

The 2nd International Conference on Culture Technology (ICCT)

December 8~10, 2017 | Tokyo Polytechnic Univ., Tokyo, Japan



International Association for
Convergence Science & Technology

KOGEI TOKYO POLYTECHNIC
UNIVERSITY



한국과학예술포럼
Korea Science & Art Forum



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Opening Address

Pyeongkee Kim

President of IACST



It is my great honor and pleasure to welcome all of you to the second ICCT in Tokyo, Japan. First of all, I would like to express my deepest gratitude to Dr. Kwangyun Wohn of KAIST and Dr. Toru Iwatani of TPU for giving us special keynote speeches today, the president Ryuichiro Yoshie of Tokyo Polytechnic University, for providing us with this wonderful place and supporting us in many ways. I also give many thanks to Dr. Kazuo Sugiyama the senior advisor of IACST. I welcome all participants to present their valuable research results and lectures from all over the world.

As you know, the theme of this conference is “Culture Technology, the flower of convergence.” While culture and technology have influenced each other throughout all human history, I could not see more active and profound interactions than today. I believe this massive and deep interaction can be further accelerated when convergence idea and technologies are applied. To make effective convergence happen, researchers should have enough time of understanding different disciplines and cultures. New ideas and experiments must be tried freely and challenged from different perspectives. This is why we have this international meeting and ICCT is willing to serve as a good platform for these innovative activities.

While previous industrial revolutions helped humanity by giving power, saving time, and shortening distances, today’s and future AI technology can challenge humanity in many areas with its maximized labor productivity and intelligence. We are hearing many prospects that AI technology will take away human jobs and we will face difficult time soon in our daily lives. On the contrary, with the help of intelligent machines, I believe this is the time we can enjoy true human life. When most labors are done by smart machines, what should we do and what do you want to do? If you ask me, I will answer “Eat, Love, and Play.” These three things are things machines cannot understand but humans get joy and satisfaction from them. I would like to invite you to join us to this “Play” ground by doing research together and helping next generations academically. In addition to hosting conferences and symposiums, I would like you to join us by promoting dynamic exchange of researches and students among member organizations and hosting international exhibitions of culture design and student’s work.

Would you please enjoy the second ICCT and all IACST events together, sharing wonderful days of good memories in Tokyo? Thank you very much.

Dr. PyeoungKee Kim

Honorable Chair of the 2nd ICCT

Congratulatory Message



Ryuichiro Yoshie

Honorable Chair of the 2nd ICCT

On behalf of Tokyo polytechnic University, I would like to express my heartfelt congratulations on the 2nd International Conference on Culture Technology. We are very pleased and honored to host this international conference at Nakano campus of our university.

To tell the truth, I'm not sure the definition of "Culture Technology". But I imagine that the "Culture Technology" is something like "Collaboration between Art and Technology". Tokyo Polytechnic University (TPU) originated from professional school of photography was a pioneer in combining self-expression through photography (Art) with photographic techniques (Technology). Now the TPU is a unique university in Japan in that it possesses Faculties of both Engineering and Arts. One of the important policies of me, the president of TPU, is to enhance further collaboration between "Art and Technology". In this sense, TPU is really appropriate place to hold this conference on "Culture Technology".

I would like to express my heartiest thanks to all the committee members who have been preparing this conference. I hope this conference will provide all the participants with places for active discussion and new ideas. I believe we can contribute to the quality of people's lives through both "Art and Technology", i.e. "Culture Technology"

Dr. Ryuichiro Yoshie
Honorable Chair of the 2nd ICCT and President of Tokyo Polytechnic
University,

Welcome Message



Yonguk Lee

Organizing Chair of
the 2nd ICCT



Tae Soo Yun

Organizing Chair of
the 2nd ICCT

It is my great pleasure to welcome you all to the second International Conference on Cultural Technology (ICCT) in Tokyo polytechnic University. First, I would like to thank everyone here for the attendance and special thanks to Dr. Pyeoungkee Kim the chairman, Conference Organizing Committee members and directors from each country.

I am pleased to hold this ICCT's second conference here in Tokyo. Tokyo is a modern city where not only information from all over the world gathers together but also it spreads out to the world. Hence the new technology is invented everyday. On the other hand, old great tradition and culture of Japan can still be seen and appreciated in Tokyo. Therefore, I think it is a very suitable place to hold ICCT to discuss particularly about culture and technology. I hope everyone enjoys this conference and the stay in Tokyo during this trip.

Our Tokyo polytechnic University members and I are very excited to hear everyone's presentations and we hope this conference will be meaningful for everyone. We hope all the researchers will be able to perform their best to describe their passions and also develop the knowledge from other researchers' presentations for future works.

Lastly, I would like to take a moment to thank to Dr. Ryuichiro Yoshie, the president of the Tokyo polytechnic University, who gave us a lot of support, and each of the sponsors.

Thank you.

Dr. Yonguk Lee and
Organizing Chair of the 2nd ICCT and Director of IACST

Dr. Tae Soo Yun
Organizing Chair of the 2nd ICCT and Chief Vice President of IACST

TPC Chair Message



Dongkyun Kim

TPC Chair of
the 2nd ICCT



Hisaki Nate

TPC Chair of
the 2nd ICCT

It is our great pleasure to welcome you to Tokyo, Japan from December 8 to 10, 2017, for the 2nd International Conference on Cultural Technology (ICCT). This year, ICCT has various topics on cultural technologies including information technology, and digital contents and cultural service. We have received more than 150 paper submissions from 5 countries (Korea, Thailand, Pakistan, Indonesia and Japan) in the world. Through a rigorous review process, we have selected 102 technical papers for presentation at the conference. The accepted papers were organized into 13 technical oral and 4 poster sessions. In addition, we have two more special sessions where we can share idea on design & entrepreneurship, and future making. Besides the papers contribution from all over the world, this successful program was made possible by the devoted service of technical program committee members. We would like to express many thanks to all of the TPC members as well as to the Organizing Committee Chairs for their active support and guidance. We hope that all of participants enjoy the excellent program of this 2nd ICCT and the beautiful attractions of Tokyo.

