

# Proceedings of the Second International Conference on Informatics and Computing (ICIC 2017)



## 2017 Second International Conference on Informatics and Computing (ICIC)

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**APTIKOM**



# Towards better competencies of ICT human resources and regional competitiveness in a global era

**Aston Hotel and Convention Center – Jayapura**

**Papua – Indonesia**

1-3 November 2017



# Message from the Chairs

It is with great honours to welcome you all to The Second International Conference on Informatics and Computing (ICIC 2017) in Jayapura, Papua, Indonesia. The ICIC 2017 main topic is "Towards better competencies of ICT human resources and regional competitiveness in a global era" and the primary goal of the conference is to exchange, share and distribute the latest research and theories from our international community which provides an exchange of the state of the art and future developments in the two key areas of this process: Computer Science and Information Science.

ICIC 2017 can be considered as a premier event for sharing knowledge and results in the area of a. Computer Engineering and Computer Systems, b. Computer Science/Informatics, Information Systems, c. Information Technology and Information Management and d. Software Engineering. It provides a platform to the researchers and practitioners from both academia as well as industry to meet and share the cutting-edge development in the field. In addition, this conferential meeting provides a great opportunity to exchange knowledge and experience for all the participants who join in from all over the world to discuss their new thinking and creations.

ICIC 2017 serves as a forum for scientists, engineers and practitioners to meet and present their latest research results, ideas, and papers in the diverse areas of Computer Engineering, Computer Science, Information Technology and Information Systems. This conference is collaboratively conducted by APTIKOM, hosted by APTIKOM Papua and Universitas YAPIS Papua, with co-hosted by STMIK Bumigoro, Universitas Pasundan, Universitas Bina Darma, Universitas Gunadarma, STMIK Bina Insani, Perguruan Tinggi Raharja, Bina Sarana Informatika, Universitas Komputer Indonesia, Universitas Dian Nuswantoro, Universitas Budi Luhur, STMIK Nusa Mandiri, STMIK Tasimalaya, Universitas Tanjung Pura, STMIK Bali, Universitas Katolik Parahyangan, Universitas BSI, LSP Informatika and STMIK Sepuluh November. This conference is organized and sponsored by APTIKOM and technically co-sponsored by IEEE Indonesia Section

This scientific conference covers 3 (three) keynote speakers and 5 (five) technical sessions. We presented 96 papers out of 173 papers submission (Success rate 55%) and has attracted researchers from 20 countries (paper submission came from 13 countries), i.e. Australia, Bahrain, Czech Republic, France, Germany, Greece, India, Indonesia, Ireland, Japan, Malaysia, Morocco, Nigeria, Oman, Poland, Saudi Arabia, Slovakia, South Korea, Sudan, and Thailand. The conference has 366 authors and 116 reviewers, who have carefully reviewed the papers. Each submitted paper was reviewed by at least 3 reviewers in the related fields, and all registered papers have the similar score of maximum 20% under the Turnitin plagiarism check.

It is expected that this conference will become a main platform for providing and exchanging information, knowledge, skills, and experiences in the field of Computer Science and Information Science. ICIC conference will be held annually to make it an ideal platform for people to share views and experiences in informatics and computing.



We would like to take this opportunity to express our thanks to APTIKOM Papua and Universitas YAPIS for hosting this conference, the members of the ICIC 2017 committees and our respected reviewers for providing proficient and valuable contribution in the preparation of this conference. We also would like to acknowledge all the participants and the co-hosts of ICIC 2017 for their supports to this conference.

We do hope that the conference will be stimulating, informative, and enjoyable to everyone.

Thank you.

**Prof. Dr. Teddy Mantoro, SMIEEE (Program Chair)**

**Assoc.Prof. Dr. Media A. Ayu, SMIEEE (TPC Chair)**



## Technical Session Schedule

Day 1: 10.30 – 12.00		
Technical Session 1-1	3	Security Comparison between Dynamic & Static WSN for 5G
	13	Testing The Best Queue Method For Internet Network in Cibuntu Tourist Village
	25	Image Segmentation Using the Otsu Method in Dental X-Rays
	27	The Depth-First Search Column by Column Approach on the Game of Babylon Tower
Technical Session 1-2	11	Comparison of Nucleus and Inflammatory Cell Detection Methods on Pap Smear Images
	28	Identification of Molar and Premolar Teeth in Dental Panoramic Radiograph Image
	33	Developing Indonesian Corpus of Pornography using Simple NLP-Text Mining (NTM) Approach to Support Government Anti-Pornography Program
	38	Chess Piece Movement Detection and Tracking, A Vision System Framework for Autonomous Chess Robot
Technical Session 1-3	4	Funding Eligibility Decision Support System Using Fuzzy Logic Tsukamoto (Case: BMT XYZ)
	23	An Enterprise Architecture Planning for Higher Education Using The Open Group Architecture Framework (TOGAF): Case Study University of Lampung
	26	Improving E-Government Services for the Poor through Transparency and Trust
	42	Concept-based Multimedia Information Retrieval System using Ontology Search in Cultural Heritage
Technical Session 1-4	54	Generating Automatic Marker Based on Combined Directional Images from Frequency Domain for Dental Panoramic Radiograph Segmentation
	62	Quality enhancement of degraded Sundanese lontar images using direct subtraction and retrospective correction methods in several color spaces
	78	Solving Non-Linear Equations Containing Spline Interpolation Function by Relaxing The Newton Method
	85	Implementation of Fuzzy C-Means Algorithm and TF-IDF on English Journal Summary



