UNIVERSITAS JEMBER
ICOMITEE 2021

ICOMITEE 2021
PROCEEDING

The 2021 International Conference on Computer Science, Information Technology and Electrical Engineering (ICOMITEE)

October
27th – 28th, 2021
El Hotel Royale, Banyuwangi

Co-Host :
UNUSA

Sponsorship :
IEEE INDONESIA SECTION
IEEE The Indonesia Section Computer Society Chapter

ICOMITEE
2021

ICOMITEE 2021

PROCEEDINGS

2021 International Conference on Computer Science, Information Technology, and Electrical Engineering (ICOMITEE 2021)

October, 27th - 28th 2021, Banyuwangi, Indonesia

Editors:

Slamin, University of Jember, Jember, Indonesia
Antonius Cahya Prihandoko, University of Jember, Jember, Indonesia
Fahrobby Adnan, University of Jember, Jember, Indonesia
Ryan Randy Suryono, Universitas Teknokrat Indonesia, Lampung, Indonesia
Endang Sulistiyani, Universitas Nahdlatul Ulama Surabaya, Surabaya, Indonesia
Eka Mistiko Rini, Politeknik Negeri Banyuwangi, Banyuwangi, Indonesia

2021 International Conference on Computer Science, Information Technology, and Electrical Engineering (ICOMITEE)

2021 International Conference on Computer Science, Information Technology, and Electrical Engineering (ICOMITEE) took place 27-28 October 2021 in Banyuwangi, Indonesia.

IEEE catalog number:	CFP21U07-ART
ISBN:	978-1-6654-0147-0

PROCEEDINGS

2021 International Conference on Computer Science, Information Technology, and Electrical Engineering (ICOMITEE 2021)

Additional copies may be ordered to:
Faculty of Computer Science
University of Jember
Jl. Kalimantan no.37, Kampus Bumi Tegalboto, Sumbersari, Jember, 68121
+62331 - 326935

Organizing Committee of ICOMITEE 2021

Steering Committee

- Iwan Taruna, University of Jember, Jember, Indonesia
- Wahyudi Hasbi, National Institute of Aeronautices & Space (LAPAN), Indonesia
- Ford Lumban Gaol, IEEE Indonesia Section Computer Society Chapter
- Son Kuswadi, Politeknik Negeri Banyuwangi, Banyuwangi, Indonesia
- Slamin, University of Jember, Jember, Indonesia
- Achmad Jazidie, Universitas Nahdlatul Ulama Surabaya, Surabaya, Indonesia
- Gamantyo Hendrantoro, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia

Conference Chair

- Saiful Bukhori, University of Jember, Jember, Indonesia

Treasurer

- Windi Eka Yulia Retnani, University of Jember, Jember, Indonesia

Technical Program Committee Chairs

- Antonius Cahya Prihandoko, University of Jember, Jember, Indonesia
- Khairul Anam, University of Jember, Jember, Indonesia
- Teguh Herlambang, Universitas Nahdlatul Ulama Surabaya, Surabaya, Indonesia
- Ryan Randi Suryono, Universitas Teknokrat Indonesia, Lampung, Indonesia

Publication Chairs

- Fahrobby Adnan, University of Jember, Jember, Indonesia
- Endang Sulistiyani, Universitas Nahdlatul Ulama Surabaya, Surabaya, Indonesia
- Ima Kurniastuti, Universitas Nahdlatul Ulama Surabaya, Surabaya, Indonesia
- Heni Sulistiani, Universitas Teknokrat Indonesia, Lampung, Indonesia
- Dedi Darwis, Universitas Teknokrat Indonesia, Lampung, Indonesia
- Eka Mistiko Rini, Politeknik Negeri Banyuwangi, Banyuwangi, Indonesia

Publicity and Sponsorship Chairs

- Januar Adi Putra, University of Jember, Jember, Indonesia

Secretary

- Beny Prasetyo, University of Jember, Jember, Indonesia

Technical Program Members

- Sasikumar A, K Ramakrishnan College of Technology, India
- Sharul Kamal A. Rahim, Universiti Teknologi Malaysia, Malaysia
- Ab Al-Hadi Ab Rahman, Universiti Teknologi Malaysia, Malaysia
- Shahliza Abd Halim, University of Technology Malaysia, Malaysia
- Dahlan Abdullah, Universitas Malikussaleh, Indonesia
- Shobit Agarwal, University of Bologna, Italy
- Anita Ahmad, University of Technology Malaysia, Malaysia
- Hani Ahmed, Universiti Malaysia Perlis, Malaysia

