ICOTEN

THE INTERNATIONAL CONGRESS OF ADVANCED TECHNOLOGY AND ENGINEERING

The International Congress of Advanced Technology and Engineering (ICOTEN 2021)

Congress Themes:

- Toward Intelligent Solutions for Societies' Development
- Toward Smart and Sustainable Engineering and Environment
- Enhancing Management and Education Polices and Technologies in Crises Time

- ICOICS 2021
- ICOEEE 2021
- ICOBBE 2021
- ICOSEE 2021
- ICOAPS 2021
- ICOMET 2021

(Virtual Conference) July 4-5, 2021

Organized by:

YSRG YEMENI SCIENTISTS RESEARCH GROUP

HADHRAMOUT UNIVERSITY

International Collaborators:

UNIVERSITY OF THE WEST of SCOTLAND UWS

CHARLES DARWIN UNIVERSITY

UTM UNIVERSITI TEKNOLOGI MALAYSIA

ENSET

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UTHM Universiti Tun Hussein Onn Malaysia

The International Congress of Advanced Technology and Engineering (ICOTEN 2021)

July 4-5, 2021

(Virtual Conference)

"*Toward Intelligent Solutions for Societies' Development.*

Toward Smart and Sustainable Engineering and Environment.

Enhancing Management and Education Polices and Technologies in Crises Time."

Editors:

Faisal Saeed
Fathey Mohammed
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Note: All times in Yemen/Mecca Time (GMT Time + 3)

Day 1:	**Sunday: July 4, 2021**					
Zoom Meeting ID: **861 7028 9022** Zoom Passcode: **ICOTEN2021** **Meeting Link:** https://us02web.zoom.us/j/86170289022?pwd=MGJUU2xxUUU1eUxWZlpmS0hsTWxtZz09						
8:10 am – 9:00	**Main Room** **Session 1: Opening Ceremony**					
8:10 am - 8:20 am	Doa'a Recitation					
8:20 am - 8:30 am	Welcoming speech by ***Dr. Faisal Saeed***, ICOTEN 2021 General Chair					
8:30 am - 8:40 am	Welcoming speech by ***Prof. Dr. Mohammed Saeed Khanbsh***, ICOTEN 2021 Honorary Chair, President, Hadhramout University, Yemen					
8:40 am – 8:50 am	Welcoming speech by ***His Excellency Dr. Adel BaHamid, Ambassador of Yemen in Malaysia***					
8:50 am – 9:00 am	Welcoming and Officiating speech by ***His Excellency, Prof. Dr. Khalid Alwesabi,*** ICOTEN 2021 Parton, Minister of Higher Education, Scientific Research and Technical Education, Yemen					
9:00 am - 9:10 am	Break					
9:10am – 12:00 pm	**Session 2: Parallel Keynote Speeches**					
9:10am – 10:30 am	**Room 1 (ICOICS)**	**Room 2 (ICOEEE)**	**Room 3 (ICOSEE)**	**Room 4 (ICOBBE)**	**Room 5 (ICOAPS)**	**Room 6 (ICOMET)**
	Parallel Keynote Speeches 1 & 2					
10:30 am – 10:40 am	Break					
10:40 am – 12:00 pm	**Room 1 (ICOICS)**	**Room 2 (ICOEEE)**	**Room 3 (ICOSEE)**	**Room 4 (ICOBBE)**	**Room 5 (ICOAPS)**	**Room 6 (ICOMET)**
	Keynote Speeches 3 & 4	Keynote Speech 3	-	Keynote Speech 3	Keynote Speech 3	Keynote Speech 3
12:00 pm – 1:00 pm	Break					
1:00 pm – 5:30 pm	**Session 3: Parallel Paper Presentations**					
1:00 pm – 3:00pm	**Room 1 (ICOICS)**	**Room 2 (ICOEEE)**	**Room 3 (ICOSEE)**	**Room 4 (ICOBBE)**	**Room 5 (ICOAPS)**	**Room 6 (ICOMET)**
	8 papers	8 papers	8 papers	5 papers	7 papers	8 papers
3:00 pm – 3:30 pm	Break					
3:30 pm - 5:30 pm	8 papers	8 papers	-	-	-	2 papers

! **Note: All times in Yemen/Mecca Time (GMT Time + 3)**

Day 2:	**Monday: July 5, 2021**			
Zoom Meeting ID: **899 3851 1298** Zoom Passcode: **ICOTEN2021** **Meeting Link:** https://us02web.zoom.us/j/89938511298?pwd=T0xyWk8xTHdqVWFidC8yUnRUaDdidz09				
8:00 am – 8:40 am	Main Room: Keynote Speech 4 (**ICOEEE**)			
8:40 am - 9:00 am	Break			
9:00 am – 12:00 pm	**Session 1: Parallel Paper Presentations**			
9:00 am – 10:15 am	**Room 1 (ICOICS)**	**Room 2 (ICOEEE)**	**Room 3 (ICOICS)**	**Room 4 (ICOICS)**
	5 papers	5 papers	5 papers	5 papers
10:15 am - 10:30 am	Break			
10:30am – 12:00pm	6 papers	6 papers	6 papers	6 papers
12:00 pm – 1:00 pm	Break			
1:00 pm – 3:45 pm	**Session 2: Parallel Paper Presentations**			
	Room 1 (ICOICS)	**Room 2 (ICOEEE)**	**Room 3 (ICOICS)**	**Room 4 (ICOICS)**
	11 papers	3 papers	10 papers	11 papers
3:45 pm – 4:00 pm	Break			
4:00 pm - 4:15 pm	Closing ceremony			