Dr. Dongkyun Kim

TPC Chair of the 2nd ICCT and Vice President of IACST

Dr. Hisaki Nate

TPC Chair of the 2nd ICCT and Director of IACST

Organization

Organizing Committee

Honorable Chairs

- Dr. Ryuichiro Yoshie, President of TPU, Japan
- Dr. Kazuo Sugiyama, Oriental Consultants Global, Japan
- Dr. Pyeoungkee Kim, President of IACST

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- Dr. Yonguk Lee, Tokyo Polytechnic University, Japan
- Dr. Soon Ki Jung, Kyungpook National University, Korea

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- Dr. Donghwa Lee, Daegu University, Korea

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- Dr. Syed Hassan Ahmed, University of Central Florida, USA
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- Dr. Kwang Chib Chang, Kyunghee University, Korea
- Dr. Kiesu Kim, Silla University, Korea

Cultural Design Chairs

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- Dr. Pil Je Park, Cachon University, Korea
- Dr. Seungpok Choi, Silla University, Korea

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TPC Chairs

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- Dr. Hisaki Nate, Tokyo Polytechnic University, Japan
- Dr. Rattasit Sukhahuta, Chiang Mai University, Thailand
- Dr. I Putu Agung Bayupati, Udayana University, Indonesia
- Dr. Sungpil Lee, Dongseo University, Korea
- Dr. Jiman Hong, Soongsil University, Korea
- Dr. Haeyoung Ko, Seoul Women's University, Korea

Steering Committee

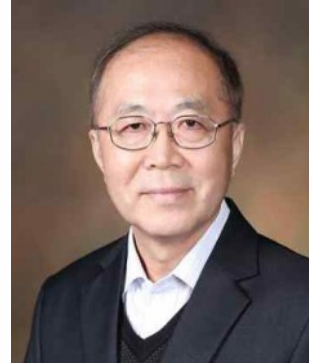
- Dr. PyeoungKee Kim, President of IACST
- Dr. Tae Soo Yun, Dongseo University, Korea
- Dr. Rattasit Sukhahuta, Chiang Mai University, Thailand
- Dr. Thomas Chun, Loughborough University, UK
- Dr. Yonguk Lee, Tokyo Polytechnic University, Japan
- Dr. Hisaki Nate, Tokyo Polytechnic University, Japan
- Dr. Thepchai Supnithi, NECTEC, Thailand
- Dr. Rolly Intan, Petra Christian University, Indonesia
- Dr. He Xiao Qing, Shanghai University, China
- Dr. Sun Guoyu, Communication University of China, China
- Dr. Se Hyun Park, Daegu University, Korea
- Dr. Kyudeuk Yeon, Christ University, India
- Dr. Intiraporn mulasastra, Kasetsart University, Thailand
- Dr. Dongkyun Kim, Kyungpook National University, Korea
- Dr. Eun Yi Kim, Konkuk University, Korea
- Dr. Jung Wha Lee, Dong-eui University, Korea
- Sang Hyo Lee, PineTree Associates, Korea
- Jong Soo Rhee, PineTree Associates, Korea

Keynote Speech

Ten Unsolved Problems in Human-Cultural Artifact Interaction

Professor Emeritus Kwangyun

Wohn KAIST, Korea



Chairman of Korea NST /Professor Emeritus, KAIST, Korea

He used "Culture Technology" first in the world

1986~1990: Professor, University of Pennsylvania, USA

1991~2004: Professor, KAIST, Korea

2005 ~ 2011 Founder & Dean, Graduate School of Culture Technology, KAIST

2005~ President, HCI Association, Korea

2017.10.23~ Chairman, National Research Council of Science & Technology, Korea

How to Create a Good Game on "PAC-MAN" experience

Professor Toru Iwatani

TPU, Japan



Game Creator /Professor, Tokyo Polytechnic University

President for Digital Games Research Association Japan

BANDAI NAMCO Entertainment Inc. fellow member

1955: Born in Tokyo.

1977: Entered the namco Ltd. (Current: BANDAI NAMCO Entertainment Inc.)

1980: Produced the video game "Pac-Man" whose theme is "Eating". It was appreciated

Schedule

Time	Program		
December 8(Friday), Place: Tokyo Polytechnic University (Nakano Campus), Tokyo, Japan			
14:00~15:00	Registration		
15:00~17:30	International Culture & Marine Design Exhibition Room# 3101(Building 3)		
December 9(Saturday), Place: Tokyo Polytechnic University (Nakano Campus), Tokyo, Japan			
08:00~09:00	Registration		
09:00~10:40	Oral Presentation 1 (Session A, B, C, D) Room# 1201~1204		
10:40~10:50	Tea Break		
10:50~11:30	Opening Ceremony - Opening Address(President Pyeoungkee Kim, IACST) - Congratulatory Message (Dr. Ryuichiro Yoshie, President of TPU, Japan) - Congratulatory Message (Dr. Kazuo Sugiyama, Director of Oriental Consultants, Japan) - Welcome Message (Dr. YongUk Lee, TPU, Japan) Room# 1B01		
11:30~12:10	Keynote Speech 1 (Speaker: Prof. Kwangyun Wohn, KAIST, Korea) Room# 1B01		
12:10~13:10	Lunch Room# Cafeteria(Building 2)		
13:10~13:50	Keynote Speech 2 (Speaker: Prof. Toru Iwatani, TPU, JAPAN) Room# 1B01		
13:50~15:30	Oral Presentation 2 (Session E, F, G, H) Room# 1201~1204	Special Session A: Color Science and Art Research Center of Color Science &Art, Tokyo Polytechnic Univ. Room# 1205	
15:30~16:20	Poster Presentation (Session P1, P2, P3, P4) Room# Cafeteria(Building 2)	Special Session B: Design and Entrepreneurship(16:00~) Prof. TJ Kim, Purdue Univ., USA Mr. Sunghwe Kim, 3D Plus, Korea Prof. Henri Christiaans, UNIST, Korea Prof. WangPo, Western Univ., Vietnam Room# 1205	Special Session C: Future Making (16:00~) Prof. Ted Shin, MSU Denver, USA Mr. Jared Vanscoder, Autodesk, USA Mr. Jeffrey Smith, Autodesk, USA Mr. Thomas Kim, Sindoh Corp., Korea Room# 1206
16:20~18:00	Oral Presentation 3 (Session I, J, K, L) Room# 1201~1204		
18:00~20:00	Banquet - Welcome Message (Vice President Taesoo Yun, IACST) - TPC Chair Message (TPC Chair Dongkyun Kim, KPNU) - Best Paper Awarding (TPC Chair Hisaki Nate, TPU) - Dinner (at Cafeteria)		
December 10(Sunday), Place: Tokyo Polytechnic University (Nakano Campus), Tokyo, Japan			
09:00~10:30	Video Presentation (Session VI)		
10:30~12:00	Evaluation (by Organizing Committee)		

Program

December 9, 2017 (Oral Presentation)

Session A - ICT Trends and Applications I

09:00~10:40, Room 1201, Session Chair: Donghwa Lee (Daegu University, Korea)