- Ruma Ajeena, University of Babylon, Iraq
- Oryina Akputu, Ritman University, Nigeria
- Ahmed Al-Naib, Northern Technical University, Iraq
- Mudrik Alaydrus, Universitas Mercu Buana, Indonesia
- Mohammed Alghamdi, Al-Baha University, Saudi Arabia
- Farah Alkhalid, University of Technology, Iraq
- Abdulkader Alwer, Istanbul Aydin University, Turkey
- Santhanakrishnan Anand, New York Institute of Technology, USA
- Ernesto Arzabala-Contreras, Universidad Tecnologica de Chihuahua, Mexico
- Mehdi Asadi, Islamic Azad University, Khamneh Branch, Iran
- Anamiya Bhattacharya, Indian Space Research Organization, India
- Ahmed Chitnalah, Cadi Ayyad University EST Laboratory, Morocco
- Tien Han Chua, Universiti Teknologi Malaysia, Malaysia
- Nagaraj Dharwadkar, Rajarambapu Institute of Technology, Islampur, India
- Ke-Lin Du, Concordia University, Canada
- Nibal Farman, Univrsity of Baghdad, Iraq
- Miguel Franklin de Castro, Federal University of Ceará, Brazil
- Franco Frattolillo, University of Sannio, Italy
- Diogo Gomes, Universidade de Aveiro, Portugal
- Visvasuresh Victor Govindaswamy, Concordia University, USA
- Eisuke Hanada, Saga University, Japan
- Hao Hao, RMIT University, Australia
- Maha Harzallah, ISITCOM, Tunisia
- S. M. Shakil Hassan, Eastern University, Bangladesh
- Sallehuddin Ibrahim, Universiti Teknologi Malaysia, Malaysia
- Mohd. Israil, Aljouf University, KSA, Saudi Arabia
- Jin Jin, University of Toronto, Canada
- Mohammed Kaabar, Washington State University, USA
- Nor Hisham Khamis, Universiti Teknologi Malaysia, Malaysia
- Sandeep Kumar, Central Research Laboratory, Bharat Electronics Ltd., India
- Evgeny Markin, Bauman State Technical University, Russia
- Israel Martin-Escalona, Universitat Politècnica de Catalunya (UPC), Spain
- Artis Mednis, Institute of Electronics and Computer Science, Latvia
- Mona Riza Mohd Esa, Universiti Teknologi Malaysia, Malaysia
- Norhaida Mohd Suaib, Universiti Teknologi Malaysia, Malaysia
- Roberto Montemanni, University of Modena and Reggio Emilia, Italy
- Waseem Mufti, Aalborg University Denmark, Pakistan
- Muhammad Nasir, Universitas Andalas, Indonesia
- Amirjan Nawabjan, Universiti Teknologi Malaysia, Malaysia
- Nik Noordini Nik Abd Malik, Universiti Teknologi Malaysia, Malaysia
- I Gde Dharma Nugraha, Universitas Indonesia, Indonesia
- Nurdin Nurdin, Universitas Malikussaleh, Indonesia
- Siti Othman, Universiti Teknologi Malaysia (UTM), Malaysia
- Varun P. Gopi, National Institute of Technology, India
- Arindam Pal, CSIRO, Australia
- Bujjibabu Penumutchi, JNTUK Kakinada, India
- Prashant Pillai, University of Wolverhampton, United Kingdom (Great Britain)
- Andri Pranolo, Universitas Ahmad Dahlan, Indonesia
- Junfei Qiu, University of York, United Kingdom (Great Britain)
- Abdul Rahim Bepar, Annamacharya Institute of Technology & Sciences, India
- Gautham Rajagopal, Medtronic, USA
- Alireza Rezvanian, Amirkabir University of Technology, Iran
- Siti Hawa Ruslan, Universiti Tun Hussein Onn Malaysia, Malaysia
- Mohd Sadiq, Jamia Millia Islamia, India
- Azahari Salleh, Universiti Teknikal Malaysia Melaka (UTeM), Malaysia