ICOICS Presentation Schedule

Day 1: Sunday: July 4, 2021	
**Time : **	**9:10am – 12:00 pm (Yemen/Mecca Time (GMT time + 3))**
Zoom link :	https://us02web.zoom.us/j/86170289022?pwd=MGJUU2xxUUU1eUxWZlpmS0hsTWxtZz09
Meeting ID :	861 7028 9022
Passcode :	ICOTEN2021
8:10am – 9:00am	**Session I: Opening Ceremony**
9:00am-9:10am	**Break**
Session II: Keynote Speeches	
Room 1	
9:10am – 9:50 am	Keynote Speaker I: **Prof. Dr. Amin Al-Habaibeh** *Professor of Intelligent Engineering, Nottingham Trent University, United Kingdom* Keynote title: *The ASPS Approach- a Self-Learning Artificial Intelligence Method for Sensor Fusion and the Rapid Design of Condition Monitoring Systems*
9:50am – 10:30 am	Keynote Speaker II: **Assoc. Prof. Dr. Nabeel Alsohybe** *Sana'a University, Yemen* Keynote title: *Smart Governance for Smart City: Current Issues, Challenges and Trends*
10:30 am – 10:40 am	Break
10: 40 am – 11:20 am	Keynote Speaker III: **Dr. Korhan Cengiz** *Trakya University, Edirne, Turkey* Keynote title: *Novel Wireless Sensor Network Protocols*

ICOICS Presentation Schedule

Day 1: Sunday: July 4, 2021	
11: 20 am – 12:00 pm	Keynote Speaker IV: **Dr. Afnizanfaizal Abdullah** *Universiti Teknologi Malaysia, Malaysia* Keynote title*: Machine Learning-as-a-Service (MLaaS): Putting the Intelligence into a cloud*
12:00 pm – 1:00 pm	Break
Session III: Paper Presentations	
Room 1: Artificial Intelligence	
1:00 pm – 1:15 pm	*Refka Hanachi, Akrem Sellami, Imed Riadh Farah and Mauro Dalla Mura.* Semi-supervised Classification of Hyperspectral Image through Deep Encoder-Decoder and Graph Neural Networks
1:15 pm – 1:30 pm	*Amira Ayadi, Mongi Boulehmi and Imed Riadh Farah.* Proposed Architecture for Hyperspectral Image Parallel Processing Methods Based on GPU
1:30 pm - 1:45 pm	*Hela Yahyaoui, Fethi Ghazouani and Imed Riadh Farah.* Deep learning guided by an ontology for medical images classification using a multimodal fusion
1:45 pm - 2:00 pm	*Umar Anjum, Ahmed Hussain, Babar Ali Channa, Umer Afzal, Israr Hussain, Abdulfattah Noorwali and Syed Aziz Shah.* JPEG Image Compression Using Multiple Core Strategy in FPGA achieving High Peak Signal to Noise Ratios
2:00 pm - 2:15 pm	*Ardan Hüseyin Eşlik, Emre Akarslan and Fatih Onur Hocaoğlu.* Cloud Motion Estimation with ANN for Solar Radiation Forecasting

ICOICS Presentation Schedule

Day 1: Sunday: July 4, 2021	
2:15 pm – 2:30 pm	*Jarray Noureddine, Ali Ben Abbes, Manel Rhif, Farah Chouikhi and Imed Riadh Farah.* An open source platform to estimate Soil Moisture using Machine Learning Methods based on Eo-learn library
2:30 pm - 2:45 pm	*Salim Klibi, Makram Mestiri and Imed Riadh Farah.* Emotional behavior analysis based on EEG signal processing using Machine Learning: A case study
2:45 pm - 3:00 pm	*Najla Hamandi and Jawad Alkhateeb.* Sentiment Analysis of Arabic Tweets Related to C0VID-19 Using Deep Neural Network
3:00 pm – 3:30 pm	Break
Room 1: Data Science	
3:30 pm – 3:45 pm	*Kawser Ahmed Pinto, Nasuha Lee Abdullah and Pantea Keikhosrokiani.* Diet & Exercise Classification using Machine Learning to Predict Obese Patient's Weight Loss
3:45 pm – 4:00 pm	*Abdulfattah Ba Alawi and Ali Al-Roainy.* Deep Residual Networks Model for Star-Galaxy Classification
4:00 pm – 4:15 pm	*Soufiane Hamida, Bouchaib Cherradi, Oussama El Gannour, Oumaima Terrada, Abdelhadi Raihani and Hassan Ouajji.* New Database of French Computer Science Words Handwritten Vocabulary

ICOICS Presentation Schedule

Day 1: Sunday: July 4, 2021	
4:15 pm – 4:30 pm	*Manel Rhif, Ali Ben Abbes, Farah Chouikhi, Noureddine Jarray and Imed Riadh Farah.* Towards a Tunisian earth observation data cube for environmental applications
4:30 pm – 4:45 pm	*Abubakar Ado, Noor Azah Samsudin and Mustafa Mat Deris.* A New Feature Hashing Approach Based on Term Weight for Dimensional Reduction
4:45 pm – 5:00 pm	*Nouf Alharbi, Arwa Althagafi, Shrooq Alhazmi, Omamah Alshomrani and Ahad Almotiry.* A Blockchain Based Secure IoT Solution for Water Quality Management
5:00 pm – 5:15 pm	*Manel Chehibi, Ahlem Ferchichi, Imed Riadh Farah and Allel Hadjali.* Management of Uncertain Spatial Information
5:15 pm – 5:30 pm	*Hanen Balti, Ali Ben Abbes, Nedra Mellouli, Yanfang Sang, Imed Riadh Farah, Myriam Lamolle and Yanxin Zhu.* Big data based architecture for drought forecasting using LSTM, ARIMA, and Prophet: Case study of the Jiangsu Province, China

ICOEEE Presentation Schedule

Day 1: Sunday, 4th July, 2021	
Time :	**9:10am – 12:00 pm (Yemen/Mecca Time (GMT time + 3))**
Zoom link :	https://us02web.zoom.us/j/86170289022?pwd=MGJUU2xxUUU1eUxWZlpmS0hsTWxtZz09
Meeting ID :	861 7028 9022
Passcode :	ICOTEN2021
Session 2: Keynote Speeches	
Room 2	
9:10am – 9:50 am	Keynote Speaker I: **Prof. Dr. Haitham Abu-Rub** IEEE Fellow, Texas A&M University, Qatar Keynote title: *Renewable Energy Dominated Grid – Opportunities and Challenges*
9:50am – 10:30 am	Keynote Speaker II: **Prof. Dr. Marwan Dhamrin** Specially Appointed Professor at Osaka University and Senior Specialist Executive at Toyo Aluminium K.K, Japan Keynote title: *Photovoltaics and World Energy Transition Outlook: Research and Development Opportunities*
10:30 am – 10:40 am	Break
10: 40 am – 11:20 am	Keynote Speaker III: Assoc. Prof. Dr. Muhammad Ramlee Kamarudin Universiti Tun Hussein Onn Malaysia (UTHM), Malaysia Keynote title: *Overview on 6G*
12:00 pm – 1:00 pm	Break