- 237 "Design of a User-centered Classifier for evaluating Voice Condition based on the S-choker," Seonghee Min and Yoosoo Oh (Daegu University, Korea)
- 396 "Simple Automatic Passenger Counting System(SAPCoS)," Disorn Tantigate and Somchoke Ruengittinun (Kasetsart University, Thailand)
- 239 "Genome Sequencing Report Exchange System," Hwijun Kwon, Shinwoong Lee, Mingyu Kim and Ilkon Kim (Kyungpook National University, Korea)
- 295 "Water Volume Detection System in Galon using Arduino," Agustinus Noertjahyana, Denny Kuriando and Resmana Lim (Petra Christian University, Indonesia)

Session B - ICT Service Technologies

09:00~10:40, Room 1202, Session Chair: Prof. Hongsik Park (Dongseo University, Korea)

- 147 "A Path Recovery Method using Cooperative Service Networks for Underwater Service Oriented Networks," Yonghwan Jeong, Sungwon Lee, Yeongjoon Bae, Eunbae Moon, Dongkyun Kim (Kyungpook National University, Korea)
- 188 "Modern day detection of Mines; Using the Vehicle Based Detection Robot," Hafiz Suliman Munawar, Usama Khalid and Adnan Maqsood (NUST, Pakistan)
- 222 "Autonomous Driving Car Technology Development Trend," Min-Joon Kim and Jong-Wook Jang (Dong-Eui University, Korea)
- 301 "Private Cloud Deployment on Shared Computer Labs," Henry Novianus Palit, Agustinus Noertjahyana, Albert Halim and Christian Adi Widjaja (Petra Christian University, Indonesia)

Session C - ICT Trends and Applications II

09:00~10:40, Room 1203, Session Chair: Prof. Rolly Intan (Petra Christian University, Indonesia)

- 249 "Utilizing Emulab for Machine Learning Resource Pool," Gi-Beom Song and Man-Hee Lee (Hannam University, Korea)
- 187 "Recent Studies of FACTS devices for Power Flow Control," Umair Khalil, Sheeraz Ahmed, M. Danyal, M. Yousaf Ali and Fazal-e-Wahab (Gomal University, Pakistan)
- 388 "Appearance based filtering of matched line segments with topological constraints," Ik Hyun Jo, Jae Seok Jang, and Soon Ki Jung (Kyungpook National University, Korea)
- 346 "Location inference and verification techniques for cultural heritage attraction," Watchira Buranasing, Thepchai Supnithi, Monthika Boriboon and Marut Buranarach (National Electronics and Computer Technology Center, Thailand)

Session D - Digital Contents I

09:00~10:40, Room 1204, Session Chair: Prof. Hyeyoung Ko (Seoul Women's University, Korea)

- 197 "Common Interest between You and Me: Investigating Common Interest among Developers in GitHub Pull Requests," Sunbin Park and Eunjoo Lee (Kyungpook National University, Korea)
- 305 "Emotion Recognition Technology using Face Feature Vectors," Jung-Wun Lee, Kyung-Ae Cha, Jeong-Tak Ryu and Se-Hyun Park (Daegu University, Korea)
- 317 "A Study on Big Data Application in Animated Characters," Young-Suk Lee (Dongguk University, Korea)
- 202 "Weeds classification system for selective herbicides using broad weed estimation," Imran Ahmed, Sheeraz Ahmed, Noor-ul-Amin and Ayub Khan (Gomal University, Pakistan)

Session E - ICT Trends and Applications III

13:50~15:30, Room 1201, Session Chair: Prof. Manhee Lee (Hannam University, Korea)

- 390 "Analysis of Camera Movement Affecting the Visual Cognition of the Audience in Animation," Jing Gu, Hyungjin Jeon and Hongsik Pak (Dongseo University, Korea)
- 403 "Hooking on 64-Bit Windows Using INT 3 Interrupt," Taehyoung Kim and Jong-Wook Jang (Dong-Eui University, Korea)
- 240 "Visual Tracking with Deep Neural Network-based Object Detection and Dynamic Image Masking," Dong-Hyun Lee (Kumoh National Institute of Technology, Korea)
- 275 "An Augmented Reality Application for Studying the Lives of Animals," Yulia, Liliana and Robert Hartono (Petra Christian University, Indonesia)

Session F - Digital Contents II

13:50~15:30, Room 1202, Session Chair: Prof. Sung Pil Lee (Dongseo University, Korea)

- 351 "A Design Study through the Self-Report Emotion Measurement of Beach Bench Users," Chao Huang and Jung-Wook Go (Dongseo University, Korea)
- 245 "PGHD generation and sharing service design for visually impaired using speech recognition and FHIR," Woo Jin Kim, Dae-young Kim, and Il Kon Kim (Kyungpook National University, Korea)
- 196 "Who should pick me up? An approach for identifying suitable source files," Geunho Choi and Eunjoo Lee (Kyungpook National University, Korea)
- 203 "IoT for Real Time Data Logger and pH Controller," Leo Willyanto Santoso, Andreas Kwariawan and Resmana Lim (Petra Christian University, Indonesia)

Session G - Culture Service I

13:50~15:30, Room 1203, Session Chair: Prof. Yoosoo Oh (Daegu University, Korea)

- 324 "Design Development of a Step for Children," Jo HyeonSeong (Dongseo University, Korea)
- 389 "A User-engaging Interactive Digital Media Art System based on Masterpieces in Virtual Reality," In Su Kim, JunHyeok Hwang, Filsang Kim, Sunij Lee, Jaeseok Jang and Soon Ki Jung (Kyungpook National University, Korea)
- 172 "An Analysis of Chinese Traditional Patterns in Mobile Game Interface of Chinese Style -A Case Study of Fantasy Westward Journey-," Rongfang Zhang and Donghyuk Choi (Dongseo University, Korea)
- 399 "Handwritten Balinese Character Recognition using K-Nearest Neighbor," I Wayan Agus Surya Darma and Ni Kadek Ariasih (STMIK STIKOM, Indonesia)

Session H - Digital Contents & Culture Service I

13:50~15:30, Room 1204, Session Chair: Prof. Intiraporn Mulasastra (Kasetsart University, Thailand)

