Cek Turnitin - Jurnal - Oil well monitoring system based on IoT technology and machine learning

by Cek Turnitin Jurnal

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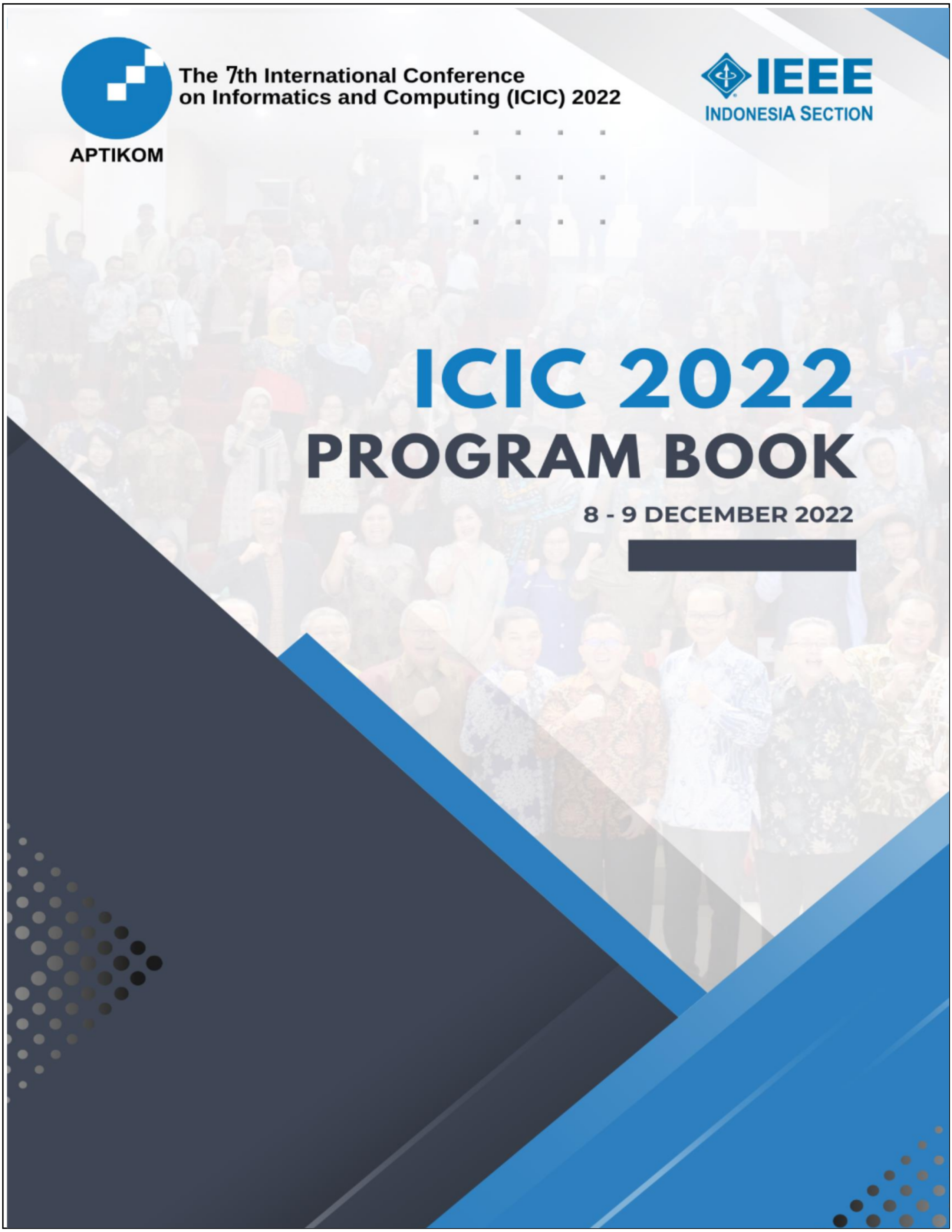
APTIKOM
The 7th International Conference
on Informatics and Computing (ICIC) 2022
IEEE
INDONESIA SECTION
ICIC 2022
PROGRAM BOOK
8 - 9 DECEMBER 2022

Welcome Message from APTIKOM Chairman

Assalamualaikum warahmatullahi wabarakatuh
A new life style is here. Landscape of things are changed. Technology of industrial revolution 4.0 and Covid-19 become the triggering factors to radical changes. Everything is converted to data. Systems of automation proliferate to profit from the digital age. The workforce landscape shifted as well, moving from traditional workforces to digital workforces. In order to take advantage of and respond to the opportunities and challenges in this disruptive environment, more digital skill sets are required.
The skillset required for the workforce in Indonesia is shown and discussed in ICIC 2022, along with how these landscapes of things and workforces are changing. Our educational systems require a drastic reform. In addition, data driven by business should be established to enhance performances. We must hasten the digital revolution in order to thrive and obtain a competitive advantage. All those issues become the main reason of ICIC 2022 choose the theme of this year conference "*Driving Digital Transformation Toward Society 5.0 through Smart Technology and Artificial Intelligence"*.

We have high hopes that this conference will help promote science and technology in Indonesia and prepare us to embrace society, together with all of our coordinated efforts in education, research, and development, and community activities. 5.0.

Welcome to join ICIC 2022

Thank you

Prof. Ir. Zainal Arifin Hasibuan, PhD.
Head of APTIKOM

Message from the General Chair of ICIC 2022

It is my great pleasure to warmly welcome you to the Seventh International Conference on Informatics and Computing (ICIC 2022) held for the first time, in Hybrid mode. Online participation will be held via the Zoom Meeting platform, while offline event will take place in the land on Bali.

The ICIC is a conference series which is conducted annually by APTIKOM, the Indonesian Association of Higher Education in Informatics and Computing. This year the main theme of the conference is ***"Driving Digital Transformation Toward Society 5.0 through Smart Technology and Artificial Intelligence"***, with an intention to bring up more awareness in our society on the importance of Artificial Intelligence in the current era and beyond.

The ICIC conference series as a flagship conference of APTIKOM serves as an arena for academicians and their students, experts and practitioners from the industry to meet, present, and have fruitful discussions on their research works, ideas, and papers in the wide areas of Computing which covers Computer Science, Information Systems, Information Technology, Software Engineering, and Computer Engineering. The conference is set to provide opportunities for participants from both academia and industry to share and exchange knowledge as well as the cutting-edge development in the computing field. It is expected that the ICIC participants will be able to take away new thinking and horizon from this conferential meeting to further their works in the area.

There are 237 papers submission and only 122 papers are accepted which is around 51% acceptance rate. The accepted papers will be presented in one of the 9 regular parallel and tracks sessions and will be published in the conference proceedings volume. The diversity of authors come from 9 different countries.