Day 1: 14.15 – 16.00		
Technical Session 2-1	173	A Research Framework of Disaster Traffic Management to Smart City
	168	Towards a Drug Information Interoperability Mechanism
	153	Diagnostic Decision Support System of Chronic Kidney Disease Using Support Vector Machine
	150	Modified Adaptive Affinity Propagation with Similarity Distribution Based Preference
	146	A Cluster Validity for Spatial Clustering Based on Davies Bouldin Index and Polygon Dissimilarity Function
Technical Session 2-2	156	Security of Data Communications Between Embedded Arduino Systems with Substitution encryption
	158	Estimation System of Occupant Behavior Against The Use Of Electricity Using Bayes Method And Decision Tree Algorithm
	159	Identification of Active and Passive Sentence for Plagiarism Detection
	171	Improving the Accuracy of Complex Activities Recognition Using Accelerometer-Embedded Mobile Phone Classifiers
	160	Velocity and Acceleration Analysis from Kinematics Linear Punch Using Optical Motion Capture
Technical Session 2-3	129	Empirical Study on Consumer Acceptance of Mobile Applications in Jakarta Indonesia
	130	Pasienesia: A Mobile based E-Patient Social Network, Promoting Empowerment Among Patients who Experience Similar Diseases
	151	Comparative Analysis between Online E-Learning and Face to Face Learning: An Experimental Study
	112	A recommendation system for culinary tourists in Jogjakarta based on collaborative filtering
	107	Learning Style Model Detection Based on Prior Knowledge in E-learning System



Technical Session 2-4	154	System Architecture for a Distributed Digital Signage System in Developing Countries: Leveraging Open Hardware, Open Source Software, and Open Standard
	142	Web Services of Transformation Data Based on OpenEHR into Health Level Seven (HL7) Standard
	109	Problematic Internet Use (PIU): The Role of Emotional Factors on Social Media Activities
	91	A Speech Intelligence Conversation Bot for Interactive Media Information
	84	Expert System for Choosing Property Based on Rule Based Reasoning
<b>Day 1: 16.20 – 18.10</b>		
Technical Session 3-1	77	Wireless Sensor System for Photovoltaic Panel Efficiency Monitoring Using WIFI Network
	88	License Plate Recognition for Moving Vehicles Case : At Night and Under Rain Condition
	37	The Synthesis of Counter Circuit Layout Design Based on CMOS Technology 0.35 $\mu\text{m}$
	111	Design of Circular Ring Microstrip Patch Antenna with an H-Shaped Slot on the Ground Plane for WiMAX
	44	Robust Ball Color Auto-Calibration for Tracking
Technical Session 3-2	148	Implementation of Image-Based Secret-Sharing on Communication between Mobile Devices
	126	Smart Aquaponic with Monitoring and Control System Based on IoT
	169	A Web Accessing Tool for Blind and Visually Impaired People Using Bahasa Indonesia
	138	Emotion Recognition and Brain Mapping for Sentiment Analysis: A Review
	92	Human Face Recognition Application Using PCA and Eigenface Approach
Technical Session 3-3	10	Land use growth simulation and optimization in the urban area
	18	Implementation of Expert System for Selecting Appropriate Mobile Application Architecture Using CLIPS
	30	Clustered Directed Diffusion Modelling for Tesso Nilo National Parks Case Study
	94	Comparison Methods for Selecting Best Images to Solar Panel Monitoring
	31	Cyberbullying Comments Classification on Indonesian Social Media Celebrity (Selebgram) using Support Vector Machine Method





Technical Session 3-4	90	An ICT Adoption for Education: A Proposed Framework
	86	The Expert-Judgement Validation and Finalization of Proposed Interaction Design Process Maturity Instrument
	1	Researching Computing Teachers' Attitudes Towards Changes in the Curriculum Content – An Innovative Approach or Resistance
	122	Performance Evaluation of Accounting Information System for Restaurants SMEs In Jabodetabek
	128	Fixed Asset Management System Development FOR PT. INVOSA SYSTEMS "AVOSA SYSTEMS"
	103	The Effect of e-CRM towards Service Quality and Net Benefits Using Structure Equation Modeling
<b>Day 2: 08.30 – 10.00</b>		
Technical Session 4-1	63	A Survey Regarding the Readiness of Campus in Indonesia on the Adoption of Green Computing
	47	Media Interactive Learning and Biology Subjects Implementation with Augmented Reality Application
	35	Solving Shortest Path Problems On Installing Data Network Connection Using Apriori Algorithm
	68	Determining Components of National Cyber Security Framework Using Grounded Theory
Technical Session 4-2	65	Decision Support System In Giving Recommendation For Flat Screen Television Purchase Using Analytical Hierarchy Process (AHP) Method
	46	Sentiment Analysis of Students' Perception on the Use of Smartphones: A Cross Sectional Study
	21	A Short Film Making With 3D CGI And Live Action Footage Usage Using Compositing Technique And Key Frames Method
	14	SMS Based Home Security Approach Using ROT 13, RC4 and RSA Algorithm
Technical Session 4-3	101	Levensthein Distance as a Post-Process to Improve the Performance of OCR in Written Road Signs
	113	File Encryption and Hiding Application Based on Advanced Encryption Standard (AES) and Append Insertion Steganography Method
	117	A Novel Scheme for Handwritten Binarization Method on Sundanese Palm Leaf Document Images
	139	Identifying The Relevant Page Numbers that Referred by The Back-of-Book Index Using Syntactic Similarity and Semantic Similarity