- 272 "Quadruped rigging with Quick rig in Maya software," Yangyang He and Chul Young Choi (Dongseo University, Korea)
- 181 "A Study on the Space Form and Sculpt of 3D Animation Background Modeling - Focused on The Gestalt Principle of Organization -," Lingfeng Gu, Hyungjin Jeon and Hongsik Pak (Dongseo University, Korea)
- 384 "Evaluation of connectives between color and typical adjective metaphor in Japanese language," Takashi Yamazoe, Yhuki Gouma and Yoshihiko Azuma (Chiba University, Japan)
- 216 "Use of AMR and CEI for Load Management due to Power Crisis in Pakistan," Sheeraz Ahmed, Gul Nabi Syed, Zahoor Ali Khan, Kashif Ali Awan and Amjad Khattak (Career Dynamics Research Center, Pakistan)

Session I - ICT Trends and Applications IV

16:20~18:00, Room 1201, Session Chair: Prof. Eun Yi Kim (Konkuk University, Korea)

- 225 "Creating Cycle Routes on Strava Segments," Wichpong Kao-ian and Intiraporn Mulasastra (Kasetsart University, Thailand)
- 365 "Trend Prediction of Detected Lightning Whistler using DBSCAN," I Putu Agung Bayupati and Ketut Adi Purnawan (Udayana University, Indonesia)
- 250 "Implementation of Indoor Positioning System using ID-Based VLC Beacon," Cheol-Min Kim, Min-Woo Jung and Seok-Joo Koh (Kyungpook National University, Korea)
- 364 "Conversion System of Earthquake Data from Microsoft Excel to Database at Indonesian Agency for Meteorological, Climatological and Geophysics Denpasar," Gusti Made Arya Sasmita and I. Gusti Putu Krisna Pradipta (Udayana University, Indonesia)

Session J - Digital Contents III

16:20~18:00, Room 1202, Session Chair: Prof. Chul-Young Choi, Dongseo University, Korea

- 173 "An Association Study on the Aesthetic Characteristics of Digital Lighting and Impressionist Painting -- Taking "Zootopia" as an example," Guochao Sha and Donghyuk Choi (Dongseo University, Korea)
- 385 "VR Entertainment System "Ideal Vacation": A Game Designing Focused on the Sense of Presence," Yusuke Numazaki, See-Sheng Toh and Masanobu Endoh (Tokyo Polytechnic University, Japan)
- 323 "Aesthetic Implication and Thought Significance of Film Semiotics -- Focusing on Chinese Documentary," Xi Fang and Won-ho Choi (Dongseo University, Korea)
- 191 "Curse of Drug Addiction among Youth in Pakistan," Farhat Shabbir (University of the Punjab, Pakistan)

Session K - Digital Contents & Culture Service II

16:20~18:00, Room 1203, Session Chair: Prof. I PUTU AGUGANG BAYUPATI (Udayana University, Indonesia)

- 342 "The comparative study of the animated movie industries of China, America, and Japan," Yan Jihui, Liu Jing and Chul Young Choi (Dongseo University, Korea)
- 325 "A Study on the Women-friendly Urban Regeneration Design of Overpass Sub-space," ShunPing He and KwanSeon Hong (Dongseo University, Korea)
- 192 "Conducive Environment Provided to Married Working Women by their Families and Society in Pakistan," Farhat Shabbir (University of the Punjab, Pakistan)

- 398 "Preprocessing system to Improve image quality of Ancient Balinese Manuscript," Ni Putu Sutramiani and I. Nyoman Piarsa (Udayana University, Indonesia)

Session L - Culture Service II

16:20~18:00, Room 1204, Session Chair: Prof. Yun Seon Do (Kyungpook National University, Korea)

- 401 "e-Culture Platform for Cultural Heritage Services," Watchira Buranasing (National Electronics and Computer Technology Center, Thailand)
- 345 "Multimodal Discourse Analysis of Chinese Traditional Cultural in the Mobile Game <King of Glory>," Ding Zhi Bo and Seung-keun Song (Dongseo University, Korea)
- 221 "Linked Open Data Development for Sharing the 3D Cultural Artifacts," Weeraphan Chanhom and Pongpon Nilaphruek (Chiang Mai University, Thailand)
- 204 "Fire detection through Image Processing: A brief overview," Hafiz Suliman Munawar, Usama Khalid and Adnan Maqsood (NUST, Pakistan)

Special Session - Color Science and Art

13:50~15:30, Room 1205, Session Chair: Prof. Yonguk Lee (Tokyo Polytechnic University, Japan)

- 158 "Color-Tunable Single Pixels Using Stacked Transparent Organic Light Emitting Diodes and Color-Tunable Lighting Domes," Takayuki Uchida, Takumi Takeuchi, Shuhei Ueda and Satoshi Kawamura (Tokyo Polytechnic University, Japan)
- 145 "Interactive Art Generating Innovative Color Expression Using Deep Learning Neural Networks," Yasuo Kuhara (Tokyo Polytechnic University, Japan)
- 163 "Virtual Environment for Visualizing Vocal Features and Its Application to Voice Training," Yoya Nakashima and Tsuyoshi Moriyama (Tokyo Polytechnic University, Japan)
- 318 "The Philosophy of the International Color Science and Art Center as the Brand Strategy of University," Yasushi Noguchi and Ryuichiro Yoshie (Tokyo Polytechnic University, Japan)

December 9, 2017 (Poster Presentation)

Session P1

16:20~18:00, Room#: Cafeteria (Building 2), Session Chair: Prof. Yoosoo Oh (Daegu University, Korea)

- 381 "VR Animation Production Based on Game Engine," Lin Qu, Taesoo Yun and Chul Young Choi (Dongseo University, Korea)
- 195 "Light Therapy System: Combining Real-time Emotion Recognition and Learning-based Color Recommendation," Yaohui Yu, Eunjeong Ko, Jinxi Li and Eun Yi Kim (Konkuk University, Korea)
- 227 "Controller's Behaviors Logging System of Therapeutic Contents for Collecting User Actions," Sunghee Lee (Kyungpook National University, Korea)
- 201 "Content-Based Image Selection for Automatic Report Generation," Jeongwook Choi, Jeongin Seo and Hyeyoung Park (Kyungpook National University, Korea)
- 215 "Wireless Sensor Networks Security," Eun-Ji Cheon, Seung-Ju Cha and Eun-Jung Choi (Seoul Women's University, Korea)
- 207 "Possibility of Using Virtual Reality, Augmented Reality and Mixed Reality for Educational Contents of STEAM," Jeongwon Na and Hyeyoung Ko (Seoul Women's University, Korea)
- 393 "Topic-based News Categories Classification using Latent Dirichlet Allocation and Convolutional Neural Networks," Taekeun Hong, Eunji Lee, Pankoo Kim and Jiman Hong (Soongsil University, Korea)
- 184 "Leap Motion Interface for Multi-modal UI/UX Engine of Car Control System," YoungJick Jang and Tae-Soo Yun (Dongseo University, Korea)
- 164 "Characteristics of Gaze Information according to Player's Experience under Searching Spaces of FPS Games," GyuHyeok Choi and Mijin Kim (Dongseo University, Korea)
- 167 "The Comparative Studies on the Cyber Punk Style in Animation and Film by Focusing on <Ghost in the Shell>," XuePing Gu, MinSik Hwang and HyunSeok Lee (Dongseo University, Korea)
- 369 "Media Characteristics for Effective Transmission Media," Yong yeongji and Donghyuk Choi (Dongseo University, Korea)

