evaluation form to the internship coordinator. Students need to write a report which will marked by lecturer.
Question: From the current internship registration process, do you find any difficulties?
Answer: Yes, the internship process right now is having difficulties because everything was done manually using Microsoft Word and Microsoft Excel.
Question: Do you find it difficult to manage student's data manually?
Answer: Yes, there will be data error when using the manual method to register student to internship.
Question: Does data error frequently happened when using Microsoft Word and Microsoft Excel?
Answer: Yes, there is a lot of risk of data error since everything was done manually using Microsoft Word and Excel. I need manage to a lot of student's internship registration process so there's probability that I mixed up between students.
Question: Do you find it become inconvenient that the academic supervisor needs to ask from you if they need student information?
Answer: During the internship lecturers will find me find out about their student internship information since they need to visit will is can be annoying when there's a lot of students.

Figure 2: Screenshots of requirements elicitation results

To gather the requirements in CODIIS development, interview was conducted with the internship coordinators. The purpose of this data collection was to get the users' requirement for the CODIIS. Figure 2 illustrates the requirements elicitation result on the manual internship process in this study. It reveals the question-and-answer session with the internship coordinators and lecturers

From the requirements elicitation activities, the Internship Coordinator think it is difficult to record the internship information manually since there will be a tendency in key in false data. In

addition, by using manual process of internship registration, the internship lecturers needs to search for their students' record manually in the manual file before going for an internship visit.

Online survey was also conducted by using Google Form to 20 students who are ready for their internship in UiTM Kelantan Branch. The questionnaire was divided into three parts. All of the respondents are from the Bachelor of Information Technology, UiTM Kelantan Branch. The results of the survey are shown in Figure 3, Figure 4 and Figure 5.

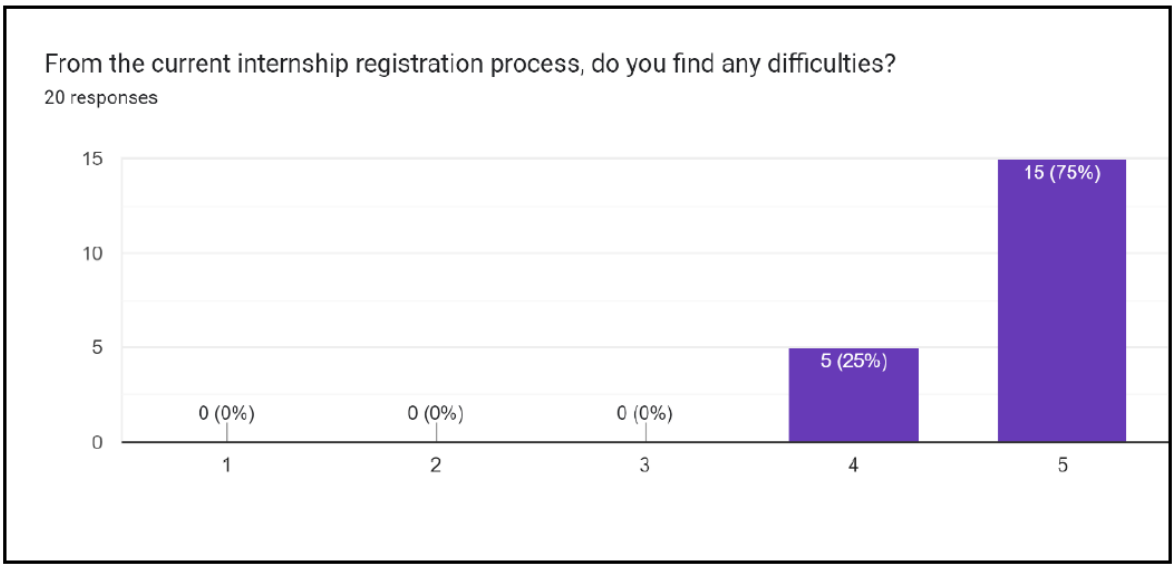

Figure 3: Result on the existing manual internship process

Figure 3 above shows that 75% of the respondents strongly agree that they found difficulties with the internship registration process while the rest slightly agree with the statement.