ICOEEE Presentation Schedule

Day 1: Sunday, 4th July, 2021	
Session 3: Paper Presentations	
Room 2	
1:00 pm – 1:15 pm	*Anas Binshitwan, Seraj Keskeso, Abdulmunem Alquzayzi and Ahmed Elbarsha* 38GHz Rectangular Microstrip Antenna with DGS for 5G Applications.
1:15 pm – 1:30 pm	*Mamunur Rashid, Nasir Algeelani, Samir A. Al-Gailani and Nohaidda Binti Sariff* Indoor Electrical Installation Design Layout Using IOT
1:30 pm - 1:45 pm	*Alhusayn Yousuf, Seraj Elshwehdi and Ahmed Elbarsha* Analysis and Design Rectangular Microstrip Patch Antenna for LTE Terminals at 2.6 GHz
1:45 pm - 2:00 pm	*Hamid Mohammed Qasem Rasheda and Qazwan Abdullah Tarbosh* Design of UWB Antenna for Microwave Imaging using Modified Fractal Structure
2:00 pm - 2:15 pm	*Muniru Okelola, Sunday Salimon, Oluwole Adegbola, Emmanuel Ogunwole, Samson Ayanlade and Baruwa Aderemi* Optimal Siting and Sizing of D-STATCOM in Distribution System using New Voltage Stability Index and Bat Algorithm
2:15 pm – 2:30 pm	*Abdulrahman Th. Mohammad, Zuhair S. Al-Sagar, Ali Nasser Hussain and Majid Khudair Abbas Al-Tamimi* Performance Analysis of 4.68 kWh Proposed Grid-Connected PV System in Iraq

ICOEEE Presentation Schedule

Day 1: Sunday, 4th July, 2021	
2:30 pm - 2:45 pm	*Meryem Benakcha, Abdelhamid Benakcha, Salah Eddine Zouzou and Abdelkarim Ammar* Experimental study of a real-time control by backstepping technique of an induction motor drive
2:45 pm - 3:00 pm	*Abdulrahman Baboraik, Sameh Kassem, Abdulla Ebrahim and Alexandar Usachev* NEW ALGORITHM FOR ELIMINATION OF INDUCTION EFFECT ON THE MAGNITUDE OF PARTIAL DISCHARGE CURRENT PULSE
3:00 pm – 3:30 pm	Break
3:30 pm – 3:45 pm	*Abdulrahman Baboraik, Abdulla Ebrahim, Sameh Kassem and Alexandar Usachev* INVESTIGATION THE IMPACT OF PARTIAL DISCHARGES POLARITY ON RELIABILITY ASSESSMENT OF INSULATION CONDITION IN HIGH VOLTAGE EQUIPMENT
3:45 pm – 4:00 pm	*Hamid Rasheda and Qazwan Abdullah Tarbosh* An Optimization of Fractal Microstrip Patch Antenna with Partial Ground using Genetic Algorithm Method
4:00 pm – 4:15 pm	*Mohamed Lotfi Cherrad, Hocine Bendjama and Tarek Fortaki* Vibration analysis for defective bearings by blind source separation
4:15 pm – 4:30 pm	*Aymen Mohammed Khodayer Al-Dulaimi, Mohammed Khodayer Hassan Al-Dulaimi and Omer Mohammed Khodayer Al-Dulaimi* Construction and Analysis of Dynamic Distribution for Resource Blocks of Real-Time and Data Elastic Traffic in IMS/LTE Networks
4:30 pm – 4:45 pm	Break

ICOEEE Presentation Schedule

Day 1: Sunday, 4th July, 2021	
4:45 pm – 5:00 pm	*Yaser Awadh, Shakir Saat and Izadora Mustaffa* State Feedback Controller Design for Capacitive Power Transfer System
5:00 pm – 5:15 pm	*Evizal Abdul Kadir, Raed Shubair, Sharul Kamal Abdul Rahim, Mohamed Himdi and Muhammad Ramlee Kamarudin* B5G and 6G: Next Generation Wireless Communications Technologies Demand and Challenges
5:15 pm – 5:30 pm	*Nawfan Al-Fakih, Salem Bagaber and Salman Al Abd* IMPROVEMENT OF WIND TURBINE LIGHTNING RECEPTOR

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The International Conference of Intelligent Computing and Informatics

(ICOICS 2021)

Smart Sensor System for Detection and Forecasting Forest Fire Hotspot in Riau Province Indonesia

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Abstract. Indonesian is one of the countries in a tropical region, in the summer season normally high temperature and hot environmental then forest and forest fire happened. This is because most of the land in Indonesia is peatland and forestry area, especially in Sumatera and Kalimantan island. Worst when it has a huge impact on the local economy, environment, flora, fauna and human health. As reported, millions of people have suffered from respiratory problems, which some have died and in serious health conditions. This research aims to prevent more casualties, providing detection and forecasting as well as warning on fires as alert to the community and representative institution. Furthermore, the research discusses on developing a smart sensing system for the ground level to do monitoring and forecasting. Several types of sensor used based on fire basic parameters such as temperature, humidity, gasses and carbon sensor to measure value in the open environment. Arduino microcontroller and algorithm introduce to the system to achieve smart monitoring system and filtering noise data from the sensors. Mathematical model and analysis applied in this system to do forecasting for the future and estimate number of hotspots in the area of forest in Riau Province. The information based on sensing and analysis as well as forecast data forward to the respective institution or government agency for further action.