All accepted papers are submitted to IEEE Xplore. IEEE Conference Number: #56845. Catalog Number: CFP22G52-ART ISBN: 979-8-3503-4571-1

On behalf of the ICIC 2022 organizers, we wish to extend our warm welcome and would like to thank for all Keynote Speakers, Reviewers, Authors, and Committees, for their effort, guidance, contribution and valuable support. We would like to also extend our gratitude to IEEE Indonesia Section for technically co-sponsored this event.

I wish you all a most wonderful, enjoyable, and productive conference in this ICIC 2022.

Thank you.

Wa billahi taufiq wal hidayah. Wallahul muwaffiq ila aqwamit tharieq.

Wasalaamu ‘alaykum warahmatullahi wabarakaatuh.

Yusuf Durachman, M.I.T

Organizing Chair

The 2022 International Conference on Informatics and Computing (ICIC) Committee

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Ridwan Sanjaya Soegijapranata Catholic University, Indonesia
Harry B. Santoso Faculty of Computer Science, Universitas Indonesia
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Aries Susanto UIN Syarif Hidayatullah Jakarta
Evi Triandini Institut Teknologi dan Bisnis STIKOM Bali
Helna Wardhana Universitas Bumigora
Retantyo Wardoyo Universitas Gadjah Mada
Andree E. Widjaja Universitas Pelita Harapan

Program Structures

Thursday, December 8th, 2022

TIME*	PROGRAM	PIC/SPEAKERS	VENUE
08.00 - 08.45	Author and Participant Registration	ICIC Committee	Denpasar Room (3rd FL)
09.00 – 09.45	Keynote Session ICIC Speaker: Moderator:	ICIC Committee	Virtual Onsite: Denpasar Room (3rd FL) (PIC: Ricky)
09.45 – 10.00	Coffee Break	ICIC Committee	TBA / Parallel Room 4th FL
10.00 – 12.00	Parallel session I ICIC	ICIC Committee	Parallel Room 4th FL PIC1: Arsa PIC2: Arya Budi (**Breakout room Zoom**)
12.00 – 13.00	Lunch	ICIC Committee	Ground FL Restaurant
13.00 – 14.45	ICIC Opening join with APTIKOM National Conference (MUNAS)		Griya Agung Ballroom (2nd Floor)
14.45 – 15.00	Coffee Break		TBA/ Parallel Room 4th FL
15.00 – 17.00	Parallel session II ICIC	ICIC Committee	Parallel Room 4th FL (**Breakout room Zoom**)
17.30 – 18.00	ICIC Closing	ICIC Committee	Denpasar Room (3rd FL)

***) All time are in Central Indonesia time (WITA), or UTC +8**

Presentation Schedule

DAY	TIME	Track 1 - TABANAN ROOM Chair: Prof Sri Hartati Host: I KM Dwiki Wahyu Danuarta			Track 2 - AMLAPURA ROOM Chair: Agus Hardjoko Host: Rolla Adi Prawira			Track 3 - BANGLI ROOM Chair: Henderi Host: I Dewa Gede Bagus Suyoga			Track 4 - SINGARAJA ROOM Chair: Dedi. I Inan Host: Natalia Sastra Guna		
THURSDAY	Session 1	CS/I	3	Onsite	CS/I	24	Onsite	CS/I	55	Onsite	IS/IT	161	Onsite
8 Nov 2022	10.00-12.00	CS/I	17	Onsite	CS/I	31	Onsite	CS/I	59	Onsite	IS/IT	163	Onsite
		CS/I	18	Onsite	CS/I	39	Onsite	CS/I	61	Onsite	IS/IT	214	Onsite
		CS/I	76	Onsite	CS/I	54	Onsite	CS/I	86	Onsite	IS/IT	134	Onsite
		CS/I	75	Onsite	CS/I	112	Onsite	CS/I	183	Onsite	SE	33	Onsite
		CS/I	74	Onsite	CS/I	117	Onsite	CS/I	190	Onsite	SE	123	Onsite
		CS/I	98	Onsite	CS/I	172	Onsite	CS/I	208	Onsite	SE	193	Onsite
		CS/I	104	Onsite	CS/I	181	Onsite	CS/I	141	Onsite	IS/IT	158	Onsite
		Track 1 - TABANAN ROOM Chair: Dr. Heni Jusuf, M.Kom Host: I KM Dwiki Wahyu Danuarta			Track 2 - AMLAPURA ROOM Chair: Dedi. I Inan Host: Rolla Adi Prawira			Track 3 - BANGLI ROOM Chair: Henderi Host: I Dewa Gede Bagus Suyoga			Track 4 - SINGARAJA ROOM Chair: Sandy Kosasi Host: Natalia Sastra Guna		
	Session 2	IS/IT	49	Onsite	IS/IT	93	Onsite	MM	207	Onsite	CS/I	171	Onsite
	15.00-17.00	IS/IT	53	Onsite	IS/IT	95	Onsite	MM	1	Onsite	CS/I	176	Onsite
		IS/IT	68	Onsite	IS/IT	92	Onsite	MM	206	Onsite	CS/I	121	Onsite
		IS/IT	100	Onsite	IS/IT	115	Onsite	MM	122	Onsite	CS/I	225	Onsite
		CE/CS	57	Onsite	CE/CS	91	Onsite	IS/IT	209	Onsite	IS/IT	228	Onsite
		CE/CS	65	Onsite	CE/CS	195	Onsite	IS/IT	213	Onsite	IS/IT	232	Onsite
		CE/CS	23	Onsite	CE/CS	82	Onsite	IS/IT	41	Onsite	IS/IT	235	Onsite
		CE/CS	84	Onsite				IS/IT	12	Onsite			