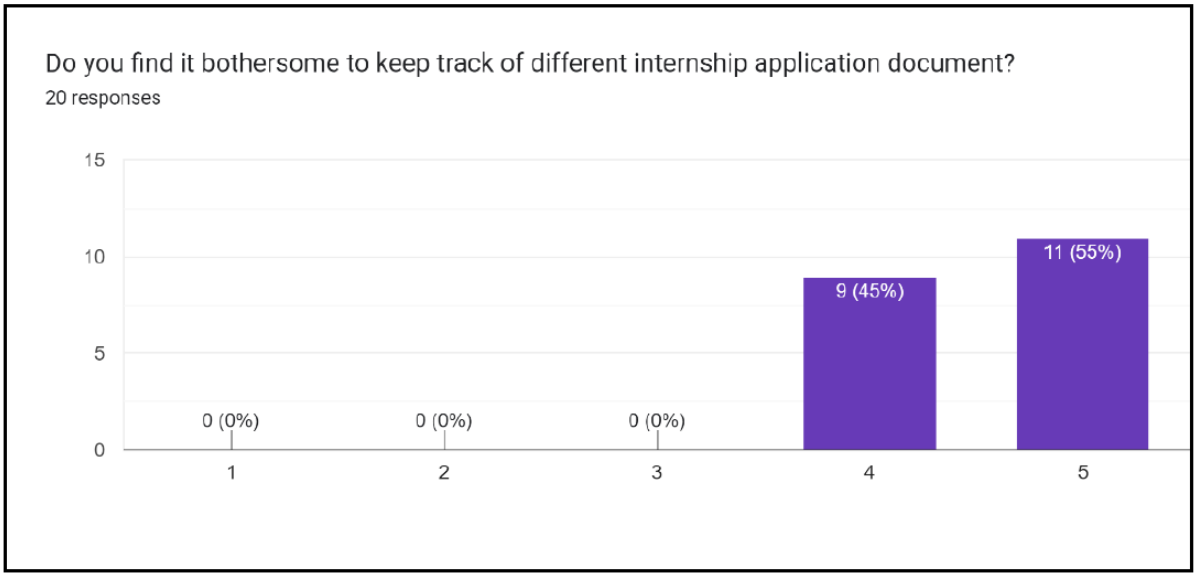

Figure 4: Result on tracking documents using manual internship process

Next, Figure 4 shows that 55% of respondents strongly agree and 45% of respondents somewhat agree that it's hard to keep track of all the different documents needed to register for an internship.