Keywords: Smart Sensing, Forest Fire, Detection, Forecasting, Riau Indonesia

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B5G and 6G: Next Generation Wireless Communications Technologies, Demand and Challenges

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Abstract. The Fifth Generation (5G) is now have been implemented in some countries and will be progressing according to its plan to be commercialized worldwide soon. Nevertheless, many research institutions around the world have now started to look Beyond 5G (B5G) and Sixth-Generation (6G) where these could be the next generation of wireless communications technologies. The demand for wireless connectivity has grown exponentially over the last few decades, to meet the demands of future connectivity a significant improvement needs to be made in communications technologies. A new paradigm of wireless communication, the 6G system, with the full support of massive multiple inputs multiple-output (MIMO) system and millimeter-Wave (mmWave), is expected to be implemented between 2027 and 2030. B5G, some fundamental issues that need to be addressed are higher system capacity, higher data rate, lower latency, higher security, and improved quality of service (QoS) compared to the 5G system. This paper focusses on the discussion of the potential of 6G wireless communication and its network demands and challenges including mmWave, terahertz communications and massive MIMO systems.

Keywords: Wireless Communication, Terahertz, MIMO System, B5G, 6G.


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Keywords—Smart Sensing, Forest Fire, Detection, Forecasting, Riau Indonesia

I. INTRODUCTION

Riau Province is located at Sumatera Island in Indonesian, as a tropical country was suffering from bad haze due to land and forest fires that happen almost every year. The location of Indonesia at equatorial causes this country to have longer dry season spans from July to October. This disaster is not only affecting the community in Indonesia but also to the neighboring countries such as Singapore, Malaysia and Thailand. Worst when it has a huge impact on the local economy, environment, flora, fauna and human health. Elderly people and children are severely affected due to haze. As reported, millions of people have suffered from respiratory problems, which some have died and in serious health conditions. To prevent more casualties, providing an early indication of fires is vital and crucial. Therefore, in this research discussed developing a smart monitoring system to detect and monitor the environmental behavior in term of temperature, humidity, gasses and climate change to do forecasting on a forest fire. The technology used in this smart monitoring is a wireless data communication with long-range (LoRa) and internet of things (IoT) technology. The integration of sensors with LoRa technology would not only save the environment and people's lives. Furthermore, the sensor would also have forecasting and could access the information through developed real-time database anywhere and anytime. This ground level detection method deployed in regions and states in Indonesia. It is anticipated to be a quicker and cheaper solution than to satellite data acquisition and this would be beneficial to social welfare and economy development in Indonesia. Figure 1 shows forest fire hotspot scattering in Indonesia region and most of it in Riau Province in Sumatera Island. Riau province is located in the center and middle of Sumatra Island which most of the is peatland type that easily to get fire when dry season.

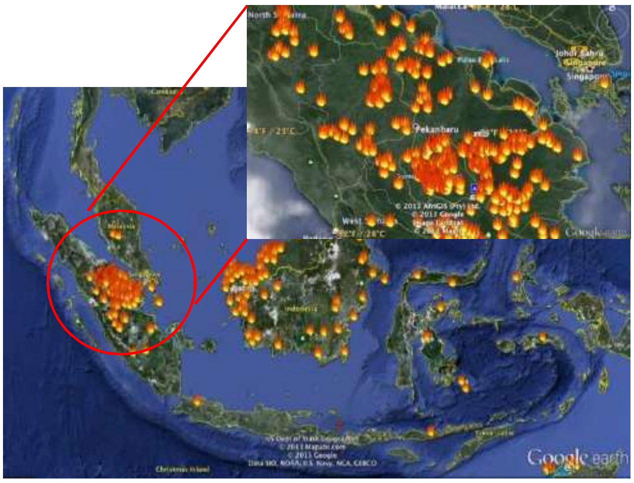

Fig. 1. Forest fire hotspot scattered in Indonesia and Riau Province.

The detailed objective of this research is to develop a ground level of sensing and collect information on the environment that can be done on analysis as data collection. There basic parameter and closely related to the impact of forest fire such as temperature, humidity, gasses, and carbon from the environmental changing for land and forest. This can be achieved by designing a smart sensor network using LoRa-IoT technology and analysis the data for the forecasting. Forest fire data in Indonesia, especially in the summer season, become the increasing number of hotspots because of dry environment, many places in Indonesia with rising temperature in summer then easy to get fire on land and forest area. In Sumatera dan Kalimantan Island, a forest fire is a disaster because of the peatland area and easy to get fire and even no one fired the land. Table 1 shows the data of forest fire in Indonesia based on province, where Riau province is one of the high and very often getting forest fire. The forest fire data shows detail in every province or state in Indonesia which almost every province has experience of fire disaster. This research aims to do detection using smart sensor of forest fire and analysis the data for the future forecasting of fire hotspot in Riau Province, Indonesia as prevention action for the authority to know hotspot location.

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TABLE I. FOREST FIRE DATA IN INDONESIA YEAR 2014-2019