Technical Session 4-4	114	Analysis of Comparison between Sequential and Parallel Computation Using OpenMP for Molecular Dynamic Simulation
	135	Kolmogorov Watermarking Technique for Secure the data of Wireless Sensor Networks
	167	Information Technology Strategic Plan Development Methodology Governing from the Perspectives of Enterprise Architecture
	95	Application Of GIS In The Spatial Analysis to Assessing the Infrastructure Dynamics of Slum Upgrading In Papua, Indonesia
<b>Day 2: 11.20 – 12.45</b>		
Technical Session 5-1	12	Hierarchical Decision Approach Based on Neural Network and Genetic Algorithm Method for Single Image Classification of Pap Smear
	100	Development of Extensible Open Information Extraction
	137	Comparison Analysis between Implementation of Principal Components Analysis and Haar Wavelet as Feature Extractors in Palmprint Recognition System
	79	Database: Taxonomy of Plants Nomenclature for Borneo Biodiversity Information System
	81	User Perceptions of Mobile Internet Services Performance in Borneo
	98	Designing a Wheeled Robot Model for Flammable Gas Leakage Tracking
Technical Session 5-2	125	Analysis of Intrinsic Factors of Mobile Banking Application Users' Continuance Intention
	97	Digital Government Services in Papua
	56	Why Does People Use E-Payment Systems in C2C E-Marketplace? A Trust Transfer Perspective
	61	Analysis of Internal and External Factors Influencing User's Knowledge Sharing Behavior on TMC Polda Metro Jaya's Twitter Using Theory of Planned Behavior
	66	Factors influencing citizen's intention to participate in e-participation: integrating Technology Readiness on Social Cognitive Theory
	74	Mobile Personal Health Record (mPHR) for Breast Cancer using Prediction Modeling



Technical Session 5-3	108	Hamiltonicity on Enhanced Extended Fibonacci Cube (E2FC) Interconnection Network
	96	Information Credibility Factors on Information Sharing Activities in Social Media
	83	Factors Influencing Continuance Intention of Travel Agency Information System Use: A Case Study of PowerSuite
	87	The Effects of Pictures, Review Credibility and Personalization on User's Satisfaction of Using Restaurant Recommender Apps
	104	Policy and Procedure Design for Video Conference Service using Soft-System Methodology: A Case Study of PT Pertamina (Persero)
Technical Session 5-4	57	User Acceptance Factors Affecting the Usage of Mobile Learning In Enriching Outside Classroom Learning at High School Level
	60	The Analysis of Tourism Information to Enhance Information Quality in E-Tourism
	72	Antecedents and Patterns of E-business Adoption among Small and Medium Enterprises
	166	Detection Water Level in Smart-Home's Bathtub In Saving Water Using Fuzzy Ultrasonic Approach
	67	Social Media Strategies for Public Diplomacy: a Case Study in the Ministry of Foreign Affairs of the Republic of Indonesia
	110	Risk Assessment Based Academic Information System Security Policy Using OCTAVE Allegro and ISO 27002



# Pasienesia: A Mobile based E-Patient Social Network

## Promoting Empowerment Among Patients who Experience Similar Diseases

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**Abstract**— The rising of e-patient has promoted self-awareness and active participation among health consumers and patients to be fully involved in their medical care. One of the embodiments of e-patient movement is the online patient community via social media. More consumers and patients use social media to acquire health information from other consumers and patients who experience similar diseases. Likewise, people become more open to share their personal health condition so that others could take advantage from their experiences. However, the usage of general social media comes with the classical issues of privacy, trustworthiness, and accuracy.

Accordingly, this study aims to build an e-patient social network solution to support the future prospect of social media usage in e-patient and to resolve the classical issues in social media. The proposed system connects patients with similar diseases, facilitates health information sharing and discussion among patients with the assistance of medical professionals. The solution development follows a modified rapid application development methodology consisting of formulating the e-patient social network requirements, designing the mobile-based e-patient system (Pasienesia), and evaluating the implementation. The evaluation with clinicians, consumers, and patients with chronic diseases demonstrates the suitability and the usefulness of the proposed e-patient system solution.

**Keywords**—*e-patient; e-patient social network; pasienesia; mobile; social media (key words)*

### I. INTRODUCTION

The use of Internet and online sources to support health information is rapidly increasing among non-medical professionals lay people, i.e., consumers and patients [1-2]. More patients actively engage in their medical care as *e-patients*. They look for health information and medical guidance online both for their own ailments and on behalf of their family members. Recent studies reported the benefit of e-patients, e.g., e-patients find more useful and detail medical information on the Internet than what they obtain from their clinicians [3], they feel more confident when consulting with clinicians [4-5], easier and larger access to medical support group [6], and better understanding when participating in participatory medical decision [5]. On the other hand, e-patients have unique relationships with their clinicians; it could be an enhanced communication or a disrupted relationship. A disruptive relationship may happen when a disagreement

occurs between the clinicians and the patients because the patients stick to inaccurate health information they found online or the clinicians feel their authorities are being challenged.

One of the embodiments of e-patient movement is the use of social media to seek and to share health information, medical advice, and personal health experience. A beneficial implementation of social media utilization is online medical support communities. This support community serves 24/7 to provide health education and health material; to encourage initiative, benevolence, and helpfulness among its members; and to provide emotional support [3, 6-7]. More consumers and patients join support communities to learn and to seek advice from other patients who experience similar diseases and from medical professionals in the community. The experienced members offer useful and detail guidance to those newly diagnosed based on what they experienced in the past, what they had learned from various sources, and what they had been informed by their clinicians [7]. Similarly, medical professionals have acknowledged the benefit of patient online communities. These communities contribute to effective medication management by providing valuable healthcare resources and long-term support for the patient [7-8].

The usage of social media for sharing health information comes with its consequences pertaining to privacy, trustworthiness, and accuracy. There are emergent concerns about protecting personal health record in digital world. Once the data available online, it may disseminate quickly and subject to privacy violation. In addition, since social media depends on user-generated content, all members are able to produce content, including health/medical materials, without proper review and evaluation. Thus, the number of inaccurate health information from untrustworthy resources increases quickly. Inaccurate health information may cause serious impacts to a person's life.

Given the current challenges and future prospects of social media for e-patient activities, this paper aims to build a mobile-based e-patient social network system. The proposed social network connects patients with similar diseases, facilitates health information sharing and discussion among patients with the assistance of medical professionals. To support accessibility and mobility and to optimize the benefit, the proposed mobile system is built on Android platform.