DAY	TIME	Track 5 Chair: Dr. Bambang Krismono Host: Putu Handika Permana			Track 6 Chair: M Said Hasibuan Host: I Gusti Made Raditya Adi Wiguna			Track 7 Chair: Dr. Rangga Firdaus Host: Ni Putu Devi Putri			Track 8 Chair: Herlino Nanang, PhD Host: Ni Nyoman Yuspita Dewi			Track 9 Chair: Lasmedi Afuan Host: Ni Nyoman Arie Rahayu		
THURSDAY	Session 1	CS/I	36	Virtual	CS/I	148	Virtual	IS/IT	13	Virtual	IS/IT	126	Virtual	CS/I	229	Virtual
8 Nov 2022	10.00-12.00	CS/I	37	Virtual	CS/I	154	Virtual	IS/IT	28	Virtual	IS/IT	136	Virtual	CS/I	230	Virtual
		CS/I	51	Virtual	CS/I	170	Virtual	IS/IT	46	Virtual	IS/IT	137	Virtual	CS/I	233	Virtual
		CS/I	67	Virtual	CS/I	175	Virtual	IS/IT	52	Virtual	IS/IT	192	Virtual	IS/IT	237	Virtual
		CS/I	108	Virtual	CS/I	184	Virtual	IS/IT	69	Virtual	IS/IT	200	Virtual	IS/IT	226	Virtual
		CS/I	139	Virtual	CS/I	186	Virtual	IS/IT	72	Virtual	IS/IT	202	Virtual	IS/IT	236	Virtual
		CS/I	146	Virtual	CS/I	199	Virtual	IS/IT	94	Virtual	IS/IT	216	Virtual	CE/CS	231	Virtual
		CS/I	147	Virtual	CS/I	234	Virtual	IS/IT	116	Virtual	IS/IT	223	Virtual	CE/CS	90	Virtual
		Track 5 Chair: Dr. Bambang Krismono Host: Putu Handika Permana			Track 6 Chair: M Said Hasibuan Host: I Gusti Made Raditya Adi Wiguna			Track 7 Chair: Dr. Rangga Firdaus Host: Ni Putu Devi Putri			Track 8 Chair: Sunny Arief Sudiro Host: Ni Nyoman Yuspita Dewi					
	Session 2	CE/CS	27	Virtual	CS/I	22	Virtual	CS/I	70	Virtual	IS/IT	44	Virtual			
	15.00-17.00	CE/CS	50	Virtual	CS/I	191	Virtual	CS/I	79	Virtual	IS/IT	106	Virtual			
		CE/CS	66	Virtual	CS/I	205	Virtual	CS/I	101	Virtual	IS/IT	85	Virtual			
		CE/CS	198	Virtual	CS/I	119	Virtual	CS/I	103	Virtual	IS/IT	224	Virtual			
		CS/I	14	Virtual	CS/I	110	Virtual	SE	107	Virtual	CS/I	2	Virtual			
		CS/I	182	Virtual	CS/I	77	Virtual	SE	135	Virtual	CS/I	40	Virtual			
		MM	15	Virtual	CS/I	187	Virtual	SE	16	Virtual	CS/I	62	Virtual			
		MM	179	Virtual				IS/IT	227	Virtual	CS/I	73	Virtual			

*) All time are in Central Indonesia time (WITA), or UTC +8

Link Zoom:

https://us02web.zoom.us/j/89497273675?pwd=MEY3bkxmSitWZm9NUGRiWDNiQlgrUT09

Meeting ID: 894 9727 3675
Passcode: icic2022

Tracks:

CE/CS CE and Computer Systems
CS/I CS and Informatics
MM Multimedia
IS/IT IS, IT and Management
SE Software Engineering

Presentation Schedule Session 1 – 10.00 – 12.00

	Track 1 - TABANAN ROOM Chair: Prof Sri Hartati Host: I KM Dwiki Wahyu Danuarta		
CS/I	**3**	The Estimating of Nutrient Value in Apples Based on Size Employing the Canny Edge Detection Algorithm	Anis Fitri Nur Masruriyah, Muhammad Haidar Ijlal, Rahmat Rahmat, Hanny Hikmayanti Handayani, Deden Wahiddin and Ahmad Fauzi
CS/I	**17**	Garbage Classification Using CNN Architecture ShuffleNet v2	Eka Setya Wijaya, Andy Mizwar, Ahmad Mujaddid Islami, Yuslena Sari, Erika Maulidiya and Irham Maulani Abdul Gani
CS/I	**18**	Bankruptcy Prediction using Ensemble Support Vector Machine	Nurul Fathanah Mustamin, Jeffry, Supriyadi La Wungo, Firman Aziz and Nurafni Shahnyb
CS/I	**76**	Comparison of Smoothing Methods for Noise Reduction on Baseline Electroencephalogram Signals	I Made Agus Wirawan, Retantyo Wardoyo, Danang Lelono and Sri Kusrohmaniah
CS/I	**75**	Improvising Low Contrast Malaria Images Using Contrast Enhancement Techniques on Various Color Models	Doni Setyawan, Retantyo Wardoyo, Moh Wibowo and E. Elsa Hardiana Murhandarwati
CS/I	**74**	A Study on Text Feature Selection Using Ant Colony and Grey Wolf Optimization	Joan Angelina Widians, Retantyo Wardoyo and Sri Hartati
CS/I	**98**	Analysis of Face Data Augmentation in Various Poses for Face Recognition Model	T.M. Syahril Nur Alamsyah, Taufik Abidin, Ridha Ferdhiana, Muhammad Dirhamsyah and Muhammad Chaidir
CS/I	**104**	Dual Cluster Head Selection Based on LEACH and Differential Search Algorithm to Extend Network Lifetime in Wireless Sensor Network	Kun Nursyaiful Priyo Pamungkas, Supeno Djanali, Radityo Anggoro, Paliling, Puhrani Burhan and Feriyadi

	Track 2 - AMLAPURA ROOM Chair: Agus Hardjoko Host: Rolla Adi Prawira		
CS/I	**24**	Public Sentiment Analysis of Indonesian Tweets About COVID-19 Vaccination Using Different Machine Learning Approaches	Valentinus Paramarta, Adele Mailangkay, Hilda Amalia and Desta Chrismas
CS/I	**31**	Fire Detection In Wetland Using YOLOv4 And Deep Learning Architecture	Andreyan Rizky Baskara, Yuslena Sari, Auria Andeni Anugerah, Eka Setya Wijaya and Ricardus Anggi Pramunendar
CS/I	**39**	A Systematic Literature Review Enhanced Felder Silverman Learning Style Models (FSLSM)	Supangat Supangat and Mohd Zainuri Bin Saringat
CS/I	**54**	Vanishing Point Detection using Angle-based Hough Transform and RANSAC	Dea Angelia Kamil, Agus Harjoko and Wahyono Wahyono
CS/I	**112**	Systematic Literature Review of Text Feature Extraction: Research Trends, Datasets, and Methods	Agus Mulyanto, Sri Hartati and Retantyo Wardoyo
CS/I	**117**	A Time-Window Approach to Recommending Emerging and On-the-rise Items	Tubagus Mohammad Akhriza and Indah Dwi Mumpuni
CS/I	**172**	Energy Efficiency in Buildings Using Multivariate Extreme Gradient Boosting	Triando Hamonangan Saragih, Rahmat Ramadhani, Muhammad Itqan Mazdadi and Muhammad Haekal
CS/I	**181**	Sentiment Classification of Visitors in Yogyakarta Palace using Support Vector Machine	Cahya Damarjati, Fadia Rani and Slamet Riyadi