No	Province	2014	2015	2016	2017	2018	2019	Total (ha)
1	Aceh	155.66	913.27	9,158.45	3,865.16	1,284.70	141.78	15519.02
2	Bali	30	373.46	-	370.8	206.54	-	980.8
3	Bangka Belitung	-	19,770.81	-	-	2,055.67	-	21826.48
4	Banten	2	250.02	-	-	-	-	252.02
5	Bengkulu	5.25	931.76	1,000.39	131.04	8.82	1.47	2078.73
6	DKI Jakarta	-	-	-	-	-	-	0
7	Gorontalo	-	5,225.89	737.91	-	158.65	27.7	6150.15
8	Jambi	3,470.61	115,634.34	8,281.25	109.17	1,390.90	4.18	128890.45
9	Jawa Barat	552.69	2,886.03	-	648.11	4,104.51	-	8191.34
10	Jawa Tengah	159.76	2,471.70	-	6,028.48	331.67	-	8991.61
11	Jawa Timur	4,975.32	7.966,79	-	5.116,43	7.279,76	-	4975.32
12	Kalimantan Barat	3.556,10	93,515.80	9,174.19	7,467.33	68,311.06	2,273.97	180742.35
13	Kalimantan Selatan	341	196,516.77	2,331.96	8,290.34	98,637.99	52.53	306170.59
14	Kalimantan Tengah	4.022,85	583.833,44	6.148,42	1.743,82	41.521,31	27,00	0
15	Kalimantan Timur	325.19	69,352.96	43,136.78	676.38	26,605.57	5,153.07	145249.95
16	Kalimantan Utara	-	14,506.20	2,107.21	82.22	625.82	792.11	18113.56
17	Kepulauan Riau	-	-	67.36	19.61	320.96	4,969.85	5377.78
18	Lampung	22.8	71,926.49	3,201.24	6,177.79	14,963.87	-	95692.19
19	Maluku	179,83	43,281.45	7,834.54	3,918.12	14,131.33	180.03	69345.47
20	Maluku Utara	6.5	13,261.10	103.1	31.1	69.54	56.79	13528.13
21	Nusa Tenggara Barat	3.977,55	2.565,71	706,07	33.120,81	14.352,26	29,10	0
22	Nusa Tenggara Timur	980.87	85,430.86	8,968.09	38,326.09	55,207.64	99.13	189012.68
23	Papua	300	350,005.30	186,571.60	28,767.38	87,676.88	-	653321.16
24	Papua Barat	-	7,964.41	542.09	1,156.03	120.63	58.36	9841.52
25	**Riau**	**6,301.10**	**183,808.59**	**85,219.51**	**6,866.09**	**37,220.74**	**27,683.47**	**347099.5**
26	Sulawesi Barat	-	4,989.38	4,133.98	188.13	978.38	56.77	10346.64
27	Sulawesi Selatan	483.1	10,074.32	438.4	1,035.51	1,741.27	441.07	14213.67
28	Sulawesi Tengah	70.73	31,679.88	11,744.40	1,310.19	3,890.95	215.92	48912.07
29	Sulawesi Tenggara	2,410.86	31,763.54	72.42	3,313.68	8,121.35	16.42	45698.27
30	Sulawesi Utara	236,06	4.861,31	2.240,47	103,04	125,07	9,98	0
31	Sumatera Barat	120.5	3,940.14	2,629.82	2,227.43	2,421.90	60.68	11400.47
32	Sumatera Selatan	8,504.86	646,298.80	8,874.91	3,625.66	13,019.68	236.49	680470.4
33	Sumatera Utara	3,219.90	6,010.92	33,028.62	767.98	3,678.79	152.55	46858.76
34	Yogyakarta	0.27	-	-	-	-	-	0.27
Total (ha)		**32,438.97**	**2,012,184.19**	**429,268.22**	**125,399.82**	**447,285.81**	**42,674.34**	**3,089,251.35**

II. RELATED WORKS

Research on the forest fire and wildfire have been done by some others researcher, there is a gap for the previous research required o fulfil and improve to become better solution and action. Previous research has been done as discussed in [1][2][3][4], the researchers used satellite images to collect data for wildfire in India region, the use of images and analysis for prediction. Modelling and detection of forest fire for prediction of number hotspot in future have been done, the data used is series data with mathematical analysis and computer simulation. Analysis of forest fire and the effect of burnt to environmental use spatiotemporal distribution and the frequency by time which day, month and year as discussed in [5][6]. The statistical and relationship between temporal dynamics of fire to the socioeconomics of landscape due to climate change effect then behaviors of weather. By elaborate temperature explanatory power to determine the anomalies of weather and how many burnt areas due to forest fire.

Use of model the constant frequency cosine to analysis seasonal variations of land environmental with time-varying parameters is one of method to determine environmental effect cause of forest fire. The model as discussed in [7] is to analysis of time-varying changes in the forest trees and vegetation. In addition, the use of Monte Carlo to do estimation is another technique apply to improve analysis and approach use by time-varying frequency. Changing of detector in binary hypothesis of land environmental data to cover and measure time-series data. In [8] discussed on the implementation of the ground sensors to do detection of changing environmental, where several sensors related to the environment especially air quality and carbon index used. Every sensor retrieve data from environmental then to analyze to determine quality of air and how much is pollution index in a location. A decision to help authority in order to support solutions and action to overcome to pollution when occur is one of the aims in this method. The effect of forest fore smoke to the human health and cardiovascular disease as well as to identify the forest smoke by computer vision as elaborate in [9][10]. The end-to-end system apply by combine variational autoencoder, then use if random forest smoke to collect and classify data into preprocessing. Validation and verification of smoke data set is done with the accuracy to determine the amount and impact to human health. The performance of the model by convolutional neural network to analysis smoke data set also explore in this method, the results give improve the accuracy in major by reducing positives and negatives false.

In the tropical countries one of the issues is forest or wildfire, most of country used satellite image to detect number of fire hotspot. A new method to detect fire hotspot as discussed in [11][12][13][14], a new solution to identity number of hotspot use ground sensor to improve the accuracy compare to the conventional by satellite images. The use of Wireless Sensor Network (WSN) and Long Range (LoRa) Wide Area Network (WAN) to support in detection system. Apply of combination several technologies to enhance data detection results of fire hotspot is done in this system, high accuracy detected data is beneficial for many applications and to plan preventive action in solve the fire issue. Investigation of number fire hotspot by generated physical and electromagnetics properties as discussed in [15] is a technique to identity how many hotspot in an area that potentially to become disaster. The electromagnetics properties analyze the scattered of the hot surface in the area by dispersed number of ash particles. Basic scattering of the fire ash and particle detected through direction of the wind and accumulated in the area that detected how much particle amount polluted to the environmental measure in a particular of time, while decision to determine fire hazard.

An intelligent system to detect and analyze forest fire use multi sensor which to obtain many parameters of data related to forest fire is a method elaborated in [16][17][18]. Several ccommon parameters related to forest fire such as smoke, temperature, pH, and carbon dioxide area among monitored. While, detection of smoke in forest fire in initial stage during prevent fire events is another discussion to achieve better and accurate data in fire detection. Use of Attention Enhanced Bidirectional Long Short-Term Memory Network (ABi-LSTM) to analyze the fire image recognition from video. Analysis of fire data use numerical calculation is a method applied in determine concentration of forest fire, which distribution, spread and threat on the environmental calculated. In [19] discussed on the data series collected in a few months to achieve behavior of data distribution and trend of environmental values to forest fire threat. Use of similar concept of mathematical modeling to revealed data to a dependence covered area.