Session P2

16:20~18:00, Room#: Cafeteria (Building 2), Session Chair: Jiman Hong (Soongsil University, Korea)

- 210 "Development of Interactive Virtual Reality Educational Contents for Middle School Students to Experience Earth Science Education," Minha Park, Jeongwon Na, Hyundam Yoon and Hyeyoung Ko (Seoul Woman's University, Korea)
- 211 "IoT Device Security Guide Trend and Analysis Research," Seul-Ki Han, Ye-na Lee and Myuhng-Joo Kim (Seoul Women's University, Korea)
- 219 "MRF model based Real-time Traffic Flow Prediction with Support Vector Regression," Eun Yi Kim and Eunjeong Ko (Konkuk University, Korea)

- 220 "Vision-based Wheelchair Navigation using Geometric AdaBoost Learning," Eun Yi Kim (Konkuk University, Korea)
- 254 "A study on the Improvement of Corporate Image Through Convergence Design Management -Focusing on the CBI and CCSR -," Hoe Jeong Gon (Seoul National University of Science and Technology, Korea)
- 236 "Deep Learning-Based Face Detection on Embedded Systems," Donghwa Lee (Daegu University, Korea)
- 238 "A Prototype Implementation of Light-Weight Graphics System with Direct Rendering Manager Support," Nakhoon Baek (Kyungpook National University, Korea)
- 260 "Risk Information Communication in Science and Technology between Science Museum and Users in the EPL Mode," Daegil Hong (Seoul National University of Science and Technology, Korea)
- 311 "Evaluating Usability of Intelligence Assistant Applications," Chae Won Park, Jae Hyung Park, Issac Han and Hohyun Lee (Paul Math School, Korea)
- 176 "Analysis on Persuasive Function and TV Public Service Advertising," Ke-Jing Wen and Won-ho Choi (Dongseo University, Korea)
- 174 "Implementation of Infantry Squad Organization for Realistic Squad Battle Game," Nak Hyeon Goo, Dong Hoon Lee and Mi Jin Kim (Dongseo University, Korea)
- 218 "Color Therapy: Estimating Hidden Relationship between Colors and Human Emotions," Yaohui Yu, Eunjeong Ko and Eun Yi Kim (Konkuk University, Korea)

Session P3

16:20~18:00, Room#: Cafeteria (Building 2), Session Chair: Donghwa Lee (Daegu University, Korea)

- 165 "A Method for Procedural Building Destruction from Houdini to UE4," JiaNi Zhou and Tae Soo Yun (Dongseo University, Korea)
- 392 "Research for Sign System Design of Public Parking Lot," Zhang Feng, Wangyang and Lee Sung Pil (Dongseo University, Korea)
- 375 "Societal Implications of Crowdfunding Success for Korean and Chinese films on Sexual Slavery - through in Korea and <22> in China," Jiang Danwei and Chang Eun jin (Dongseo University, Korea)
- 335 "Research on Elderly TV Programs Based on the Characteristics of the Times and the Demands of the Elderly," DanYa Liu and DongHun Lee (Dongseo University, Korea)
- 333 "A Study on the Traditional Color Metaphorical Function of 'Chinese School 'Animation,'" Hao Shen and DongHun Lee (Dongseo University, Korea)
- 321 "A Study on Kinetic Art as Synesthesia Visualization by Music Waveform," WonUng Jeong and SeHwa Kim (Dongseo University, Korea)
- 171 "Ethnocultural Characteristics in the Animation of Chinese School," Ting-Wu and Mijin Kim (Dongseo University, Korea)
- 253 "Plasmonic color structures embedded on imaging devices for augmented reality," Yun Seon Do (Kyungpook National University, Korea)
- 255 "A study on Qualitative Evaluation Model for Specialized Trade Exhibition," Young Soo Kim (Seoul National University of Science and Technology, Korea)
- 368 "Workflow of the Digital Actor Hologram Performance based on Digital Synthesis," Fu Linwei, Jiang Haitao, Ji Yun, Young Jick Jang and Tae Soo Yun (Dongseo University, Korea)
- 402 "File carving analysis in the Pagefile.sys," SeungJu Cha and EunJung Choi (Seoul Women's University, Korea)
- 178 "Proposal of Spatial Structure Image Elements Appliance to Enhance Immersion in Virtual Reality Space," Hyungjin Jeon, Eeljin Chae, Hongsik Pak and Taesoo Yun (Dongseo University, Korea)
- 182 "The Analysis of the Continuity of the Scenes and screen Transformation in 3D Animation," Qiwen Song, Hyungjin Jeon and Hongsik Pak (Dongseo University, Korea)
- 367 "A Study on Ink Painting Blurring Effect for Making CG Ink Painting Animation," Dong JiaJia, Hou ZhengDong, YoungJick Jang and ChulYoung Choi (Dongseo University, Korea)

Session P4

16:20~18:00, Room#: Cafeteria (Building 2), Session Chair: Hyeyoung Ko (Seoul Women's University, Korea)

- 256 "A study on Evaluation System Construction Method for Convergence Design Education Program based on Design and Engineering," Yi Yeon Kim (Seoul National University of Science and Technology, Korea)
- 257 "A study on Establishing EVE (Exhibit Value Engineering) System for Improving the QUALITY of Exhibits in Science Center," Yoon Ho Uh (Seoul National University of Science and Technology, Korea)
- 258 "A study on the Design Convergence Attitude of Nano Technology and Art," Gyu Woon Oh (Seoul National University of Science and Technology, Korea)
- 259 "The Influences that Virtual Reality Exercises on Educational Effectiveness and Return Visitors in Experiential Safety Hall Activities - Focus on Elementary School Students -," Hee Hyoung Chung (Seoul National University of Science and Technology, Korea)
- 261 A study on Composition of Evaluation Model and Setting Up Weighted Value for Coffee Remote Education," Sung Kwon Hong (Seoul National University of Science and Technology, Korea)
- 329 "Research on the Regeneration of Chinese Ancient Towns Based on Theory of the Production of Space," WenLi Chen and Kwan-Seon Hong (Dongseo University, Korea)