- Roselina Sallehuddin, University Technology Malaysia, Malaysia
- Vaibhav Saundarmal, Marathwada Institute of Technology, Aurangabad, India
- Ahmad Zuri Sha'ameri, Universiti Teknologi Malaysia, Malaysia
- Durga Prasad Sharma, AMUIT, MOSHE FDRE under UNDP & Adviser (IT) ILO-UN, India
- Robert Szabolcsi, Óbuda University, Hungary
- Said Touati, Nuclear Center Research Of Birine, Algeria
- Nguyen Tri-Hai, Chung-Ang University, Korea (South)
- Munirul Ula, Universitas Malikussaleh, Indonesia
- Y. V. Pavan Kumar, Vellore Institute of Technology - Andhra Pradesh (VIT-AP) University, India
- Azli Yahya, Universiti Teknologi Malaysia, Malaysia
- Aws Yonis, Ninevah University, Iraq
- Efil Yusrianto, UIN IMAM BONJOL PADANG, Indonesia

Reviewers

- Abu Bakar Abd Rahman, Universiti Malaysia Sabah, Malaysia
- Abdul Abdul, Federal Urdu University of Arts, Science & Technology Islamabad Pakistan, Pakistan
- Sakena Abdul Jabar, Universiti Malaysia Sarawak, Malaysia
- Antar Abdul-Qawy, Faculty of Science, SUMAIT University, Zanzibar, Tanzania
- Nelly Adiwijaya, Universitas Jember, Indonesia
- Sandeep Agrawal, RJIT Tekanpur, India
- Mohd Ashraf Ahmad, Universiti Malaysia Pahang, Malaysia
- Omar Al saif, Northern Technical University, Iraq
- Qusay Al-Doori, University of Technology, Iraq
- Mohammad Al-Mashhadani, Al-Maarif University College, Iraq
- Yahiea Al-Naiemy, Budapest University of Technology and Economics, Hungary
- Karim Al-Saedi, Mustansiriyah University, Iraq
- Atallah AL-Shatnawi, Al-albayt University, Jordan
- Maher Alasaady, Northern Technical University, Iraq
- Hamid Alasadi, IRAQ- BASRA, Iraq
- Mihaela Albu, Politehnica University of Bucharest, Romania
- Qutaiba Ali, University of Mosul, Iraq
- Wisam Ali, University of Technology, Iraq
- Mohammad AlShabi, University of Sharjah, United Arab Emirates
- Ahmed Alsheikhy, Northern Border University, Saudi Arabia
- Ghada Amer, Faculty of Engineering - Benha University, Egypt
- Manilal Amipara, Gujarat Technological University, India
- Khairul Anam, University of Jember, Indonesia
- Rakan Antar, Northern Technical University, Iraq
- Anna Antonyová, University of Prešov in Prešov, Slovakia
- Intan Sari Areni, Hasanuddin University, Indonesia
- Ezendu Ariwa, University of Bedfordshire, United Kingdom (Great Britain)
- Farrukh Arslan, Purdue University, USA
- Carlos Astudillo, State University of Campinas, Brazil
- Irfan Bahiuddin, Universitas Gadjah Mada, Indonesia
- Bakhyt Bakiyev, Suleyman Demirel University, Kazakhstan
- M'hamed Bakrim, University of Cadi Ayyad Marrakesh, Morocco
- Younes Balboul, ENSA, Sidi Mohamed Ben Abdellah University, Morocco
- Maushumi Barooah, Gauhati University, India
- Bikash Behera, International Institute of Information Technology Bhubaneswar, India
- Dinesh Bhatia, Biomedical Engineering Department, North Eastern Hill University, India
- Subhasis Bhattacharjee, Adobe Systems India Private Limited, India
- Parameshachari Bidare Divakarachari, GSSSIETW, Mysuru, India
- Tuğçe Bilen, Istanbul Technical University, Turkey
- Shilpi Birla, Manipal University Jaipur, India