	Track 3 - BANGLI ROOM Chair: Henderi Host: I Dewa Gede Bagus Suyoga		
CS/I	**55**	Classification and Sentiment Analysis on Tweets of the Ministry of Health Republic of Indonesia	Apriandy Angdresey, Indah Yessi Kairupan and Kenshin Geraldy Emor
CS/I	**59**	Conditional Random Field for Crime News Information Extraction with SMOTE	Viny Christanti Mawardi, Veronika Veronika and Dali Santun Naga
CS/I	**61**	The Implementation of Real-ESRGAN as An Anticipation to Reduce CER Value in Plate Number Extraction Results Employing EasyOCR	Geo Septian, Deden Wahiddin, Hilda Novita, Hanny Hikmayanti Handayani, Ayu Ratna and Anis Fitri Nur Masruriyah
CS/I	**86**	Classification of Chili Plant Condition based on Color and Texture Features	Deffa Rahadiyan, Sri Hartati, Wahyono Wahyono and Andri Prima Nugroho
CS/I	**183**	Hate Speech Detection in Code-Mixed Indonesian Social Media: Exploiting Multilingual Languages Resources	Endang Wahyu Pamungkas, Azizah Fatmawati, Dedi Gunawan, Yusuf Sulistyo Nugroho and Endah Sudarmilah
CS/I	**190**	Comparison of Convolutional Neural Network Models to Detect Covid-19 on CT-Scan Images	Slamet Riyadi, Suci Rahmadina M. Rasyid and Cahya Damarjati
CS/I	**208**	Analysis of Indonesian Discussion Tendency on Twitter with Text Classification	Reyvan Rizky Irsandy and Ayu Purwarianti
CS/I	**141**	1D Convolutional Neural Network to Detect Ventricular Fibrillation	Sava Savero, Muammar Sadrawi and David Agustriawan

	Track 4 - SINGARAJA ROOM Chair: Dedi. I Inan Host: Natalia Sastra Guna		
IS/IT	**161**	Adaptation on Education after Covid-19 – Optimalizing Cognitive Load on Nervous System Science Learning for Higher Education Students through the Usage of Chunking Style Animation in Social Learning Media	Ng Melissa Angga, Cicilia Caroline Phieranto, Fonny Tejo, Dionisius Yovan, Angelica Angelica and Felicia Sumarsono Putri
IS/IT	**163**	Topic Modeling for Cyber Threat Intelligence (CTI)	Hatma Suryotrisongko, Hari Ginardi, Saeed Dehqan and Yasuo Musashi
IS/IT	**214**	Evaluation of Enterprise Resource Planning (ERP) and Open-source ERP Modification for Performance Improvement	Ananda and Jansen Wiratama
IS/IT	**134**	M-Government Adoption in Indonesia: Self-Determination Theory	Dedi I. Inan, Achmad Nizar Hidayanto, Ratna Juita, Antares Firman, Ali Muktiyanto, Hermawan Wibisana Arifin, Muhammad Rizky Darmawan, Nabilla Yuli Shafira and Cassie Michelle
SE	**33**	Design and Build a Attendance System and Employee Performance Assessment with a Website-Based Profile Matching Method	Hata Maulana, Noorlela Marcheta, Asep Taufik Muharram, Kamil Raihan Permana and Alifiah Putri Aisyah
SE	**123**	GeoJSON Implementation for Demographic and Geographic Data Integration Using RESTful Web Services	Alam Rahmatulloh, Bambang Tri Handoko, Rahmi Nur Shofa and Irfan Darmawan
SE	**193**	Development of Portal Signer for Digital Products by Using Iterative Model at PT RST	Manogunawan Resqi Gultom, Riyanthi Angrainy Sianturi, Rince Septriana Parhusip, Ova Ferdinan Marbun and Yohanssen Pratama
IS/IT	**158**	Adoption Technology at MSMEs: A Conceptual Model with TOE	Evi Triandini, I Gusti Ngurah Satria Wijaya, I Ketut Putu Suniantara and Sugiarto Sugiarto

Presentation Schedule Session 2 – 10.00-12.00 (VIRTUAL)

	Track 5 Chair: Dr. Bambang Krismono Host: Putu Handika Permana		
CS/I	**36**	Comparison of the K-Nearest Neighbor and Decision Tree algorithm to the Sentiment Analysis of Investment Applications Users in Indonesia	Doni Purnama Alamsyah, Rizkiansyah Rizkiansyah and Asti Herliana
CS/I	**37**	Investigation of Netizen Sentiment Analysis Toward The Controversy of Information and Electronic Transaction Law	Fahdi Saidi Lubis, Muharman Lubis and Lukmanul Hakim
CS/I	**51**	Sentiment Analysis of "Hepatitis of Unknown Origin" on Social Media using Machine Learning	Nova Agustina, Harya Gusdevi, Iis Ismawati, Diyah Wijayati and Candra Nur Ihsan
CS/I	**67**	Multiclass Intent Classification for Chatbot Based on Machine Learning Algorithm	Wan Mohd Amir Fazamin Wan Hamzah, Mohd Kamir Yusof, Ismahafezi Ismail, Mokhairi Makhtar, Hasnah Nawang and Azwa Abdul Aziz
CS/I	**108**	Low Cloud Type Classification System Using Convolutional Neural Network Algorithm	Muhammad Naufal Fikriansyah, Hapsoro Agung Nugroho and Marzuki Sinambela
CS/I	**139**	Rice seed classification using machine learning and deep learning	Budi Dwi Satoto, Devie Rosa Anamisa, Budi Irmawati, Muhammad Yusuf, Mohammad Kautsar Sophan and Siti Oryza Khairunnisa
CS/I	**146**	Analysis for Data Mobility and Covid-19 Positive Rate with Multilayer Perceptron	Arie Vatresia, Ruvita Faurina and Riki Zulfahmi
CS/I	**147**	Multibranch Convolutional Neural Network For Gender And Age Identification Using Multiclass Classification And FaceNet Model	Haris Setiawan, Mudrik Alaydrus and Abdi Wahab

	Track 6 Chair: M Said Hasibuan Host: I Gusti Made Raditya Adi Wiguna		
CS/I	**148**	Detecting Online Outlier for Data Streams using Recursive Residual	Yasi Dani
CS/I	**154**	Implementation of Adaptive Bit Decision Point to Improve Receiver Performance in Li-Fi System	Juan S. Biantong, Mudrik Alaydrus and Ahmad Sony Alfathani
CS/I	**170**	LongSpam: Spam Email Detection using LSTM Algorithm	Nurhadi Wijaya
CS/I	**175**	LSTM and ARIMA for Forecasting COVID-19 Positive and Mortality Cases in Indonesia	Syafrial Fachri Pane, Adiwijaya Adiwijaya, Mahmud Dwi Sulistiyo and Alfian Akbar Gozali
CS/I	**184**	Semantic Segmentation of Landsat Satellite Imagery	Herlawati Herlawati, Rahmadya Trias Handayanto, Prima Dina Atika, Sugiyatno Sugiyatno, Rasim Rasim and Mugiarso Mugiarso
CS/I	**186**	DeepRec: Efficient Product Recommendation Model for E-Commerce using CNN	Hamzah Hamzah, Erizal Erizal and Mohammad Diqi
CS/I	**199**	Adopting Haar Cascade Algorithm on Mask Detection System Based on Distance	Jemakmun Jemakmun, Rudi Suhirja, Darius Antoni, Hadi Syaputra and Darius Antoni
CS/I	**234**	E-Archive Document Clustering Information System Using K-Means Algorithm	Aida Fitriyani, Wowon Priatna, Dani Yusuf, Tri Dharma, Sri Rejeki and Amri Amri