Machine learning through Deep Belief Network (DBN) is one of technique applied in the analysis of fire data. Video surveillance security data is use to get forest fire data in surrounding environment. Training of data and fine tuning with the speeder in data analysis is advantage of the method as discussed in [20][21][22]. Theoretical model to analyze forest fire by influencer of fire particles in area of environmental as elaborated give good impact of analysis due to complex environmental such with vegetable, trees and others impact in land. Detection and monitoring of ash discharges from forest fire is a way to find how much the fire in a forest as well as how large the area get fire. The mechanism to detect of multiple particle in a amount fire emitted from fire with a number of maximum the electric field charge to strength near the elongated particle is 10.2 times as elaborated in [23][24]. Early detection of environmental with high risk of flame, hot surface of land especially if summer or dry season that potential to fire the land and forest is applied method discussion. Structured algorithm implements in the determine of fire based of values mention to prevent and action taken to overcome fire disaster in a land or forest.

III. Forest Fire Detection and Monitoring System

The number of hotspot detection and monitoring is based data received by the ground sensor system installed a dedicated area that potential go get fire. Data captured by sensor send to the central database which is at the backend system in the Islamic University of Riau for analysis. In this case, the station installed in most of region or location potentially to become a hotspot based on the survey have been done before installation. Figure 2 shows the map of Riau Province Indonesia, where the location of the ground sensor installed and scattered at the point of the area which becomes potentially to get fire, especially in the peatland area as current issue in the forest fire. Wireless Sensor Network (WSN) technology is applied in this sensing system, for the detection environmental parameter and monitoring the changes of the basic parameter as indicating the potential to become fire. The parameters such as temperature, humidity, carbon dioxide, haze, and smoke. These parameters can be analyzed and become the main reference to determine either the environmental potential for the fire or just normal condition.

Fig. 2. Location of ground sensor installed in Riau Province, Indonesia.

Figure 3 shows a block diagram for the detection of basic parameters used for analysis and determine the potential of the forest fire. There is a different sensor used, each sensor working asset to detect the parameters set in the system. Data detected from all the sensor collected in an internal memory system in sensor node then forward to the WSNs gateway system for a large capacity of data memory. In the gateway system data filtering for unused data is done to minimize a large number of data to be sent to the backend system

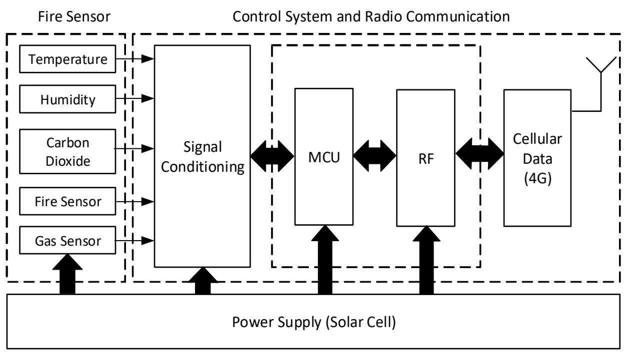

Fig. 3. Block diagram of a sensor system for detection environmental parameters.

In actual condition, the fore in the forest may have a different scenario, in someplace have many numbers of hotspot and closer, while other places may have a few numbers of the hotspot. To determine the number of hotspots in a geographical area, can do estimation using formula (1) with assuming the number of sensors deployed in the area with the function of coverage P is given as (1).

$$P = f\,(x, y, t) = \{(x_1, y_1)\ldots.(x_n, y_n)\},$$

$$(x_k, y_k) = f(t), k = 1,2,3,..n \qquad (1)$$

(x, y) is representing coordinate of the sensor deploys in the area or region to be monitor, the larger area to cover than more sensor to deploy. In this research used scenario of the sensor with the static position, while the sensing system expected to read more data from the environmental as well as multi parameters then coverage area indicates by Index Percentage (IP). In this case, assume the IP is coverage area that can define by a scalar value refer to the amount of percentage area coverage by the sensor and with the specific time can be calculated IP as in formula (2). The number of sensors deploy will determine the IP, more sensor installed will get more accuracy in data collection.

$$IP = \frac{\text{area covered with sensors}}{\text{the total area of the surveillance region}} \,.\, 100\% \qquad (2)$$

Signal conditioning of data retrieve from all the sensors connect to the main control unit (MCU) for data processing. In this case several step to analysis the data in order to avoid noise data to be analysis, real-time data from the sensor normalized by the system before send to the test unit and used artifical intelligent algorithm to achive high accucary decision in the result. Figure 4 shows a block diagram how a data from many sensor with various type of data being analysis with data training as part of intelligent algorithm. While loss or error data during analysis optimize and repeat back untul zero error and no losses data. The final step is determine results of forecasting number of fire hotspot data based on traning and testing data, results achieved presented and keep in the database.

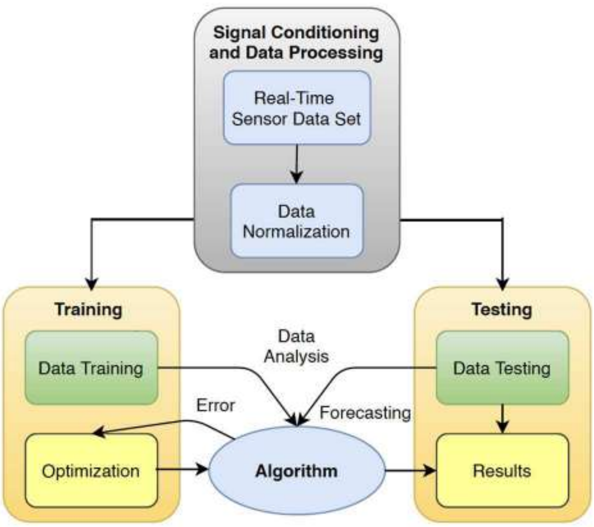

Fig. 4. Analysis diagram of real-time sensor data to forecasting number of hotspot using algorithm.