- 336 "Analysis of Wharf Park Project based on placeness,"** Ma DongQing and Yoon JiYoung (Dongseo University, Korea)
- 205 "A Heuristic Checklist for the usability Evaluation of English Learning Mobile Application,"** Hyebin Jeon and Hyeyoung Ko (Seoul Women's University, Korea)
- 397 "A Railway Accident Prevention System Using MobileNets,"** Ziyu Fang and Pyeoungkee Kim (Silla University, Korea)
- 344 "A Resear on the Potential of Limited Animation Techniques Function in Computer,"** Gu Jie and Chul-Young Choi (Dongseo University, Korea)
- 166 "Representing the Aesthetic Characteristic of <the Great Wave off Kanagawa> in Animation <Kubo and the Two Strings> and <Miss Hokusai>,"** Han Zhe, MinSik Hwang and HyunSeok Lee (Dongseo University, Korea)
- 391 "A Comparative Study on the Value of Design Concept between Service Provider and Service Receiver,"** Lee Sangki, Chung Joo Young and Lee Sung Pil (Dongseo University, Korea)
- 352 "Research on the Application of Real-Time Motion Capture Technology in VR,"** Lin-Chao Gao, Lin Qu, Tae-Soo Yun and Chul-Young Choi (Dongseo University, Korea)

Guide Line for Authors/Chairs

Guideline for Authors

Oral Sessions

1. Duration of the Presentation

The allotted time for each speaker is 15 minutes to present and 5 minutes for Q&A.

2. Equipment in Presentation Room

Each presentation room will have a projector, a screen and a laptop computer running PowerPoint under MS Windows, equipped with USB port.

3. Preparation for Your Presentation Session

Bring a USB memory with your PowerPoint presentation and make sure that your file is copied on the laptop computer before your session starts. Please show up 15 minutes before the actual session starts and introduce yourself to the session chair. Be prepared to give some bibliographic details about yourself to the chairperson so that he/she can introduce you before your presentation.

Poster Sessions

1. Duration of the Presentation

The poster session has 60 minutes, requiring all presenters to be available at their posters during the session.

2. Poster Specification

Posters must be designed to fit a 841mm wide x 1189mm tall board. Posters may be prepared as a single poster or as several smaller sections mounted together. The heading of the poster should list the paper title, author(s) name(s), and affiliation(s).

3. Poster Set-Up

Posters may be attached to the boards by push pins or tapes, which will be provided. Posters must be set up by presenters 10 minutes before the session starts. Posters must be removed by presenters right after the session is over. Posters not removed by 10 minutes after the session will be removed by volunteers (session organizers not responsible for posters left after this deadline).

Guideline for Chairs

Before Your Session

1. Check the Program

Prior to departure for the meeting, check the program on our website (<http://icct.iaacst.org>) to find the time slot for the session that you are chairing.

2. Pick Up the Materials for Session Chair from Registration Desk

Please arrive at the registration desk about 20 minutes prior to the start of the session and pick up the material prepared for a session chair.

3. Check the Meeting Room

Please arrive at the session room about 10 minutes prior to the start of the session and familiarize yourself with the controls for lights, microphones, a pointer, and a projector. If you encounter problems, immediately alert the session staff who is serving your session in the session room. Meanwhile, you have to check the presence of individual speaker in your session.

During Your Session

1. Introduction

At the start of the session, briefly introduce yourself and explain the timing system to the audience, and as often during the session as you think necessary.

2. Time Allotment

The allotted time for each speaker is 15 minutes to present and 5 minutes for Q&A. If possible, you may give a brief introduction of the speaker to the audience, including his or her affiliation and position, at the beginning of each presentation.

3. Absent Speakers

Should a speaker fail to appear, you may recess the session until it is time for the next scheduled abstract. If you are notified of the absence of any speaker before the session starts, please announce it to the audience. You have to report the absence of any speaker to the secretariat for conference administration at the registration desk.

IoT for Real Time Data Logger and pH Controller

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Abstract

Acidity in wastewater is the critical problem in developing country. The absence of efficient wastewater management has caused serious environmental problems and cost issues. Therefore, in this paper IoT-based data logger and pH controller is proposed to reduce the inefficiency. IoT is a concept whereby objects around us can interact and exchange information with each other without human intermediaries through the Internet. One of the implementation of IoT is to monitor the level of liquid acidity through smartphones. It needs additional tools such as sensors, microcontrollers, and other devices that are then connected to the internet. Android-based mobile phone is used to interact with sensors, microcontroller, and other tools through the internet wherever the user is. From the testing, there is a successful communication between the components of the device, sensors, and Android devices. It is possible to adjust the acidity of the liquid automatically by activating the pump in accordance with the results of the pH reading

Keywords- Internet of Things; microcontroller; acidity; monitor and controlling

I. Introduction

IoT or Internet of Things is a system whereby interrelated devices can exchange data over the Internet without requiring human-to-human or human-to-computer interaction [1]. Things in the Internet of Things can mean anything like a sensor-mounted chair, a heart monitor implant, or a vehicle with a sensor installed to alert tire pressure. Internet of Things uses objects with sensors to record data. The data obtained will be processed through a processor board or microcontroller. Microcontroller commonly used for IoT is RaspberryPi, Arduino, ESP8266 and others. The purpose of IoT is to get various data from around us as an analysis or reference that will be used for other purposes such as decision making, market analysis, or just observation.

The level of acidity in liquids can also be one of the objects for the Internet of Things. The level of acidity of fluid that we consume is very important for our health. Water that has an unbalanced acidity level will cause the environmental health and ecosystem to be disturbed. In addition, the level of fluid acidity also affects the analysis of a process or

decision-making for an industrial company. Liquid waste is liquid waste derived from the production from industry, household, or shops. Liquid waste that is not neutralized and disposed of will affect the ecosystem of the landfill. Fluids which have too high pH or too low can cause damage to both the drainage used, the container used, and the location used as the discharge of the liquid. One effort to manage liquid waste is to neutralize the pH or acidity levels.

Some industries and households do not pay attention to the impact of liquid waste on the environment. Effluent produced by an industry should meet the national guideline values of wastewater quality before it is released into rivers, streams or even municipal sewer systems. Management of liquid waste focuses on finding a way to dispose of the waste in a way that is safe for humans and the environment.