- Angelo Bruno, IEEE Senior Member, Italy
- Rodrigo Campos Bortoletto, Instituto Federal de São Paulo, Brazil
- Alessandro Carrega, CNIT, Italy
- Chung-Liang Chang, National Pingtung University of Science and Technology, Taiwan
- Abhay Chaudhary, Vellore Institute of Technology, AP, India
- Tai-Chen Chen, MAXEDA Technology, Taiwan
- Jose Cordeiro, School of Technology of Setubal / I. P. S., Portugal
- Siriporn Dachasilaruk, Naresuan University, Thailand
- D Dafik, University of Jember, Indonesia
- Sarada Dakua, Hamad Medical Corporation, Qatar
- Luca Davoli, University of Parma, Italy
- Sorin Ioan Deaconu, Politechnica University Timisoara, Romania
- Tresna Dewi, Politeknik Negeri Sriwijaya, Indonesia
- Tio Dharmawan, Universitas Jember, Indonesia
- Nishant Doshi, PDPU, India
- Nikolaos Doukas, Hellenic Army Academy, Greece
- Nabil Elmarzouqi, Mohammed V University in Rabat, Morocco
- Philipp Fechteler, Fraunhofer HHI, Germany
- Smain Femmam, University UHA, France
- Muftah Fraifer, IDC-CSIS-UL, Ireland
- Muhammad Furqon, Universitas Jember, Indonesia
- Dharmendra Ganage, Sinhgad College of Engineering, India
- Thittaporn Ganokratanaa, King Mongkut's University of Technology Thonburi, Thailand
- Antonios Gasteratos, Democritus University of Thrace, Greece
- Mihai Gavrilas, Technical University of Iasi, Romania
- Amirreza Ghadimi Avval, University of Arkansas, USA
- Alireza Ghasempour, ICT Faculty, USA
- Hossein Ghodosi, James Cook University, Australia
- Amin Gholoobi, Open University of Cyprus, Cyprus
- Renaldi Gondosubroto, GReS Studio, Indonesia
- Agustinus Bimo Gumelar, Institut Teknologi Sepuluh Nopember, Indonesia
- Brij Gupta, National Institute of Technology Kurukshetra, India
- Seng Hansun, Universitas Multimedia Nusantara, Indonesia
- Triwahju Hardianto, University of Jember, Indonesia
- Shanmugasundaram Hariharan, Shadan Women's College of Engineering and Technology, India
- Suneeta Harlapur, Vemana Institute of Technology, India
- Mohd Zamri Hasan, University Malaysia Perlis, Malaysia
- Rini Hasanah, Brawijaya University, Indonesia
- Teguh Herlambang, University of Nahdlatul Ulama Surabaya, Indonesia
- Roberto Carlos Herrera Lara, National Polytechnic School, Ecuador
- Paramate Horkaew, Suranaree University of Technology, Thailand
- Hanim Hussin, Universiti Teknologi MARA, Malaysia
- Ba Dieu Huynh, Duy Tan University, Vietnam
- Duy Huynh, Ho Chi Minh City University of Technology (HUTECH), Vietnam
- Hamidah Ibrahim, Universiti Putra Malaysia, Malaysia
- Nazrita Ibrahim, Universiti Tenaga Nasional, Malaysia
- Fakrulradzi Idris, Universiti Teknikal Malaysia Melaka, Malaysia
- Asif Iqbal, KTH Royal Institute of Technology, Sweden
- Zafar Iqbal, PMAS, Arid Agriculture University, Rawalpindi, Pakistan
- Ismahafezi Ismail, Universiti Sultan Zainal Abidin, Malaysia
- Mohd Zain Ismail, Universiti Kuala Lumpur British Malaysian Institute, Malaysia
- Hossein Jafari, Intelligent Fusion Technology, Inc., USA
- Ramkumar Jaganathan, Dr NGP Arts and Science College, India
- Norziana Jamil, Universiti Tenaga Nasional, MALAYSIA, Malaysia
- Emilio Jiménez Macías, University of La Rioja, Spain