		Track 7 Chair: Dr. Rangga Firdaus Host: Ni Putu Devi Putri	
IS/IT	**13**	The Influence of The COVID-19 Pandemics in Indonesia On Predicting Economic Sectors	Heriyanto Heriyanto, Syafrial Fachri Pane, Aji Gautama Putrada, Nur Alamsyah and Mohamad Nurkamal Fauzan
IS/IT	**28**	Validation and Verification of Business Architecture Process Based On The V . Model	Widia Febriyani, Firna Muninggar Kistianti and Muharman Lubis
IS/IT	**46**	Acceptance Rate Analysis of Internal Management Operational Application on Pt. Sigma Cipta Caraka Using Technology Acceptance Model (TAM)	Fatimah Azzahra Ashari, Muhammad Qamra Zahran Muharam, Junia Himmayati and Teguh Prasandy
IS/IT	**52**	ONLINE LEARNING AND STUDENTS' ETHICAL BEHAVIOR DURING COVID-19: FOR BETTER OR FOR WORSE? CASE STUDY FOR CREATIVEPRENEURSHIP STUDY PROGRAM, BINUS BANDUNG	Febri Tri Intan Azhana, Rosita Widjojo, Khusnul Khotimah, Doni Purnama Alam Syah, Muchamad Rizky Zakaria and Balqis Putri Hidayatullah
IS/IT	**69**	Analysis of Design Implementation Guidelines for Data Governance Management Based on DAMADMBOKv2	Fadhil Rozi Hendrawan, Tien Fabrianti Kusumasari and Rokhman Fauzi
IS/IT	**72**	Enterprise Architecture Planning based on One Data in Indonesian Higher Education	Hery Dian Septama, Muhamad Komarudin, Puput Budi Wintoro, Mahendra Pratama, Titin Yulianti and Bambang Sundari
IS/IT	**94**	Motivation and Drivers for Online Fashion Rental: Study by Social Networking Sites in Indonesia	Margareth Setiawan, Sandy Setiawan, Aris Darisman and Rosyidah Rahmah
IS/IT	**116**	Model Implementation of Application Programming Interface for E-Government Data Integration	Agus Sifaunajah, Tholib Hariono, Moh. Anshori Aris Widya, Primaadi Airlangga, Sujono and Siti Sufaidah

		Track 8 Chair: Herlino Nanang, PhD Host: Ni Nyoman Yuspita Dewi	
IS/IT	**126**	Android-based Matrix Learning Media to Increase Student Interest in Learning	Isna Wardiah, Rahimi Fitri, Reza Fauzan, Seberan and Fuad Sholihin
IS/IT	**136**	Digital Transformation Impact Analysis towards Transition in the Role of Information Technology for Organization in New Digital Bank	Yosua Pangihutan Sagala, Muhammad Akmal Juniawan, Vina Ardelia Effendy, Rahmawati Putrianasari, Vien Aulia Rahmatika, Muhammad Rifki Shihab and Benny Ranti
IS/IT	**137**	Analysis of Critical Success Factors in Information Technology Projects: A National Shipping Company Case Study	Ivan Eka Aditya, Ardhy Wisdarianto and Teguh Raharjo
IS/IT	**192**	User Experience Evaluation of IT Support Mobile Application Using System Usability Scale (SUS) and Retrospective Think Aloud (RTA)	Imanuel Revelino, Sunardi Sunardi, Ratih Muthiah Kamilia, Ganis Maulia Yusuf and Rizki Kurniawan
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Paper ID #84

Evizal Abdul Kadir, Muslim Abdurrahman, Sharul Kamal Abdul Rahim, Agus Arsad, Sri Listia Rosa, dan Apri Siswanto

Oil Well Monitoring System Based on IoT Technology and Machine Learning

Abstract -

The process of crude oil mining in oil wells takes a long time and requires good supervision to avoid unwanted things. This process requires full 24-hours monitoring of oil parameters such as oil temperature and flow rate. Currently, the supervision process is still done manually which may occur some errors. Based on this fact, this paper aims to design a surveillance or monitoring system that is more effective and efficient. The testing of this monitoring system uses an oil pump machine prototype with the assistance of a MAX-6675 temperature sensor and an ultrasonic flowmeter TUF-2000m as well as a sensor TM-1 transducer as an input tool. Raspberry Pi 3 as a microcontroller and a web application as an output that displays data in the form of graphs. The test stage is carried out by heating the temperature sensor, slowing down the flow of oil on the prototype, and checking the values displayed on the graph. The results of the test when the temperature sensor received heat, the microcontroller ran well, as evidenced by the data that was successfully stored on the web server and a graph showing the increase in the oil temperature value. Likewise with the flow rate sensor when it receives resistance or the flow is slowed down, the graph shows a decrease in the flow rate value in the oil. With the results of this test, the prototype of the monitoring system on oil wells with the Internet of Things (IoT) technology runs as expected, namely being able to monitor the value of oil parameters in real-time which allows effectiveness and efficiency in work to increase.

Keywords: Oil Well, Monitoring System, Internet of Things

Host:

Sponsored by:

Co-Host:

Oil Well Monitoring System Based on IoT Technology and Machine Learning

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Abstract — **The process of crude oil mining in oil wells takes a long time and requires good supervision to avoid unwanted things. This process requires full 24-hours monitoring of oil parameters such as oil temperature and flow rate. Currently, the supervision process is still done manually which may occur some errors. Based on this fact, this paper aims to design a surveillance or monitoring system that is more effective and efficient. The testing of this monitoring system uses an oil pump machine prototype with the assistance of a MAX-6675 temperature sensor and an ultrasonic flowmeter TUF-2000m as well as a sensor TM-1 transducer as an input tool. Raspberry Pi 3 as a microcontroller and a web application as an output that displays data in the form of graphs. The test stage is carried out by heating the temperature sensor, slowing down the flow of oil on the prototype, and checking the values displayed on the graph. The results of the test when the temperature sensor received heat, the microcontroller ran well, as evidenced by the data that was successfully stored on the web server and a graph showing the increase in the oil temperature value. Likewise with the flow rate sensor when it receives resistance or the flow is slowed down, the graph shows a decrease in the flow rate value in the oil. With the results of this test, the prototype of the monitoring system on oil wells with the Internet of Things (IoT) technology runs as expected, namely being able to monitor the value of oil parameters in real-time which allows effectiveness and efficiency in work to increase.**