## II. RESEARCH DESIGN

This paper adopted Rapid Application Development (RAD) methodology to build and to evaluate the e-patient social network system. RAD method reduced development time, encouraged initial reviews and feedback from the users, and enabled extensibility. We expected the proposed system to be extended with new features for the future growth. The method consisted the following four phases:

### 1. Requirement planning phase,

The first phase was elaborated into two main activities, i.e., requirement elicitation and user requirement analysis. At the elicitation, we interviewed target users, i.e., three consumers (non-medical professionals who seek health information online), four patients with chronic disease, and a clinician (cardiologist). We also conducted literature study synthesis about e-patient, social media, and consumer health informatics. The next activity was analyzing the collected interview data and literature study synthesis result to define the user requirements. This phase produced a list of user requirements, detail features for each requirement.

### 2. Design phase,

The design phase in this study transformed user requirements into a blueprint of system solution that consisted of scenario modeling and data modeling. The scenario modeling was developed based on use case model and scenario, while the data modeling was constructed using conceptual data model. The output of design phase included use case diagram, use case scenario, conceptual data model, and physical data model.

### 3. Construction phase,

This phase focused on system development based on defined design. The construction consisted of database development, web service development using Lumen framework, and Android-based client application development.

### 4. Evaluation phase,

The evaluation phase was elaborated into system testing and system evaluation. The system testing assessed the output of the system against the expected output as defined in the use case scenario. After the system testing, we conducted a User Acceptance Testing (UAT) to evaluate the developed system, whether it has met all user requirements. We recruited all participants from requirements elicitation to evaluate the developed system. Acceptance testing is necessary to verify that the proposed solution works for the users and to ensure user participation in the system development. Lack of user participation is one of the major causes of system and IT management failures [9].

## III. PASIENESIA: A MOBILE-BASED E-PATIENT SOCIAL NETWORK SYSTEM

### A. User Requirements and Features

Drawing on the interview results and literature study synthesis, the functional requirements of the proposed system composed of:

#### 1. Finding other users who have similar medical profile,

In order to find and to connect user to other patients who have similar disease, each user must complete a medical profile. It includes personal detail, health topics interest, and general medical history. According to Cufoglu (2014), a user profile is necessary to filter and to match recommended users based on specific criteria [10]. After completing the medical profile, user can join any health communities listed in the system. Grouping health communities based on similar medical condition encourages the community's members to talk about their disease and to provide more suitable support for others [7]. Besides join a community, a user should be able to find others who have similar medical profile and send messages to discuss specific ailments in private. To protect user privacy, all users must provide valid identification to register to the system.

#### 2. Participating in a health community,

User participation in a health community occurs in various forms, e.g., creating post(s) in a community page about specific topic, giving response to a post, reporting potentially problematic post and comment, and writing health/medical articles. All participants in the requirement elicitation rate creating post and giving response in the community page as must haves. In accordance with the interview result, most of e-patient participants in Hosch and Fergusson study stated that online communities provides more comprehensive health information than their clinicians [7]. In the proposed system, a user can post and comment about personal experience, treatment options, medical self-management, day to day living with diseases, as well as emotional support and health care provider recommendation. Another must have feature is reporting problematic posts/comments to maintain the discussion quality and the accuracy of shared health information in the community page. This feature manages the credibility and trustworthiness of the community page, as suggested by Metzger and Flanagin in their study [11].

The proposed system also provides dedicated features for medical professionals users, i.e., writing health/medical articles, assisting the discussion in a community page, and facilitating private discussion with the patient users. These features are suggested by the clinician in the requirement elicitation. According to studies in [12-13], the clinician presence in online communities is necessary to assist discussion and information sharing among the users. Social media and online communities have grown as one of the key sources for promoting health education. These media extend the capability of medical treatment outside the clinic.