- Siti Amely Jumaat, Universiti Tun Hussein Onn Malaysia, Malaysia
- Sandeep Kakde, Y C College of Engineering, India
- Dimitrios Kallergis, University of West Attica, Greece
- S Kannadhasan, Cheran College of Engineering, India
- Lavish Kansal, Lovely Professional University, India
- Mahdi Karami, Universiti Putra Malaysia, Malaysia
- Inderpreet Kaur, Director IGEN Edu Solutions India, India
- Mohammad Khalily Dermany, Islamic Azad University, Khomein Branch, Iran
- Talha Khan, University of Illinois at Chicago, USA
- Zeashan Khan, Air University, Pakistan
- Nikhil Khanna, University of Delhi, India
- Fayez Khazalah, Al al Bayt University, Jordan
- Dong W. Kim, Inha Tech College, Korea (South)
- Montree Kumngern, King Mongkut's Institute of Technology Ladkrabang, Thailand
- Yeni Kustiyahningsih, University of Trunojoyo, Indonesia
- Otavio Lavor, UFERSA, Brazil
- Trong Nghia Le, Ho Chi Minh City University of Technology and Education, Vietnam
- Gyu Myoung Lee, Liverpool John Moores University, United Kingdom (Great Britain)
- Yih-Jiun Lee, Chinese Culture University, Taiwan
- Narkedamilly Leelavathy, Jawaharlal Nehru Technological University, India
- Xia Li, Apple, USA
- Marco Listanti, University of Rome "La Sapienza", Italy
- Chuan-Ming Liu, National Taipei University of Technology, Taiwan
- Renato Lopes, Universidade de Brasília, Brazil
- Pascal Lorenz, University of Haute Alsace, France
- Nadir Mahammed, Ecole Supérieure en Informatique 08 mai 1945 Sidi Bel Abbès, Algeria
- Ahmed Mahmood, University of Guelph, Canada
- Haitham Mahmoud, Birmingham City University (BCU), United Kingdom (Great Britain)
- Massudi Mahmuddin, Universiti Utara Malaysia, Malaysia
- Wayan Mahmudy, Universitas Brawijaya, Indonesia
- As Mansur, Medan State University (Unimed), Indonesia
- Syed Manzoor Qasim, King Abdulaziz City for Science and Technology, Saudi Arabia
- Warsuzarina Mat Jubadi, Universiti Tun Hussein Onn Malaysia, Malaysia
- Ebrahim Mattar, University of Bahrain, Bahrain
- Michael McGuire, University of Victoria, Canada
- Zahéra Mekkioui, University of tlemcen, Algeria
- Charles Miers, Santa Catarina State University, Brazil
- Dan Milici, University of Suceava, Romania
- Thippeswamy MN, Nitte Meenakshi Institute of Technology, India
- Khairul Anuar Mohamad, Universiti Tun Hussein Onn Malaysia, Malaysia
- Amjed Sid Ahmed Mohamed Sid Ahmed, Global College of Engineering and Technology, Oman
- Suraya Mohammad, University Kuala Lumpur - British Malaysian Institute, Malaysia
- Negar Mohammadi-Koushki, none, USA
- Amir Hossien Mohammadzadeh Niaki, Niroo Research Institute (NRI), Iran
- Khalil Azha Mohd Annuar, Universiti Teknikal Malaysia Melaka, Malaysia
- Azrul Mohd Ariffin, Universiti Tenaga Nasional, Malaysia
- Shukor Sanim Mohd Fauzi, Universiti Teknologi Mara, Perlis Campus, Malaysia
- Nur Razia Mohd Suradi, Universiti Selangor, Malaysia
- Mohd Yuzri Mohd Yusop, Universiti Kuala Lumpur, Malaysia
- Hamed Mojallali, University of Guilan, Iran
- Rodrigo Montufar-Chaveznava, Facultad de Ingeniería, Universidad Nacional
- Autonoma de Mexico, Mexico
- Pedro Moura, University of Coimbra, Portugal
- Mohamed Moussaoui, Abdelmalek Esaadi UniversitY, Morocco
- Munawir Munawir, Universitas Pendidikan Indonesia, Indonesia