Keywords—**Oil Well, Monitoring System, Internet of Things**

I. INTRODUCTION

Energy is an important part of human life, without enough energy economic activity will slow down. Most of the energy used by humans comes from fossils, one of which is crude oil. This oil has been separated from natural gas after the extraction or mining process because crude oil is found together with natural gas [1]. Crude oil is a non-renewable natural resource, in the form of a dark brown or dark brown liquid or it can be greenish and has several very complex carbon chains, therefore crude oil is of high economic value. Data based on the central statistics agency shows that crude oil production in Indonesia in 2020 reached 259 million barrels [2]. Meanwhile, crude oil reserves reached 4.17 billion barrels. This figure certainly illustrates that the production of crude oil and natural gas in Indonesia is still very large. However, the oil reserve does not mean that it can be obtained easily, the process of extracting oil from oil wells requires a systematic process and design of tools, starting from the design of pipes, pumps, and monitoring sensors that are very necessary. The process of extracting crude oil or fluids from production wells (oil wells) through a piping system is carried out in two ways, namely by using the individual system, flow line or by using a production line system is pumped to the Gathering Station (GS), the type of equipment used in the GS is generally largely determined by the parameters of temperature, pressure, and the resulting fluid.

Several works have been done the previous research related to the oil well monitoring system in a petroleum company, especially in the downstream process. Research on the monitoring of oil parameters and indicators for example liquid flow rate in the pipeline as discussed in [3-7]. The research monitors for a parameter and then sends the information to a database at the data center. While other research is to monitor oil well parameters using an ultrasonic sensor to find the values of flow and water content as elaborate in the [8-10], the discussion the how much sensitivity in the sensor to various sample pipeline sizes. The size and thickness of the pipe affected the sensitivity and reading of the sensor to the actual flow rate, a calibration in measurement and testing is required to achieve actual values. In the [11-12] discussion on monitoring water content in a pipeline near to oil well, the research to find how much water percentage in a well then, the percentage of oil from the pump at the oil well. While [13-14] elaborates on the flow sensing system to detect and monitor abnormality in a pipeline at the oil well. The discussion of the oil well monitoring system to retrieve well information for example pump status, voltage, current, and flow as well as the temperature as discussed in the [15-16].

This research aims to design a new model of a monitoring system for oil wells using IoT and store all the well data and information in a cloud system. Wireless monitoring systems apply to get the information that is a constraint for the remote location of the well. The proposed monitoring system has a new design with several sensor connected to each other's then sending all the information to the backend system for analysis as well as displaying the information on the command center.

II. Monitoring and System Design

Currently, the monitoring system on the oil well is running on the conventional method in which every sensor installed in each pipe will be checked by the officer periodically or manually written to find out the value of the parameters generated by the crude oil extraction process, sometimes even checking is only done when a problem occurs that does not occur. wanted. Figure 1 shows the illustrated of the physical oil well on the field for pumping the oil from the ground.

Fig. 1. Illustrated of oil well on the field and parts to monitor

A. Conventional Oil Well Monitoring System

The value of the oil well parameter will determine various things such as production level, pipe safety, and so on. Based on the analysis of the current system, the following is an overview of the current system analysis. Figure 2 shows a conventional method of monitoring oil wells by directly visiting the site and recording manually on the sheet. Several instruments are installed on the oil well to monitor performance and production of the well, there are important parts to monitor such as temperature, flowrate, pump status, pressure including power supply which voltage and current supplied to well.

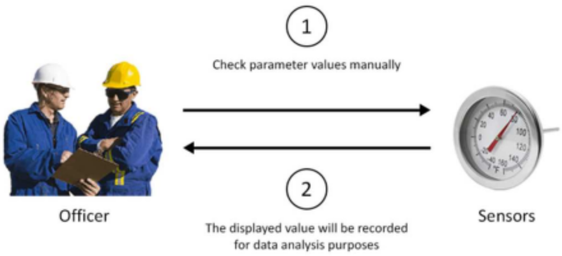


Fig. 2. Conventional monitoring of oil well

B. Digital Oil Well Monitoring System

The proposed new method is to monitor the oil well indicator by digitalizing the system by installing the sensor to all the equipment and parameter would like to check and measure. The procedure analysis of this system is necessary to know the current procedures for designing the new system. Figure 3 shows the design of the following is an overview of the current system and proposed digital system for the oil well.

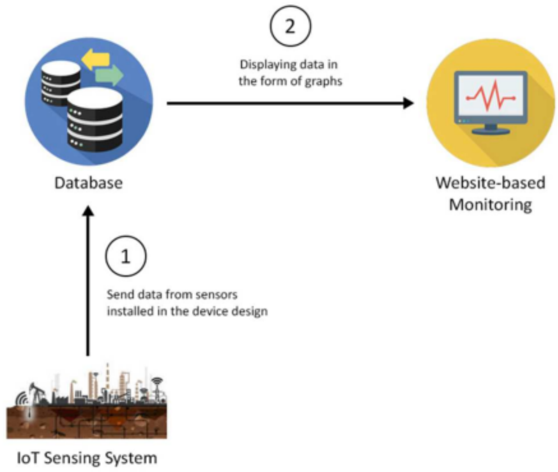


Fig. 3. Architecture of monitoring sytem in oil well

The use of an oil pump for the engine and prototype has many advantages, including minimizing the risk of accidents that could occur in the actual oil well area. In addition, by using a prototype, trials can be freely carried out many times and are not limited in time. The prototype that will be used is available in-house in the Laboratory, Faculty of Engineering, Islamic University of Riau. In this research, an ultrasonic flow meter model TUF-2000M was used with the help of a transducer model TM-1 which was installed with the method installation method. This sensor is installed on the outside of the pipe which is placed after the pump, and the temperature sensor used is the MAX-6675 sensor, installed into the pipe to read the temperature of the oil that is flowing. Here is the photo. Figure 4 shows the prototype of the oil well monitoring system while figuring 4(a) the full unit with a circulating pump system and figure 4(b) the sensor used in the prototype system for monitoring temperature and flow rate. The prototype can run as scenarios that we trying to simulate according to the actual operation on the field.

(a)

(b)

Fig. 4. Prototype of oil well monitoring system (a) the full unit of oil well with the circulate pump (b) sensor used in the prototype

The Raspberry Pi 4 microcontroller is needed in the initial data processing, its function is to receive data from sensors and forward it to the web server. The microcontroller sends data to the web server using a post request technique using the HTTP request library. The tool used and simulation has been done in the laboratory to check and monitor the system in a few days. Figure 5 shows a block diagram of the system and Raspberry Pi 4 microcontroller module used in this prototype of a system.