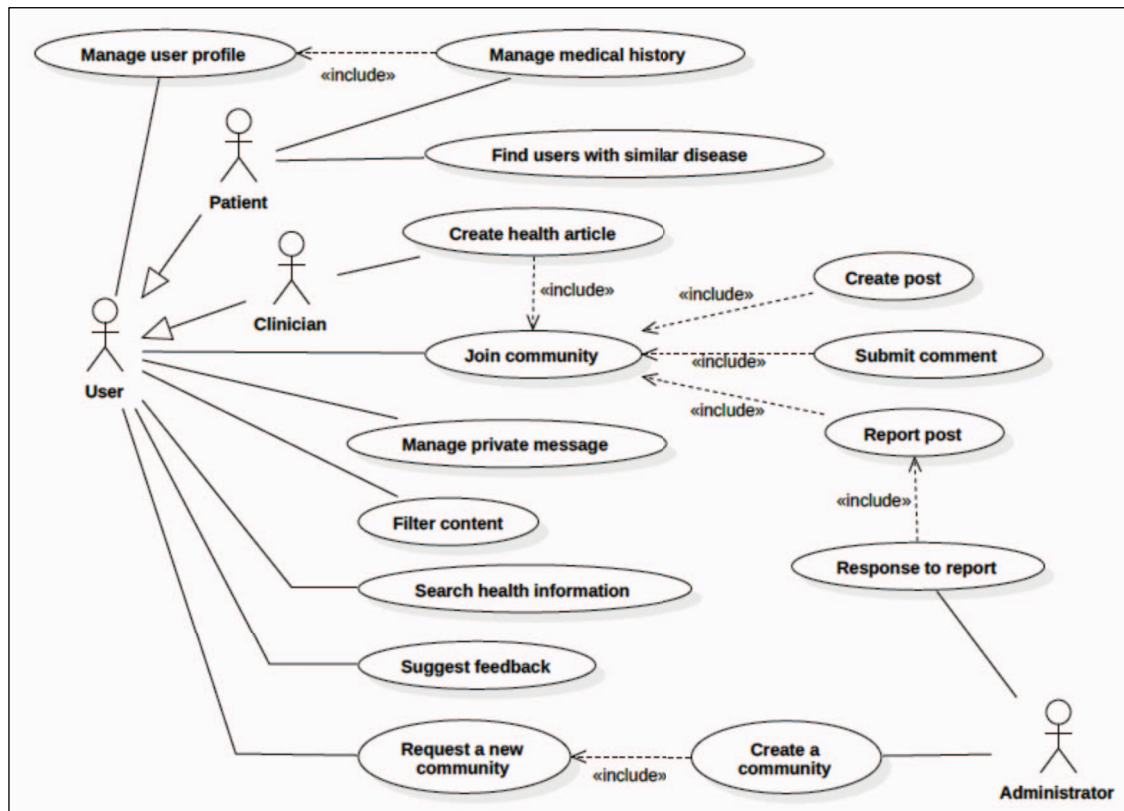


Fig. 1. Use Case Diagram

TABLE I. FUNCTIONAL REQUIREMENT AND FEATURE

No.	Functional Requirement	Feature	
FR-1	Finding other users who have similar medical profile	FR-1-1	Manage user profile
		FR-1-2	Manage medical history
		FR-1-3	Join health communities
		FR-1-4	Find users based on medical profile
		FR-1-5	Send and response private message(s) to other users
FR-2	Participating in a health community	FR-2-1	Create post(s) in a community page
		FR-2-2	Submit comment(s) to a post in a community page
		FR-2-3	Report post(s)
		FR-2-4	Response to user report
		FR-2-5	Create health/medical article(s)
FR-3	Finding a specific health information	FR-3-1	Search health information based on user keywords
		FR-3-2	Filter content based on user preferences
FR-4	Suggesting feedback for system improvement	FR-4-1	Request to create a new health community
		FR-4-2	Suggest feedback for system improvement

### 3. Finding a specific health information,

The next requirement for the proposed system is related to finding relevant health information, i.e., health information search based on user keywords, and content filtering feature. The system provides content filtering based on the interview result with two patients in the requirement elicitation. The filtering system enables personalization based on user needs. User can arrange the displayed content based on selected community and/or post category.

### 4. Suggesting advice/feedback/recommendation for system improvement,

This purpose of this requirement is to maintain the reliability and the operability of the social network system. The suggested features consist of creating a new community page and suggesting feedback for system improvement.

#### B. Use Case Model

The use case model for e-patient social network system composed of three actors and twelve use cases as depicted in Fig. 1. The actors represented the system users, i.e., administrator, patient, and medical professional (clinician). The use cases were constructed based on the functional requirements and features as shown in Table 1. The use case model produced 15 use case scenarios.



### C. Data Model

We designed the data model based on the functional requirements using conceptual data modeling. The next step was converting the conceptual data model to physical data model and generating SQL script from physical data model. The data model consisted of non-transactional data and transactional data. The non-transactional data included medical profile, health interest, specialist, and community. The community table listed five prevalent chronic diseases in Indonesia as the initial data, i.e., cardiovascular, stroke, respiratory, cancer, and diabetes. The medical profile and health interest tables listed disease names published by *Konsil Kedokteran Indonesia (KKI)* in 2012. The specialist table recorded acknowledged specialist categories in Indonesia. The transactional data included post, comment, report, feedback, and user log.

### D. System Construction: Pasienesia

The construction of the proposed e-patient social network, Pasienesia, comprised of mobile-based client application development, web service development, and database construction. Fig. 2. illustrates Pasienesia system architecture.

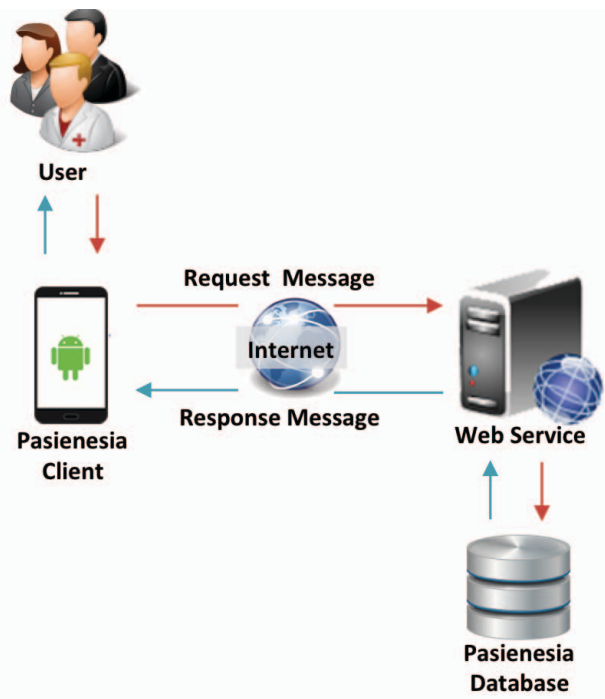


Fig. 2 Pasienesia System Architecture

We developed the web service using Lumen framework [14]. The web service connected mobile-based client (Android application) and Pasienesia database in MySQL. The bridge connection was required because Android-based client could not communicate directly with MySQL. The connection between client and web service was built using library Retrofit 2 [15]. Retrofit performed HTTP Request by translating the API into Java interfaces. This feature enabled data access and manipulation between client and database via web service.

We developed the mobile-based client as an Android application to support accessibility and mobility. Recent survey in 2016 reported that mobile devices accounted for 51.3% of Internet usage worldwide [16] and Android apps generated more than 80.7% of mobile data traffic in 4Q 2016 [17]. Android-based client development composed of initiating Retrofit to the application project and constructing the program code for each feature in the use case model.

The feature implementation included main user menu, join health communities, submit comment(s) to a post in a community page, and find other users who have similar disease as shown in Fig. 3, Fig. 4, Fig. 5, and Fig. 6 respectively.