- T Vijay Muni, K L University, India
- Rinaldi Munir, Institut Teknologi Bandung, Indonesia
- Sarhan Musa, Prairie View A&M University, USA
- Mas Rina Mustaffa, Universiti Putra Malaysia, Malaysia
- Marwan Nafea, University of Nottingham Malaysia, Malaysia
- Ali Nahar, University of Technology -Iraq, Malaysia
- Paniti Netinant, Rangsit University, Thailand
- Mohd Natashah Norizan, Universiti Malaysia Perlis, Malaysia
- Nurdin Nurdin, Universitas Islam Negeri (IAIN) Datokarama Palu, Indonesia
- Ahmad Fairuz Omar, Universiti Sains Malaysia, Malaysia
- Nor Azlan Othman, Universiti Teknologi MARA (UiTM) Cawangan Pulau Pinang, Malaysia
- Rosaura Palma-Orozco, Instituto Politécnico Nacional, Mexico
- Shashikant Patil, SVKM NMIMS Mumbai India, India
- Taraknath Paul, ICFAI University Jharkhand, India
- Yesaya Paulus, Dipa Makassar University, Japan
- Vanita Pawar, DIAT, Pune, India
- Rajesh Pindoriya, Indian Institute of Technology Mandi, India
- Petra Poulova, University of Hradec Kralove, Czech Republic
- Eko Prasetyo, PT. PLN (Persero), Indonesia
- Emil Pricop, Petroleum-Gas University of Ploiesti, Romania
- Salita Ulitia Prini, Indonesian Institute of Sciences, Indonesia
- Cong Pu, Marshall University, USA
- Sameerchand Pudaruth, University of Mauritius, Mauritius
- Pakawan Pugsee, Chulalongkorn University, Thailand
- Yogesh Pundlik, Kamala Institute of Technology and Science, Singapur-, India
- Asep Purnomo, Universitas Gadjah Mada, Indonesia
- Fitri Maya Puspita, University of Sriwijaya, Indonesia
- Fika Rachman, University of Trunojoyo Madura, Indonesia
- Ema Rachmawati, Telkom University, Indonesia
- Indra Raharjana, Universitas Airlangga, Indonesia
- Harikumar Rajaguru, Bannari Amman Institute of Technology, India
- Grienggrai Rajchakit, Maejo University, Thailand
- Ramadiani Ramadiani, Mulawarman University, Indonesia
- Shuvendu Rana, SRM University AP, United Kingdom (Great Britain)
- Priya Ranjan, SRM University, Amaravathi, India
- Nadana Ravishankar, VelTech High Tech Dr Rangarajan Dr Sakunthala Engineering College, India
- Windi Retnani, Universitas Jember, Indonesia
- Indra Riyanto, Universitas Indonesia, Indonesia
- Zairi Rizman, Universiti Teknologi MARA, Malaysia
- Nuno Rodrigues, Instituto Politécnico de Bragança, Portugal
- Vahideh Sadeghi, Isfahan University of Technology, Iran
- Ahmed Saeed, Future University in Egypt, Egypt
- Basil Saied, Formerly at University of Mosul, Iraq
- Arun Saini, The ICFAI University, Jaipur, India
- Sandeep Saini, The LNM Institute of Information Technology, Jaipur, India
- Wael Salah, Palestine Technical University - Kadoorie, Palestine
- Hussain Saleem, University of Karachi, Pakistan
- Azmi Saleh, Jember University, Indonesia
- Andrews Samraj, Mahendra Engineering College, India
- Tomonobu Sato, Hitachi ICT Business Services, Ltd., Japan
- Alfredo Satriya, University of Florida, USA
- Toufik Sebbagh, University of Skikda, Algeria
- Sandeep Sengar, Indian Institute of Technology (ISM) Dhanbad, India
- Tomonobu Senjyu, Faculty of Engneering, University of the Ryukyus, Japan
- Amel Serrat, USTO MB, Algeria