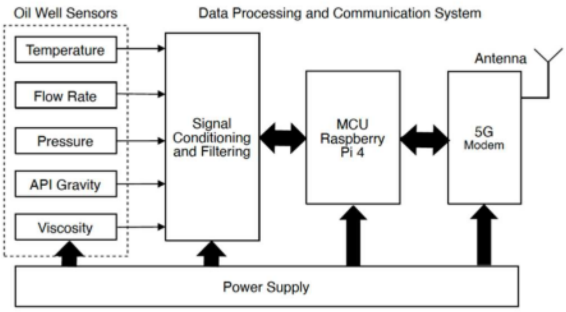


Fig. 5. Block diagram of monitoring sytem in oil well

System workflow design is a step-by-step process of describing how to sample test data sent within the system. And to produce oil, many processes are carried out and take a very long time, one of the processes is the extraction or mining process of oil, the results of which will be pumped into the GS through gathering pipes, and to find out how it works, a workflow design is made. The system workflow starts by checking the sensor and reading raw data using the flowrate sensor, this data will then be sent to the Raspberry Pi 3 microcontroller. After the data is received, the microcontroller will then check whether there is internet access, if there is data will be sent directly to the web server, else the data will be stored in the local database. All data stored in the local database will be sent to the web server when the microcontroller is connected to the internet. Figure 6 shows a flowchart of the entire monitoring process of the oil well in the field. All the data is stored in a database for accessing by the system in anytime at anywhere by pushing the data to a cloud computing.

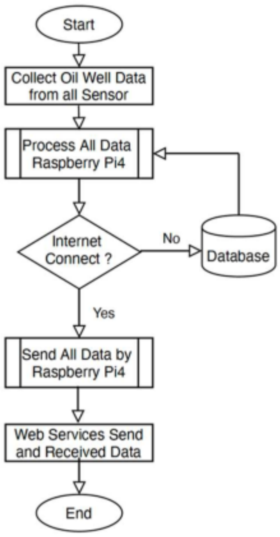


Fig. 6. Flowchart of the process of oil well monitoring

C. *LSTM Algorithm*

The proposed method is different compared to other techniques as discussed previously, in that the LSTM deep learning algorithm applied with a big number of training data and testing data achieves high accuracy forecasting results for the specific case in the Indonesia region. Python programming is used in simulation and analysis as it is one of the high-level programs with a fast process, and it is applied in many kinds of deep learning algorithms. Figure 7 shows the structure of the RNN of the LSTM Algorithm.

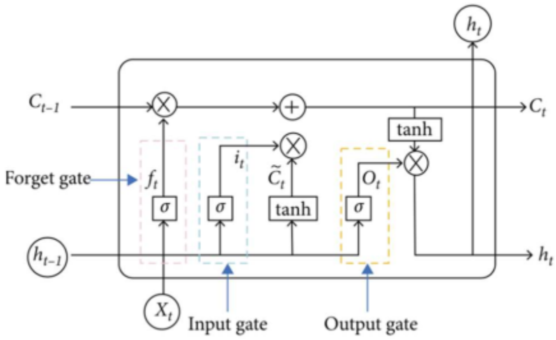


Fig. 7. Structure of the RNN-LSTM Algorithm

LSTM is divided in to two parts of the RNN's hidden state memory cell which the C_t and the h_t working memory. These memory cells are responsible for the retention of sequence features. The memory of the previous sequence is controlled by the forgetting gate *f* working memory, and h_t is used as output, and the output gate *O* controls the portion of the current memory C_t to be written as an input, *i* controls the portion of the current state information h_{t-1} and the current input X_t to be written to the memory cell. The three types of gates above are not static. The previous state information h_{t-1} and the current input X_t are determined together through nonlinear activation after linear combination. The LSTM model consists of three major cells, and each cell can be written as Equations (1)–(6).

$$f_t = \sigma\,(W_f\,.\,[h_{t-1}, x_t] + b_f) \quad (1)$$

$$i_t = \sigma\,(W_i\,.\,[h_{t-1}, x_t] + b_i) \quad (2)$$

$$`C_t = \tanh\,(W_c\,.\,[h_{t-1}, x_t] + b_c) \quad (3)$$

$$C_t = f_t\, * C_{t-1} + i_t * `C_t \quad (4)$$

$$o_t = \sigma\,(W_o\,[h_{t-1}, x_t] + b_o) \quad (5)$$

$$h_t = o_t\, * \tanh\,(C_t) \quad (6)$$

where w_f, w_i, w_c, and w_o are weight matrixes of b_f, b_i, b_c, and b_o are bias vectors, $\tilde{c}_t$ is the new candidate sate generated by x_t and h_{t-1} through the *tanh* layer, and σ is the sigmoid activation function.

Figure 8 shows a complete prototype oil well system, while several sensors are embedded in the system to obtain actual data from the well. The prototype can demonstrate how the actual process in the well as the representative of the actual well in the site.

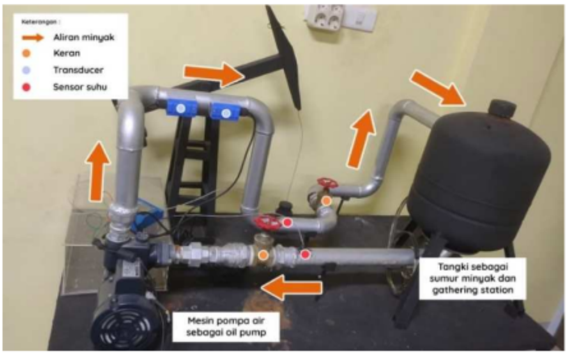
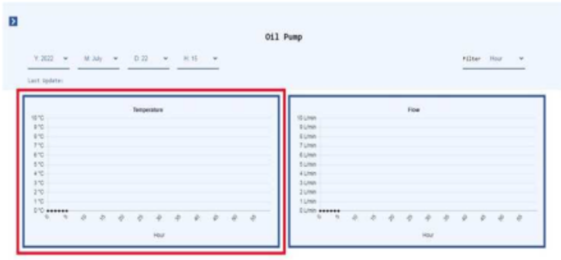


Fig. 8. Complete prototype of oil well monitoring system with process flow

III. Results and Discussion

The results of the design of an oil well monitoring tool with the Internet of Things are as shown in figure 7 with the complete circulation system for testing in various scenarios as actual on the field. Testing of the temperature sensor will be tested with four tests, the first test is by heating the pipe using wax as a heat generator and the second test turning off the heater and letting the temperature or temperature of the oil drop, and the third and fourth tests are the same as the first test, only the test is not too hot so that there is the resulting difference.