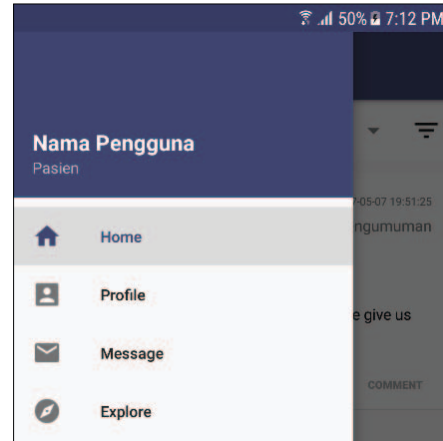


Fig. 3. Main Menu Interface

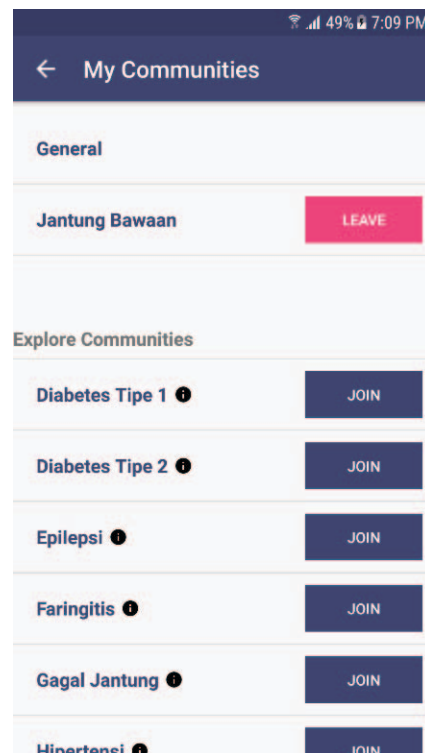


Fig. 4. Join Health Communities Interface

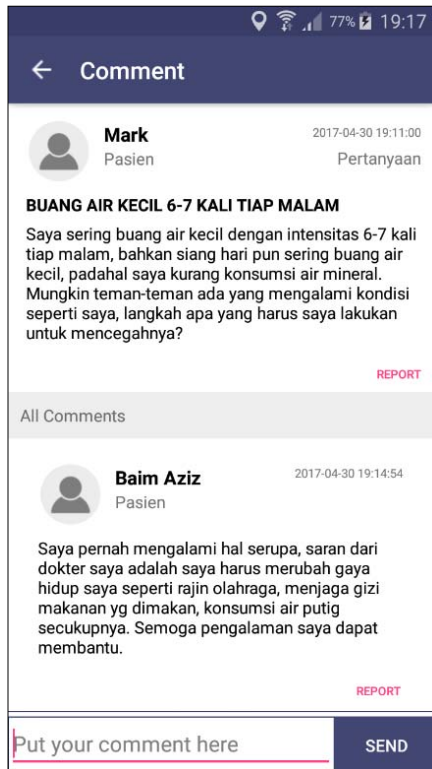


Fig. 5. Submit a Comment to a Post Interface

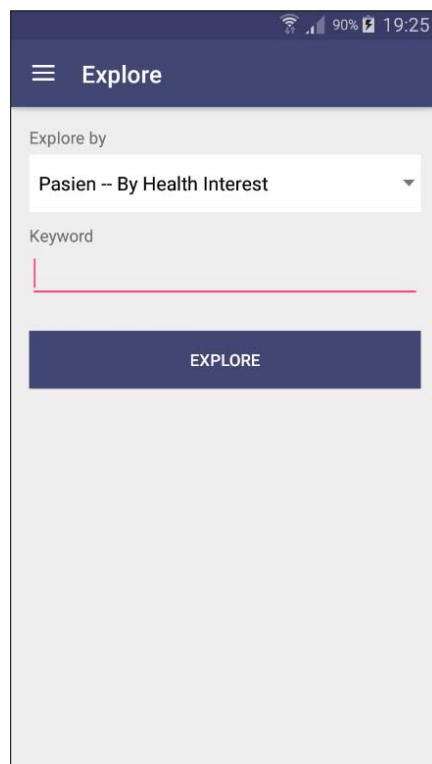


Fig. 6. Find other users who have similar disease

### E. System Evaluation

We conducted functional testing and user acceptance testing to evaluate the correctness and the completeness of the requirements implementation and the system usability.

#### 1. Functional testing,

The first evaluation examined the functionality of the system based on the specifications using equivalence partitioning method. We partitioned the test cases based on the use case model. We tested one condition from each test case. The functional testing showed that all test cases were passed, thus all specifications had been implemented in the developed system.

#### 2. User acceptance testing,

User acceptance testing validated the system functional compliance with the user requirements. The testers incorporated all participants in the requirement elicitation, i.e., three consumers, four patients with chronic disease, and a clinician (cardiologist). The clinician tester assessed 100% for functional correctness and completeness and 100% for usability. Equivalently, patient and consumer testers also rated the system as having 100% functional correctness and completion. All features, i.e., manage user profile, manage medical history, find users with similar diseases, create health article, join community, manage private message, filter content, search health information, suggest feedback, create health community, and request health community, operated properly. For the usability testing, all participants agreed that the developed system had implemented basic usability guideline for mobile applications.

## IV. DISCUSSION

This paper proposes Pasienesia, a mobile-based e-patient social network system. The system requirements come from the target users, i.e., the consumers and patients with chronic diseases, and clinician. We incorporate clinician (as the representative of medical professionals) to the e-patient system. The presence of medical professional is required to ensure the trustworthiness and accuracy of health information being shared. Besides, medical professionals can use the system to educate the patient, to extend the social responsibility pertaining to health and medical issues, and to gain new perceptions from other users. In the future, the e-patient system may serve as more promising health care resources. The responsibilities of health care are shared between patients and medical professionals. As stated in [7], a technology-based networked team management connecting patients, caregivers, and medical professionals is the future of health care innovation.

Based on the evaluation result, all participants acknowledge the system requirements formulation and the willingness of using the developed system. Although the result of the system development corresponds to the goal of this study, a more comprehensive evaluation is required. The next evaluation should involve larger participants from patients, consumers, clinician, and caregivers. The e-patient social network should be updated and improved regularly to accommodate the



progressive development of healthcare management in the future. We also obtained suggestions from the participants, such as increasing the number of system participants, providing notification feature, and adding activity dashboard page for each user.