- Nadheer Shalash, Al-Mamon University College, Iraq
- Aditi Sharma, Quantum University, Roorkee, Uttarakhand, India
- Sachin Sharma, Technological University Dublin, Ireland
- Akbar Sheikh-Akbari, Leeds Beckett University, United Kingdom (Great Britain)
- Divya Rishi Shrivastava, Manipal University Jaipur, India
- Khairul Azami Sidek, International Islamic University Malaysia, Malaysia
- Joni Simatupang, President University, Indonesia
- Pramod Singh, ABV-IIITM Gwalior, India
- Ramesh Singh, DTU Delhi, India
- Simar Preet Singh, Bennett University, Greater Noida, India
- Vivek Singh, Shambhunath Institute of Engineering and Technology, Prayagraj,
- UP, INDIA, India
- Shefali Singhal, none, India
- Jee Siong, Multimedia University, Malaysia
- Rostyslav Sklyar, Independent Professional, Ukraine
- Slamin Slamin, University of Jember, Indonesia
- Nikolaos Sofianos, Democritus University of Thrace, Greece
- Viranjay M. Srivastava, University of KwaZulu-Natal, South Africa
- Sritrusta Sukaridhoto, Politeknik Elektronika Negeri Surabaya, Indonesia
- Heni Sulistiani, Universitas Teknokrat Indonesia, Indonesia
- Ahmed Sultan, Baghdad - Iraq, Iraq
- Ryan Suryono, Universitas Teknokrat Indonesia, Indonesia
- Sutrisno Sutrisno, Universitas Diponegoro, Indonesia
- Mujtaba Mahdi Mudassir Syed, Osmania University, India
- Pooya Taheri, SFU, Canada
- Thitinan Tantidham, Mahidol University, Thailand
- Pham Thanh Thuy, MICA Institute (HUST - CNRS/UMI 2954 - INP Grenoble), Vietnam
- Hua Nong Ting, Universiti Malaya, Malaysia
- Huong Yong Ting, University College of Technology Sarawak, Malaysia
- Rahmat Trialih, Brawijaya University, Indonesia
- Muharrem Tümçakır, Gebze Technical University, Turkey
- Mohd Umar Farooq, Muffakham Jah College of Engineering and Technology, India
- Madhur Upadhayay, Shiv Nadar University, India
- Panagiotis Varzakas, University of Thessaly, Greece
- Jami Venkata Suman, GMR Institute of Technology, India
- Chitra Venugopal, Oregon Institute of Technology, USA
- Rima Wahyuningrum, University of Trunojoyo Madura, Indonesia
- Carlos Becker Westphall, Federal University of Santa Catarina, Brazil
- Widjonarko Widjonarko, Universitas Jember, Indonesia
- Widodo Widodo, Universitas Negeri Jakarta, Indonesia
- Tianhua Xu, Tianjin University, China
- Abid Yahya, Botswana International University of Science and Technology (BIUST), Botswana
- Srihari Yamanoor, Self, USA
- Chong Yen Fook, Universiti Malaysia Perlis, Malaysia
- Thaweesak Yingthawornsuk, King Mongkut's University of Technology Thonburi, Thailand
- Sumendra Yogarayan, Multimedia University (MMU), Malaysia
- Pujianto Yugopuspito, Universitas Pelita Harapan, Indonesia
- Noor Zaman, Taylor's University, Malaysia
- Qi Zhao, University of California, Los Angeles, USA

Table of Contents

Auhtor Index   **231**

How Affect Autonomous and Controlled Motivation using Massive Open Online Course?

1st Erri Wahyu Puspitarini
Information Technology
STMIK Yadika Bangil
Indonesia
www.erri@stmik-yadika.ac.id

2nd Hari Moerti
Information Technology
STMIK Yadika Bangil
Indonesia
hari_moerti@stmik-yadika.ac.id

3rd Anik Vega Vitianingsih
Faculty of Engineering
Universitas Dr Soetomo
Indonesia
vega@unitomo.ac.id

4th Anastasia Maukar
Faculty of Engineering
President University
Indonesia
almaukar@president.ac.id

5th Fitri Marisa
Information Technology
Universitas Widyagama
Indonesia
fitrimarisa@gmail.com

6th Saiful Bukhori
Faculty of Computer Science
University of Jember
Indonesia
saiful.ilkom@unej.ac.id