According to figure 9, it can be seen that the sensor is attached to the frame. The temperature sensor (red point) is located before and after the pump engine, the flowmeter using a transducer (blue point) is located after the pump engine, and the faucet (orange point) is located before and after the pump engine. Please note, when oil is sucked in by the pump, the tank is considered an oil well and when it has passed through the pump, the tank is considered a gathering station. The process of oil flow in this prototype is that the Oil pump (pump engine) will suck oil from the oil well (tank) so that the oil flows through the oil pump and then the oil will continue to flow until it enters the gathering station (tank). Figure 8 shows an interface of the oil well monitoring system



for the temperature and flowrate measurement.

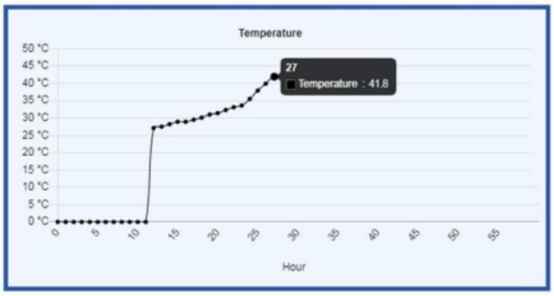
(a)

(b)

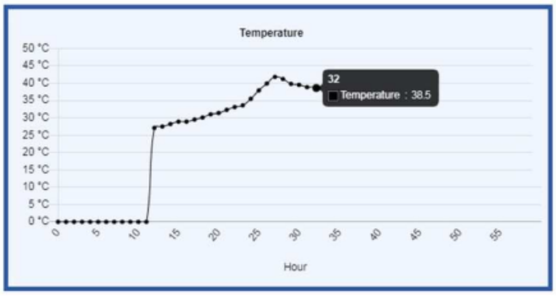
Fig. 9. Sample of graphs as display in monitoring system

Based on this process, the function of the first temperature sensor is to check the temperature of the oil before it is mined, the value of this sensor is only for testing the tool and the oil itself. The value that will be taken for monitoring is the value of the second temperature sensor, the sensor located after passing the oil pump. The function of the flowmeter sensor is to take the flow rate value of the oil that flows after passing

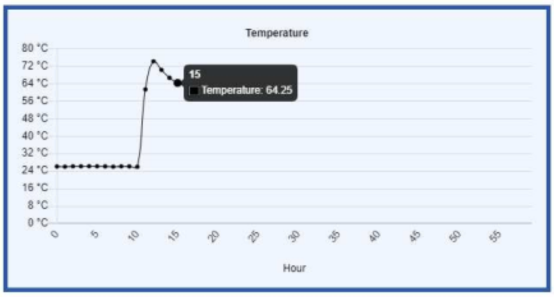
through the pump engine, and the faucet function to test the flow rate value when there is an obstacle. Then finally, the results of the oil well monitoring web design are shown below. The results of the temperature sensor test will be displayed in graphical form in a monitoring web application. The graphic display can be seen in the image as shown in figure 10 (a), (b), and (c) for scenarios of temperature.



(a)



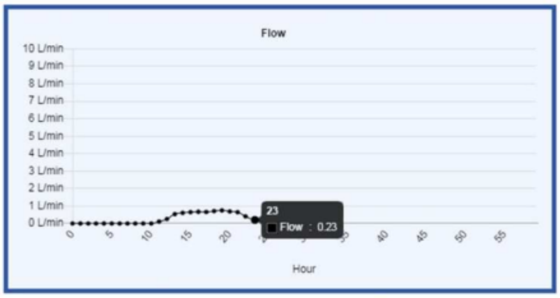
(b)



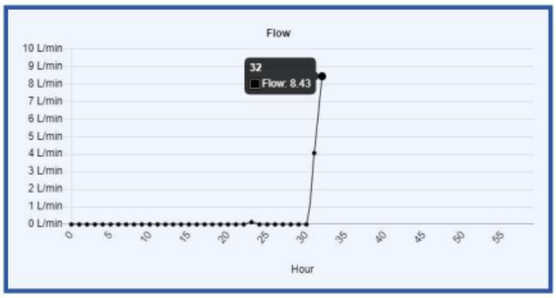
(c)

Fig. 10. Monitoring of oil well temperature in various scenarios (a) temperature 41.8 (b) temperature 38.5 degree (c) temperature 64.25 degree

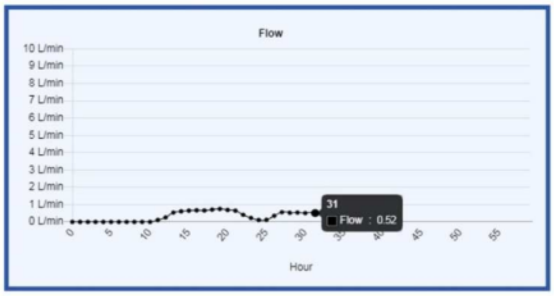
While the flow rate sensor of the oil well and distribution pipe to the GS is measured in single line flow, the process is to monitor and retrieve sample data flow with duration every minute. Figure 11 (a), (b), and (c) shows a display of the measurement of flowrate in a pipe which is 0.23, 8.43, and 0.52 liters/minute, for the oil well monitoring system. This standard in the prototype unit is in unit liters/minute but in the actual field, the unit may be high liters/second or in oil barrels. The results of measurement flowrate to check and in actual situation to confirmation of the oil well is working fine to produce oil or the oil pump is working to supply oil to GS. Oil flow rate in a pipeline has an impact and indicator of the oil production, the normal flowrate has standard and may be different in every will, by the record and check the normality the production or failure of a well identified by the monitoring system. Current status of parameters be able to monitor in a prototype are temperature and flow rate as shows in figure 10 and 11. While the other parameters such as API, Viscosity, and pressure of crude oil in the pipeline still under conducting the research and will added to the prototype system once completed.



(a)



(b)



(c)

Fig. 11. Monitoring system of pipeline flowrate in an oil well (a) 0.23 (b) 8.43 (c) 0.53 liters/minute

IV. Conclusion

This research aims to monitor oil well status and equipment installed, the processes of designing, manufacturing, testing, and discussing oil well monitoring tools, it can be concluded several things such as an IoT-based oil well monitoring prototype was made using a Raspberry Pi 4 microcontroller with the help of a TUF-2000M flowrate sensor and a temperature sensor connected to a Web server. The process of monitoring temperature and flowmeter using the Raspberry Pi 4 as a bridge between the TUF-2000M sensor and the Web server. Data from the flowrate and temperature sensors are sent using the request post technique and successfully display by the web system. The future development of the system is to do parallel monitoring for numbers of oil well that achieve real-time monitoring concurrently to all well.

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