IV. Results and Discussion

Forest fire detection system has been developed and installed several sensors to detect many types of environmental-related to the fire. A fire commonly consists of several parameters such as changing temperature, humidity, carbon dioxide, haze particle, and smoke. Results of detection data from sensor log into a computer as a database to do an analysis and prediction in the future trend of forest fire hotspot. The sensor works base on the monitoring of the environment if the value indicates a high concentration of carbon, smoke, and high temperature then analysis of data to the potential of exist of fire hotspot. This case with high value of parameters related to the existence of fire hotspot but is not guaranteed because of other factors such as vehicle pollution and transportation effect, local community firing the land of rubbish near the home, or pollution from the factory. To conform to the fire hotspot, exist based on data recorded from the system then another technique or method to make sure as evince which is to check how the content of carbon concentration in the sky as well as haze content. All of the parameters detected and monitored by the system recorded in a database for some time then analyze to achieve high accuracy of data dan decision.

Furthermore, all those data keep in a database and by the time the amount of data is become high in volume the results of analysis become accurate because of data training and evince in data history is in big number. The monitoring system is also occupied with an alert system if the value of some parameters related to the fire of over or in abnormally. Figure 5 shows a system complete with sensors to detect air pollution and fire parameters in the sky to measure and indicate the level related to the forecasting number of fire hotspot.

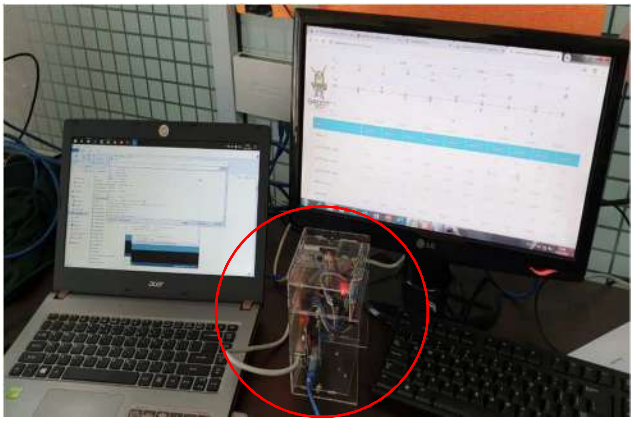

Fig. 5. Forest fire sensors system developed and initial test to capture number of hotspot.

The data captured and recorded by the sensor deploy in the area within Riau Province provide information number of hotspots of forest fire during the time. Table 2 shows a series data number of hotspots recorded started from January 2014 to December 2019. Data shows number of hotspots divided into monthly classification and based on the region of fire in Riau Province, Indonesia.

TABLE II. Distribution of Forest Fire Data in Riau Province, Indonesia Year 2014-2019.

Year	Month	No. of fire hotspots	Year	Month	No. of fire hotspots
2014	January	15	2017	January	25
	February	66		February	11
	March	122		March	18
	April	21		April	20
	May	5		May	24
	June	15		June	15
	July	11		July	55
	August	20		August	16
	September	40		September	30
	October	10		October	19
	November	10		November	10
	December	10		December	25
2015	January	11	2018	January	24
	February	75		February	48
	March	21		March	28
	April	65		April	30
	May	15		May	11
	June	44		June	16
	July	16		July	43
	August	26		August	13
	September	52		September	12
	October	16		October	10
	November	30		November	10
	December	28		December	20
2016	January	41	2019	January	35
	February	74		February	35
	March	22		March	27
	April	20		April	33
	May	26		May	88
	June	36		June	40
	July	32		July	32
	August	11		August	30
	September	42		September	15
	October	13		October	21
	November	20		November	16
	December	12		December	12

The final number of forest fire hotspot based on sensor detection and analysis of the results in forecasting in the next few coming months. Based on the data then authority or representative institution can do preparation on the disaster of land and forest fire including the location or region that potentially to become get fire. The decision and analysis give the values with the high accuracy, the data collected is based on real environmental and from the sensor deployed. Table 3 shows forecasting of number hotspot in Riau Province based on analysis of data collected. Finally, the detection and monitoring system for forest fire get benefit to the authority and community to prevent forest fire in the summer season with the dry environmental. The prevention action also can be plan by the government or authority based on forecasting data as well as specific to the area and how many the number of the fire hotspot.

TABLE III. FORECASTING NUMBER OF FOREST FIRE HOTSPOTS IN RIAU PROVINCE IN 5 MONTHS

Months	Appearance of number fire hotspots
1	25
2	31
3	26
4	30
5	27

V. CONCLUSION

Forest fire hotspots detection and forecasting based on sensor data collection and analysis with mathematical analysis and modelling have been done. Data obtain refer to sensor deployed in many areas that potentially become fire and strategic location. Series data achieved for the 5 years with the number of hotspots, the data collected with Riau Province. Results shows the forest fire hotspot was selected and could be used for monthly data modelling of hotspots or for the 5 months ahead since it fulfilled all the criteria in the portmanteau test. Forecasting data of number fire hotspot and information of the location is very beneficial for the local government or authority.

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REFERENCES

[1] S. Gupta, A. Roy, D. Bhavsar, R. Kala, S. Singh, and A. S. Kumar, "Forest Fire Burnt Area Assessment in the Biodiversity Rich Regions Using Geospatial Technology: Uttarakhand Forest Fire Event 2016," *J. Indian Soc. Remote Sens.*, vol. 46, no. 6, pp. 945–955, 2018, doi: 10.1007/s12524-018-0757-3.

[2] B. Kumari and A. C. Pandey, "MODIS based forest fire hotspot analysis and its relationship with climatic variables," *Spat. Inf. Res.*, vol. 28, no. 1, pp. 87–99, 2020, doi: 10.1007/s41324-019-00275-z.

[3] F. Alimenti *et al.*, "A Low-Cost Microwave Radiometer for the Detection of Fire in Forest Environments," *IEEE Trans. Geosci. Remote Sens.*, vol. 46, no. 9, pp. 2632–2643, 2008, doi: 10.1109/TGRS.2008.921395.

[4] E. A. Kadir, H. Irie, S. L. Rosa, and M. Othman, "Modelling of wireless sensor networks for detection land and forest fire hotspot," *Telkomnika (Telecommunication Comput. Electron. Control.*, 2019, doi: 10.12928/TELKOMNIKA.v17i6.12971.

[5] Q. Liu, Y. Shan, L. Shu, P. Sun, and S. Du, "Spatial and temporal distribution of forest fire frequency and forest area burnt in Jilin Province, Northeast China," *J. For. Res.*, vol. 29, no. 5, pp. 1233–1239, 2018, doi: 10.1007/s11676-018-0605-x.