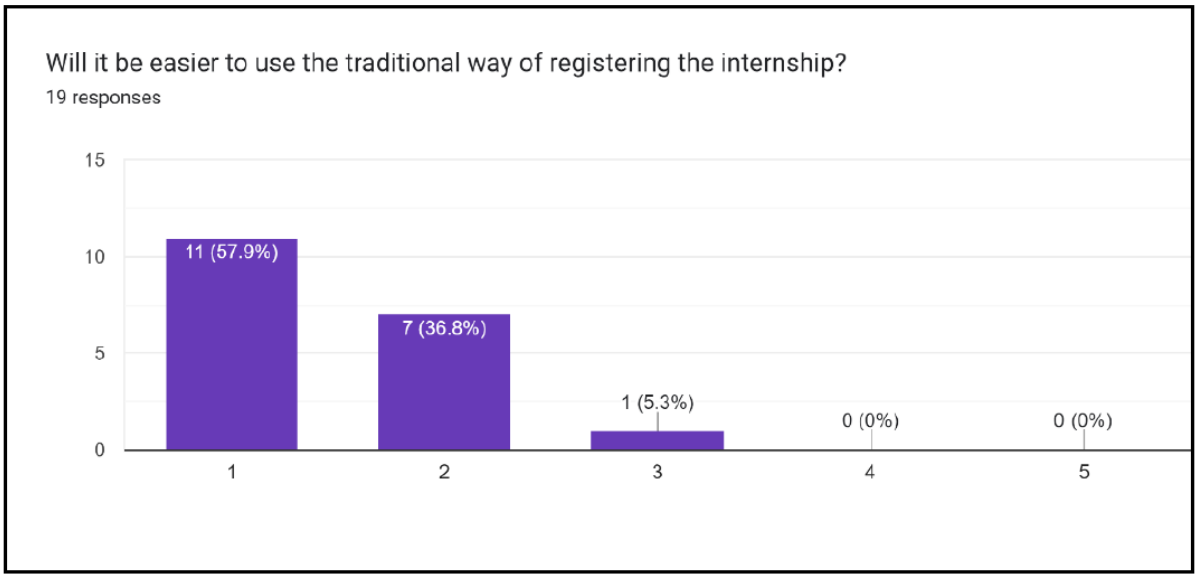

Figure 5: Result on ease of use in traditional internship registration process

Figure 5 reveals 11 respondents (57.8%) strongly disagree it will be easier internship process when using traditional method for registering internship and 5.3% of the respondents feel natural about the statement.

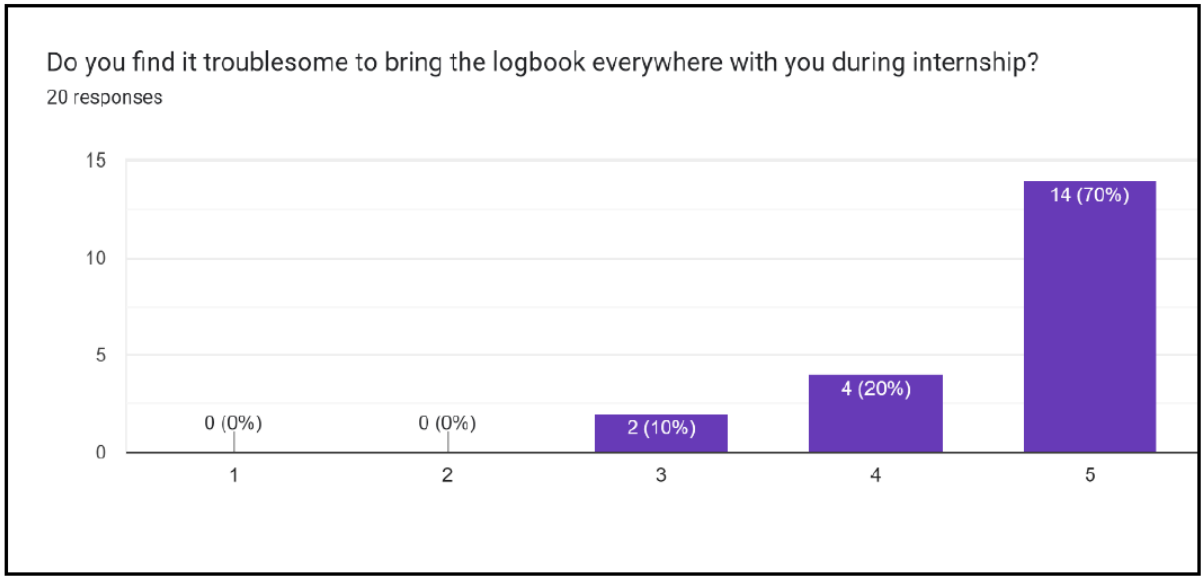

Figure 6: Respondents' opinion about bringing logbook during internship

Figure 6 depicts that 70% of the respondents strongly agree and 20% of the respondents somewhat agree that they found it troublesome to bring the logbook everywhere with you during the internship while the rest of the respondent neutral about the statement.

As the summary, the analysis above shows the importance of having online intership system in improving internship registration process as well as documents tracking for students' information. From the requirements elicitation activities, the Internship Coordinator thinks it is difficult to record the internship information manually since there will be a tendency in key in false data. In addition, by using manual process of internship registration, the internship lecturers need to search for their students' record manually in the manual file before going for an internship visit.

Therefore, there is a need for implementing CODIIS by using a web-based platform as it can assist students to share and exchange their information with coordinators and also their supervisors. This can also reduce the delay in obtaining current information regarding the internship progress.