## V. CONCLUSION

This study addresses the future prospect of utilizing social media for e-patients as well as the solution to resolve the privacy, accuracy, and trustworthiness issues. The results of this study support two main contributions, i.e., the essential user requirements and the mobile-based e-patient social network system. Patients can use the system to find other patients who have similar diseases, by accessing patient exploration feature and joining available health communities, and to acquire reliable health information. The developed system also incorporates medical professionals to contribute to the e-patient system.

## REFERENCES

- [1] A. Bianco, R. Zucco, C. Nobile, C. Pileggi and M. Pavia, "Parents Seeking Health-Related Information on the Internet: Cross-Sectional Study", *Journal of Medical Internet Research*, vol. 15, no. 9, p. e204, 2013.
- [2] I. Puspitasari, K. Fukui, K. Moriyama and M. Numao, "Predicting Consumer Familiarity with Health Topics by Query Formulation and Search Result Interaction", in *Pacific Rim International Conference on Artificial Intelligence*, Gold Coast, Australia, 2014, pp. 1016-1022.
- [3] T. Ferguson, "The first generation of e-patients", *BMJ*, vol. 328, no. 7449, pp. 1148-1149, 2004.
- [4] H. Wald, C. Dube and D. Anthony, "Untangling the Web—The impact of Internet use on health care and the physician–patient relationship", *Patient Education and Counseling*, vol. 68, no. 3, pp. 218-224, 2007.
- [5] P. Jacobson, "Empowering the physician-patient relationship: The effect of the Internet", *Partnership: The Canadian Journal of Library and Information Practice and Research*, vol. 2, no. 1, 2007.
- [6] S. Ziebland and S. Wyke, "Health and Illness in a Connected World: How Might Sharing Experiences on the Internet Affect People's Health?", *Milbank Quarterly*, vol. 90, no. 2, pp. 219-249, 2012.
- [7] D. Hoch and T. Ferguson, "What I've Learned from E-Patients", *PLoS Medicine*, vol. 2, no. 8, p. e206, 2005.
- [8] J. Naslund, K. Aschbrenner, L. Marsch and S. Bartels, "The future of mental health care: peer-to-peer support and social media", *Epidemiology and Psychiatric Sciences*, vol. 25, no. 02, pp. 113-122, 2016.
- [9] I. Puspitasari, "Stakeholder's Expected Value of Enterprise Architecture, An Enterprise Architecture Solution based on Stakeholder Perspective", in *2016 IEEE 14<sup>th</sup> International Conference on Software Engineering, Research, Management, and Applications (SERA)*, Towson, USA, 2016, pp. 243-248.
- [10] A. Cufoglu, "User Profiling - A Short Review", *International Journal of Computer Applications*, vol. 108, no. 3, pp. 1-9, 2014.
- [11] M. Metzger and A. Flanagin, "Credibility and trust of information in online environments: The use of cognitive heuristics", *Journal of Pragmatics*, vol. 59, pp. 210-220, 2013.
- [12] K. Zhao, X. Wang, S. Cha, A. Cohn, G. Papandonatos, M. Amato, J. Pearson and A. Graham, "A Multirelational Social Network Analysis of an Online Health Community for Smoking Cessation", *Journal of Medical Internet Research*, vol. 18, no. 8, p. e233, 2016.
- [13] J. Colbert and L. Lehmann, "Partnering with patients to realize the benefits of social media", *American Journal of Obstetrics and Gynecology*, vol. 212, no. 3, pp. 302-303.e1, 2015.
- [14] T. Otwell, "Lumen - PHP Micro-Framework By Laravel", *Lumen.laravel.com*, 2017. [Online]. Available: <https://lumen.laravel.com/>. [Accessed: 15- Jul- 2017].
- [15] Retrofit", *Square.github.io*, 2017. [Online]. Available: <http://square.github.io/retrofit/>. [Accessed: 14- Jan- 2017].
- [16] "Mobile and tablet internet usage exceeds desktop for first time worldwide | StatCounter Global Stats", StatCounter Global Stats, 2017. [Online]. Available: <http://gs.statcounter.com/press/mobile-and-tablet-internet-usage-exceeds-desktop-for-first-time-worldwide>. [Accessed: 12- Jan- 2017].
- [17] "Gartner Says Worldwide Sales of Smartphones Grew 7 Percent in the Fourth Quarter of 2016", *Gartner.com*, 2017. [Online]. Available: <http://www.gartner.com/newsroom/id/3609817>. [Accessed: 21- Apr- 2017].

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## Pasienesia: A mobile based e-patient social network: Promoting empowerment among patients who experience similar diseases (Conference Paper)

Puspitasari, I. ✉, Pramudhika, R. ✉, Raharjana, I.K. ✉

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### Abstract

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The rising of e-patient has promoted self-awareness and active participation among health consumers and patients to be fully involved in their medical care. One of the embodiments of e-patient movement is the online patient community via social media. More consumers and patients use social media to acquire health information from other consumers and patients who experience similar diseases. Likewise, people become more open to share their personal health condition so that others could take advantage from their experiences. However, the usage of general social media comes with the classical issues of privacy, trustworthiness, and accuracy. Accordingly, this study aims to build an e-patient social network solution to support the future prospect of social media usage in e-patient and to resolve the classical issues in social media. The proposed system connects patients with similar diseases, facilitates health information sharing and discussion among patients with the assistance of medical professionals. The solution development follows a modified rapid application development methodology consisting of formulating the e-patient social network requirements, designing the mobile-based e-patient system (Pasienesia), and evaluating the implementation. The evaluation with clinicians, consumers, and patients with chronic diseases demonstrates the suitability and the usefulness of the proposed e-patient system solution. © 2017 IEEE.