To solve the wastewater problems, this paper aims to design and implement an IoT for data logger and pH controller. The designed system is able to communicate with a variety of smart objects using Wi-Fi, Bluetooth and IrDA standards. As a result, all objects can exchange information through the designed system. The main contributions of this paper are as follows: (1) The designed IoT system enables the communication among different smart devices, including smart phones, microcontroller, and sensors. 2) The system provides solution to the wastewater management in order to know the acidity level of the liquid and help the pH setting using cutting edge technology.

The remaining part of this paper is organized as follows. Section 2 presents the background and the related work. Sections 3 presents the design of the IoT system and 4 present the testing of the proposed system. Finally, the conclusions are drawn in Section 5.

II. Related Work

A. Internet of Things (IoT)

The Internet of Things (IoT) is a technology that has become popular to describe the machine connectivity phenomenon [2, 3, 4]. Small sensors and computer chips are placed on a variety of devices or things, which enable them to communicate via the internet or other network to computer systems. As the Internet of Things moves more into daily life, it creates exciting opportunities for developer and researcher alike [5]. In industry, IoT could do automation in the industrial processes [6]. IoT can be used for agricultural purposes [7]. IoT was illustrated by its typical use in medical system and

smart home [8, 9].

B. Ubidots Cloud Platform

Ubidots is a server that can be used for the implementation of the Internet of Things. Ubidots helps for the process of cloud implementation. Ubidots provides APIs to help with the data collection process and make it informational. API is a way or solution for objects to interact with the web. This API allows makers to make changes and retrieval data from the server. This API supports both HTTP and HTTPS usage. To exchange data required API key. To retrieve a value or variable from the server then required the ID of that variable and the user account tokens that the server has given. To facilitate Android developers, Ubidots has provided a library that works to shorten the writing of HTTP requests in JAVA [10]. Ubidots has been used in several IoT-based system, for example for health management system [11], smart home [12, 13] and for environmental monitoring system [14].

C. Arduino IDE

Arduino IDE is an open-source software that helps create scripts or code and upload the script or code on the board or microprocessor. Arduino IDE has an environment written in Java. The Arduino IDE also has a compiler for C or C++ languages. Arduino IDE does have a major function to help create scripts or code for various boards or microprocessors [15].

D. Microcontroller

Microcontroller is a microprocessor that has additional parts that make it possible to organize or control other objects. It can be interpreted that the microcontroller run programs that have been created by the user and stored in memory. Microcontroller is a very useful tool that can help the designer to manipulate data obtained from input or output. Usually microcontroller is composed of microprocessor, memory and I/O. The microprocessor itself is composed of Central Processing Unit (CPU) and Control Unit (CU). CPU is the main brain that performs arithmetic and logic processes. While CU controls the operation of the microprocessor and sends signals to other parts of the microprocessor to perform instructions [16].

III. System Design and Implementation

Schematic design is used to explain how to install the device. The schematic design can be seen in Figure 1. The output of the transmitter will be received by microcontroller with analog pin A0. The input included is a positive flow while the negative flow of the transmitter will be attached to the ground pin of the microcontroller. Positive and negative current flows are connected to a 100 ohm resistor.

Positive flow is given an additional 10K ohm resistor to anticipate if there is too large flow undesirable and can damage microcontroller. Terminals are used to make GND (ground) pins and 3V3 pins (3.3 volts) can be used by 2 different relays. Then the IN pin on each relay is paired on different digital

pins.

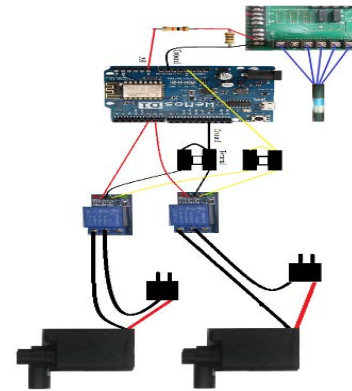


Fig 1. Schematic Design

Use case diagram was used to create Android applications. It can be seen in Figure 2. The apps has some features such as signing in, signing up, and adding device to add new pH meter. There is a feature to set pH limits per device and setting about device information or delete device. Moreover, there is a pH statistics to see statistics of data from device which is selected, and view monthly average statistics to see pH statistics at each pH meter per month. To use existing features must be successful sign in or sign up first.

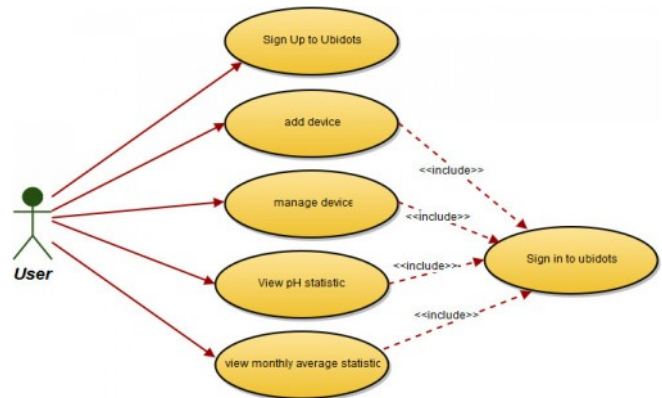


Fig 2. Use Case Diagram for Apps

Creating database on Android app using SQLite. The database is used to store data both from the server and from user input. The database is used to store user account information such as tokens and devices that have been created by the user using the account and the data on the device. The used ERD is shown in Figure 3.

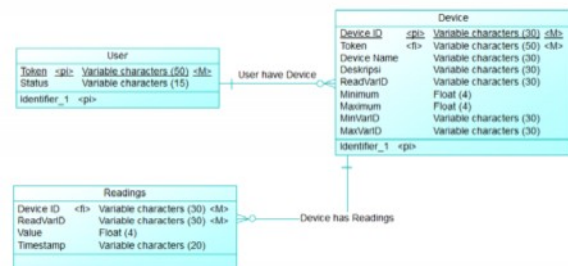


Fig 3. ERD Design

IV. Testing

This section discusses the system testing of the IoT-based program. System testing is done by doing the process. The purpose of system testing is to know whether the program can perform well and in accordance with needs

First, device should be added to the system. Add device works to add new device and stored in server and android database. This page can be accessed by the user by pressing the "+" button. The add device page can be seen in Figure 4.