[6] L. Costa, K. Thonicke, B. Poulter, and F.-W. Badeck, "Sensitivity of Portuguese forest fires to climatic, human, and landscape variables: subnational differences between fire drivers in extreme fire years and decadal averages," *Reg. Environ. Chang.*, vol. 11, no. 3, pp. 543–551, 2011, doi: 10.1007/s10113-010-0169-6.

[7] S. Chakraborty, A. Banerjee, S. K. S. Gupta, P. R. Christensen, and A. Papandreou-Suppappola, "Time-Varying Modeling of Land Cover Change Dynamics Due to Forest Fires," *IEEE J. Sel. Top. Appl. Earth Obs. Remote Sens.*, vol. 11, no. 6, pp. 1769–1776, 2018, doi: 10.1109/JSTARS.2018.2818060.

[8] E. A. Kadir, S. K. A. Rahim, and S. L. Rosa, "Multi-sensor system for land and forest fire detection application in Peatland Area," *Indones. J. Electr. Eng. Informatics*, 2019, doi: 10.11591/ijeei.v7i4.1604.

[9] C. Fan and F. Gao, "A New Approach for Smoking Event Detection Using a Variational Autoencoder and Neural Decision Forest," *IEEE Access*, vol. 8, pp. 120835–120849, 2020, doi: 10.1109/ACCESS.2020.3006163.

[10] D. Zhang, Y. Cao, G. Zhang, and X. Lu, "An Attention Convolutional Neural Network for Forest Fire Smoke Recognition," in *2019 6th International Conference on Systems and Informatics (ICSAI)*, 2019, pp. 1207–1211, doi: 10.1109/ICSAI48974.2019.9010577.

[11] E. A. Kadir, H. Irie, and S. L. Rosa, "Modeling of wireless sensor networks for detection land and forest fire hotspot," in *ICEIC 2019 - International Conference on Electronics, Information, and Communication*, 2019, doi: 10.23919/ELINFOCOM.2019.8706364.

[12] A. H. Zaji, H. Bonakdari, and B. Gharabaghi, "Remote Sensing Satellite Data Preparation for Simulating and Forecasting River Discharge," *IEEE Trans. Geosci. Remote Sens.*, vol. 56, no. 6, pp. 3432–3441, 2018, doi: 10.1109/TGRS.2018.2799901.

[13] A. Divya, T. Kavithanjali, and P. Dharshini, "IoT Enabled Forest Fire Detection and Early Warning System," in *2019 IEEE International Conference on System, Computation, Automation and Networking (ICSCAN)*, 2019, pp. 1–5, doi: 10.1109/ICSCAN.2019.8878808.

[14] E. A. Kadir, A. Efendi, and S. L. Rosa, "Application of LoRa WAN sensor and IoT for environmental monitoring in Riau Province Indonesia," in *International Conference on Electrical Engineering, Computer Science and Informatics (EECSI)*, 2018, doi: 10.1109/EECSI.2018.8752830.

[15] T. C. Baum, L. Thompson, and K. Ghorbani, "The Nature of Fire Ash Particles: Microwave Material Properties, Dynamic Behavior, and Temperature Correlation," *IEEE J. Sel. Top. Appl. Earth Obs. Remote Sens.*, vol. 8, no. 2, pp. 480–492, 2015, doi: 10.1109/JSTARS.2014.2386394.

[16] E. A. Kadir, S. L. Rosa, and A. Yulianti, "Application of WSNs for Detection Land and Forest Fire in Riau Province Indonesia," in *Proceedings of 2018 International Conference on Electrical Engineering and Computer Science, ICECOS 2018*, 2019, doi: 10.1109/ICECOS.2018.8605197.

[17] Y. Cao, F. Yang, Q. Tang, and X. Lu, "An Attention Enhanced Bidirectional LSTM for Early Forest Fire Smoke Recognition," *IEEE Access*, vol. 7, pp. 154732–154742, 2019, doi: 10.1109/ACCESS.2019.2946712.

[18] B. G. Sherstyukov and A. B. Sherstyukov, "Assessment of increase in forest fire risk in Russia till the late 21st century based on scenario experiments with fifth-generation climate models," *Russ. Meteorol. Hydrol.*, vol. 39, no. 5, pp. 292–301, 2014, doi: 10.3103/S1068373914050021.

[19] V. I. Marzaeva, "Mathematical Modeling of Canopy Forest Fire Spread in the Presence of Fire Breaks and Barriers," *Tech. Phys.*, vol. 64, no. 8, pp. 1073–1081, 2019, doi: 10.1134/S1063784219080139.

[20] R. Kaabi, M. Sayadi, M. Bouchouicha, F. Fnaiech, E. Moreau, and J. M. Ginoux, "Early smoke detection of forest wildfire video using deep belief network," in *2018 4th International Conference on Advanced Technologies for Signal and Image Processing (ATSIP)*, 2018, pp. 1–6, doi: 10.1109/ATSIP.2018.8364446.

[21] T. Baum, L. Thompson, and K. Ghorbani, "A Complex Dielectric Mixing Law Model for Forest Fire Ash Particulates," *IEEE Geosci. Remote Sens. Lett.*, vol. 9, no. 5, pp. 832–835, 2012, doi: 10.1109/LGRS.2012.2184259.

[22] P. Li *et al.*, "Influence of forest fire particles on the breakdown characteristics of air gap," *IEEE Trans. Dielectr. Electr. Insul.*, vol. 23, no. 4, pp. 1974–1984, 2016, doi: 10.1109/TDEI.2016.7556469.

[23] D. Huang, W. Lu, M. Long, and P. Li, "Influence of the typical vegetation ashes/particles on discharge characteristics of conductor-plane air gap," *J. Eng.*, vol. 2019, no. 16, pp. 3214–3218, 2019, doi: 10.1049/joe.2018.8500.

[24] F. M. A. Hossain, Y. Zhang, C. Yuan, and C. Su, "Wildfire Flame and Smoke Detection Using Static Image Features and Artificial Neural Network," in *2019 1st International Conference on Industrial Artificial Intelligence (IAI)*, 2019, pp. 1–6, doi: 10.1109/ICIAI.2019.8850811.

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