5 Conclusion

CODIIS is a suggestion after requirements elicitation activities that has been accomplished in order to give a more effective method than the manual internship process. Students can use the system to submit forms and they can also use it to make their daily log report, which is aimed at replacing the more conventional manner of using the logbook. The lecturer can view the student's personal information as well as the information of the internship placement. They are also able to check the daily student log that was sent to them by the student. A supervisor at the company can log in to the system to review the intern's daily log. Internship Coordinator can update new information to students using CODIIS. They also can use the system to access document that was required and uploaded by student plus they can view every student's internship information. The students, the lecturers, and the company supervisors will benefit in using a system that is able to integrate intership-related information.

Acknowledgements

The authors would like to thank Universiti Teknologi MARA (UiTM) Kelantan Branch, Malaysia and Universiti Teknologi MARA (UiTM) Shah Alam, Malaysia for supporting the research activities related to software development and its application.

References

[1] R. A. AlGhamdi, "Virtual internship during the COVID-19 pandemic: exploring IT students satisfaction," *Education+ Training*, vol. 64, no. 3, pp. 329–346, 2022.
[2] W. Wu, "Investigating internship experiences of data science students for curriculum enhancement," In *Proceedings of the 27th ACM Conference on on Innovation and Technology in Computer Science Education*, Vol. 1, pp. 505–511, 2022.
[3] N. Thi Ngoc Ha and E. Dakich, "Student internship experiences: areas for improvement and student choices of internship practices," *Education+ Training*, vol. 64, no. 4, pp. 516–532, 2022.
[4] I. Baker and D. Fitzpatrick, "Student experiences in pre-COVID virtual internships: integration, barriers, motivation challenges, supportive supervisors, and intern growth," *American Journal of Distance Education*, vol. 36, no. 2, pp. 90–102, 2022.
[5] S. Theocharis and G. A. Tsihrintzis, "Production and Publication of Linked Open Data: The Case of Open Ontologies," In *Semantic Knowledge Modelling via Open Linked Ontologies: Ontologies in E-Governance*, Springer, pp. 255–347, 2023.
[6] D. Ghelani, T. K. Hua, and S. K. R. Koduru, "A Model-Driven Approach for Online Banking Application Using AngularJS Framework," *American Journal of Information Science and Technology*, vol. 6, no. 3, pp. 52–63, Springer, 2022.
[7] P. Web and V. K. Kotaru, *Building Of fline Applications with Angular*, 2022.
[8] N. Dubey, P. Dhanve, P. Nikalje, and V. Bodhale, "Online Food Ordering System," *International Research Journal of Modernization in Engineering Technology and Science*, vol. 5 no. 3, pp. 2770-2776, 2023.
[9] S. bin Uzayr, *PHP: The Ultimate Guide*. CRC Press, 2022.
[10] G. Engebreth and S. K. Sahu, "Introduction to Symfony," In *PHP 8 Basics: For Programming and Web Development*, Springer, pp. 273–283, 2022.
[11] M. Muqorobin and N. A. R. Rais, "Comparison of PHP Programming Language with Codeigniter Framework in Project CRUD," *International Journal of Computer and Information System (IJCIS)*, vol. 3, no. 3, pp. 94–98, 2022.
[12] H. Zelfia, T. Simanungkalit, and T. Raharjo, "Comparison of Scrum Maturity between Internal and External Software Development: A Case Study at One of the State-Owned Banks in

Indonesia," In *2022 1st International Conference on Information System & Information Technology (ICISIT)*, IEEE, pp. 312–317, 2022.

[13] F. Erawantini, S. Farlinda, and A. L. Suryana, "Design electronic medical records with clinical decision support system (CDSS) to prevent interaction of drug content in outpatient department," *Bali Medical Journal*, vol. 11, no. 2, pp. 651–659, 2022.

[14] E. Hendrawan, M. Meisel, and D. N. Sari, "Analysis and Implementation of Computer Network Systems using Software Draw.io," *Asia Information System Journal*, vol. 2, no. 1, 2023.

[15] T. Rozhnova, V. Tomachynska, and D. Korsun, "Life cycle models, principles and methodologies of software development," *Scientific Collection «InterConf+»*, vol. 28, no.137, pp. 394–401, 2022.