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Zhang, Y. , Wang, P. , Heaton, A.  
(2012) *IHI'12 - Proceedings of the  
2nd ACM SIGHIT International  
Health Informatics Symposium*

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(2018) *41st International ACM  
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- 
- 1 Bianco, A., Zucco, R., Nobile, C.G.A., Pileggi, C., Pavia, M.  
**Parents seeking health-Related information on the internet: Cross-sectional study**  
([Open Access](#))
- (2013) *Journal of Medical Internet Research*, 15 (9), art. no. e204. Cited 54 times.  
[http://www.jmir.org/article/viewFile/jmir\\_v15i9e204/2](http://www.jmir.org/article/viewFile/jmir_v15i9e204/2)  
doi: 10.2196/jmir.2752
- [View at Publisher](#)
- 
- 2 Puspitasari, I., Fukui, K.-I., Moriyama, K., Numao, M.  
**Predicting consumer familiarity with health topics by query formulation and search result interaction**
- (2014) *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 8862, pp. 1016-1022. Cited 2 times.  
<http://springerlink.com/content/0302-9743/copyright/2005/>  
doi: 10.1007/978-3-319-13560-1
- [View at Publisher](#)
- 
- 3 Ferguson, T., Frydman, G.  
**The first generation of e-patients**
- (2004) *British Medical Journal*, 328 (7449), pp. 1148-1149. Cited 106 times.
- [View at Publisher](#)
- 
- 4 Wald, H.S., Dube, C.E., Anthony, D.C.  
**Untangling the Web-The impact of Internet use on health care and the physician-patient relationship**
- (2007) *Patient Education and Counseling*, 68 (3), pp. 218-224. Cited 242 times.  
doi: 10.1016/j.pec.2007.05.016
- [View at Publisher](#)
- 
- 5 Jacobson, P.  
**Empowering the physician-patient relationship: The effect of the Internet**  
(2007) *Partnership: The Canadian Journal of Library and Information Practice and Research*, 2 (1). Cited 13 times.
- 
- 6 Ziebland, S., Wyke, S.  
**Health and illness in a connected world: How might sharing experiences on the internet affect people's health?**
- (2012) *Milbank Quarterly*, 90 (2), pp. 219-249. Cited 187 times.  
doi: 10.1111/j.1468-0009.2012.00662.x
- [View at Publisher](#)
- 
- 7 Hoch, D., Ferguson, T.  
**What i've learned from E-patients** ([Open Access](#))
- (2005) *PLoS Medicine*, 2 (8), pp. 0728-0730. Cited 36 times.  
[http://medicine.plosjournals.org/archive/1549-1676/2/8/pdf/10.1371\\_journal.pmed.0020206-L.pdf](http://medicine.plosjournals.org/archive/1549-1676/2/8/pdf/10.1371_journal.pmed.0020206-L.pdf)  
doi: 10.1371/journal.pmed.0020206
- [View at Publisher](#)
-

- 8 Naslund, J.A., Aschbrenner, K.A., Marsch, L.A., Bartels, S.J.  
The future of mental health care: Peer-To-peer support and social media (Open Access)

(2016) *Epidemiology and Psychiatric Sciences*, 25 (2), pp. 113-122. Cited 91 times.  
<http://journals.cambridge.org/action/displayJournal?jid=EPS>  
doi: 10.1017/S2045796015001067

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---

- 9 Puspitasari, I.  
Stakeholder's expected value of Enterprise Architecture: An Enterprise Architecture solution based on stakeholder perspective

(2016) *2016 IEEE/ACIS 14th International Conference on Software Engineering Research, Management and Applications, SERA 2016*, art. no. 7516152, pp. 243-248. Cited 2 times.  
ISBN: 978-150900809-4  
doi: 10.1109/SERA.2016.7516152

[View at Publisher](#)

---

- 10 Cufoglu, A.  
User profiling - A short review  
(2014) *International Journal of Computer Applications*, 108 (3), pp. 1-9. Cited 9 times.

- 11 Metzger, M.J., Flanagin, A.J.  
Credibility and trust of information in online environments: The use of cognitive heuristics

(2013) *Journal of Pragmatics*, 59, pp. 210-220. Cited 133 times.  
<http://www.elsevier.com/locate/pragma>  
doi: 10.1016/j.pragma.2013.07.012

[View at Publisher](#)

---

- 12 Zhao, K., Wang, X., Cha, S., Cohn, A.M., Papandonatos, G.D., Amato, M.S., Pearson, J.L., (...), Graham, A.L.  
A multirelational social network analysis of an online health community for smoking cessation (Open Access)

(2016) *Journal of Medical Internet Research*, 18 (8), art. no. e233. Cited 16 times.  
[https://www.jmir.org/article/viewFile/jmir\\_v18i8e233/2](https://www.jmir.org/article/viewFile/jmir_v18i8e233/2)  
doi: 10.2196/jmir.5985

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---

- 13 Colbert, J.A., Lehmann, L.S.  
Partnering with patients to realize the benefits of social media

(2015) *American Journal of Obstetrics and Gynecology*, 212 (3), pp. 302-303.e1. Cited 4 times.  
<http://www.elsevier.com/inca/publications/store/6/2/3/2/7/7/index.htm>  
doi: 10.1016/j.ajog.2014.12.014

[View at Publisher](#)

---

- 14 Otwell, T.  
(2017) *Lumen-PHP Micro-Framework by Laravel*  
Lumen.laravel.com, [Online] [Accessed: 15-Jul-2017]  
<https://lumen.laravel.com/>

- 15 (2017) *Square.github.io*  
Online [Accessed: 14-Jan-2017]  
[Retrofit](#)
-

□ 16 (2017) *Mobile and Tablet Internet Usage Exceeds Desktop for First Time Worldwide* | StatCounter Global Stats  
StatCounter Global Stats, [Online] [Accessed: 12-Jan-2017]  
<http://gs.statcounter.com/press/mobile-and-tabletinternet-usage-exceeds-desktop-for-first-time-worldwide>

□ 17 (2017) *Gartner Says Worldwide Sales of Smartphones Grew 7 Percent in the Fourth Quarter of 2016*. Cited 24 times.  
Online [Accessed: 21-Apr-2017]  
[Gartner.com](http://gartner.com)

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