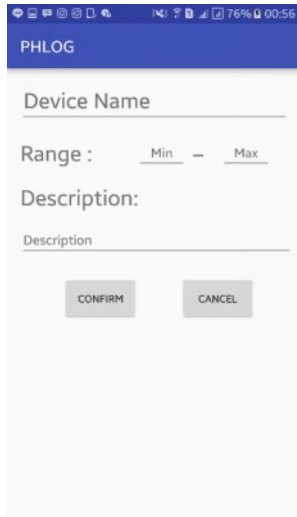


Fig 4. Add Device Interface

Users must enter device name, minimum range, maximum range, and description for every new device. If the user does not fill one of the fields then the application will display the alert or error message. Moreover, if the minimum range is filled over the maximum range then the app will display the alert as shown in Figure 5.



Fig 5. Alert when the minimum level over the maximum level

If all the fields are filled and the user confirms the add device then the app will try to connect with the server and display the progress dialog as shown in Figure 6.

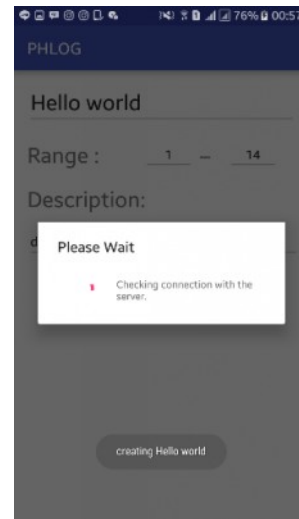


Fig 6. Progress dialog - check the connection to server

If the connection is successful then device creation will continue. The application will display the progress dialog as shown in Figure 7. After that the user will be redirected back to the main page.

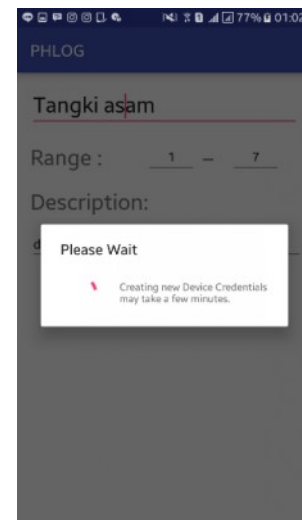


Fig 7. Process of Variable Creation

If the connection fails then the application will display the alert/error message.

The manage device page and data view feature in this application is to display data from the selected device. In addition, this page also has a function to change the pH range and description of the selected device and remove the selected device and its data from the server and database. This page can be accessed by the user by tapping the object in listview. In this page the user can see the graph of sensor readings data taken from the server every 10 seconds. The manage device page and data view can be seen in Figure 8.

Users can change the description, minimum range, and maximum range. If one of the descriptions, minimum range, or maximum range is not filled then the application will display the alert as in Figure 9.



Fig 8. Interface of *Manage Device* and *View Data*



Fig 9. *Alert* if field is empty

If all the fields are filled and the user press the "confirm" button then the application will display the progress dialog as shown in Figure 10.

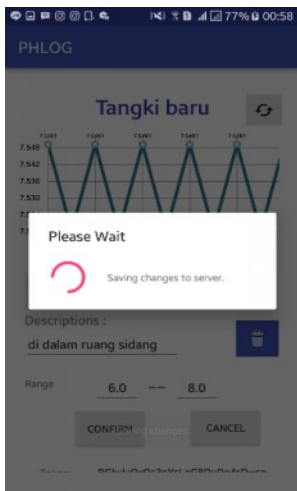


Fig. 10. *Progress Dialog Edit Device*

If the user pressed the delete button then the dialog box will appear as shown in Figure 11.

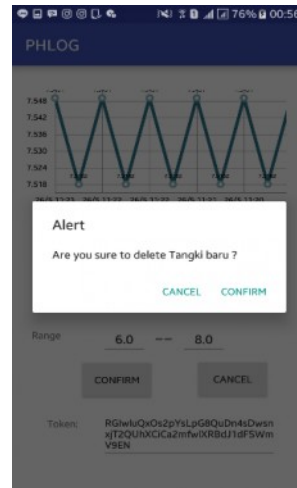


Fig. 11. *Delete Confirmation Dialog*

Users can remove the device by pressing "confirm" then the application will bring up the progress dialog as in Figure 12. Then the user will be directed to the main page.

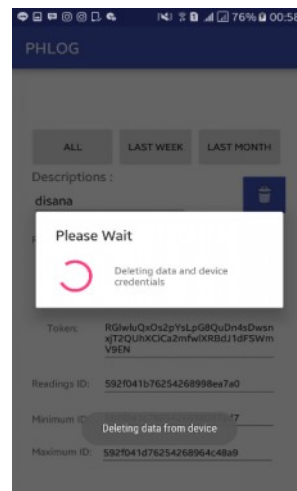


Fig. 12. *Delete Progress Dialog*

The input on the microcontroller of the sensor is a bit. To be able to calculate the pH of the obtained bit value, it requires a solvent which have a known pH value. The solution used by the author has pH 4.01 and 6.86. The results of the measurement experiment can be seen in Table I. Equation (1) is used to calculate the pH.

TABLE I.
EXPERIMENT OF pH MEASUREMENT WITH KNOWN SOLVENT

pH	Bit
4.01	245
6.86	337

$$pH = M * \langle \text{known bit} \rangle + C \quad (1)$$

The value of M and C variables from equation 1 can be seen in Table II.

TABLE II.
EXPERIMENT OF LINEAR EQUATIONS

pH	Bit	Linear equation
4.0	245	$4.01=M*245+C$
1		
6.8	337	$6.86=M*337+C$
6		

So $M = (6.86-4.01) / (337-245) = 0.031$ and $C = 4.01 - (0.031 * 245) = -3.58$. From the experimental results it can be concluded that the equation used is $pH = (0.031 * \langle \text{bit read result} \rangle) - 3.58$.

The comparison of the result of the line equation with the original pH can be seen in Table III.

TABLE III.
THE RESULT OF LINEAR EQUATION WITH KNOWN pH

pH	Bit	Calculation	Error
4.01	245	4.015	0.005
6.86	337	6.867	0.007

The pH control is performed when the sensor readout results out of a predetermined range of users through the Android app and the microcontroller will power the pump for 1 second. The pH control is done by using vinegar water to lower the pH and soap water to raise the pH level.

V. Conclusion

From the implementation of IoT for real time data logger and controller level of acidity of liquid waste using microcontroller and Android, can be drawn conclusion include: Android can interact with microcontroller by using Ubidots server as an intermediary. Application helps control process by setting pH limit setting. Microcontroller can control fluid pH by using pumps. Applications may warn that the pH has exceeded the specified limit. These devices are low cost, more efficient and capable of processing, analyzing, sending the data, and it can be viewed everywhere. The application is numerous and can be further developed to integrate more sensors which are applicable to monitor the quality of the environment.

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Leo Willyanto Santoso

and certifies the acceptance for publication of the paper entitled

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