Abstract—**Higher Education is currently facing various challenges since the Covid-19 pandemic, especially for teaching and learning activities using online learning. Massive Open Online Course (MOOC), one of the newest forms of innovation used as an online learning tool. MOOC is the most recent stage in the development of open educational resources. The inflexibility or standardization of lectures will reduce the enthusiasm of students to participate in MOOCs. MOOCs are part of a growing trend in higher education, but motivation from students is dwindling. This study uses the ACM (Autonomous and Controlled Motivation) model to measure how much influence autonomous motivation has on student's intention to use the MOOC application. It also measures how much influence controlled motivation has on students' choice to use the MOOC application as online learning. Respondents in this study were higher education students who used the MOOC application. The statistical test of the ACM model has been carried out using smart-PLS software to test the proposed hypothesis. The result showed that autonomous and control motivation were significant determinants of perceived behavior control. Eventually, the instructor can assist institutions in initiating MOOC-based online education, as well as increasing student involvement and engagement**

Keywords—**autonomous motivation, controlled motivation, MOOC.**

I. INTRODUCTION

Many prospective learners are no longer able to attend practical higher education institutions during the Covid-19 pandemic. Today, many post-secondary students cannot go to campus to study the entire course to earn a degree. Massive Open Online Course (MOOC), one of the newest forms of innovation used as an online learning tool, this lecture represents the latest stage of the evolution of open educational resources [1]. These courses are accessible via the internet and are usually open for registration with no requirements or limits on student numbers. It is very supportive of implementing the Independent Learning Campus Independent curriculum, which is one of the implementations of education in the era of the industrial revolution 4.0.

Some observers believe that MOOC provides an opportunity for everyone struggling to receive a good quality higher education from a Top-ranked university in developed countries. This course can be supported by autonomy for students. Other observers are also anxious that MOOC providers may not be able to offer a wide range of courses at the same time in content that accommodates the diversity of learning objectives and motivations, different levels of prior knowledge, or available resources [2].

The inflexibility or standardization of lectures will reduce the enthusiasm of students to participate in MOOCs. As researched by [3], MOOC represents a positive trend in higher education, but student motivation is diminishing.

Autonomous motivation is also referred to as intrinsic motivation, where activities are carried out by individuals based on pleasure and sincerity. In contrast, controlled motivation, which is often referred to as extrinsic motivation, is an activity carried out by individuals due to pressure from outsiders [4].

This study aims to examine the Autonomous Motivation (AM), Controlled Motivation (CM), Perceived Behavior Control (PBC), and Behavior Intention (BI) of students using the MOOC application as online learning, especially during the Covid-19 pandemic. In terms of the urgency of the research, this research is expected to correct the shortcomings contained in the application of the MOOC application in terms of intrinsic and extrinsic student motivation. So that online learning

using MOOC can be used continuously or long term. When participants have significant objective intentions, implementation behavioral intentions have been demonstrated to be highly effective.

II. METHODS

A. Participants

One hundred and thirty-seven higher education students participated in Indonesia. 50.36% of whom were males, whose age ranged from 19 to 24 with a mean of 21.50. All participants had heard about MOOCs and had taken at least one MOOC in Indonesia before. Students varied in terms of ethnic background, which include Javanese, Arabian, Madura, among others.

B. Procedure

Participants completed an online survey in the academic year during homeroom. Surveys were conducted during the academic year of 2020/2021. The distribution of the questionnaire was sent out using google form.

C. Measure

As in previous research, autonomous motivation was calculated as the mean of intrinsic, and controlled motivation was calculated as the mean of external and introjected regulation [5].

To measure autonomous motivation and controlled motivation, we used the academic regulation scale of [6]. All items were provided Likert scale ranging from 1 (Totally not agree) to 5 (Totally Agree). Eighteen items were presented, including four constructs: six items for autonomous motivation and four items for controlled motivation [6], three items for perceived behavioral control [7], and five items for behavioral intention were adapted from Unified Theory of Acceptance and Use of Technology [8]. The construct and the description measurement are shown in Table 1.

TABLE I.   CONSTRUCTS AND DESCRIPTION

	Construct	Description of measurement
Independent Variables	Autonomous Motivation	Engaging inhabits that emanates from the self and is thought to be consistent with intrinsic goals or ends
	Controlled Motivation	Engaging inhabits for reasons that are externally referenced, such as gaining rewards or perceived approval from others or avoiding punishment or guilt
Mediating Variable	Perceived Behavior Control	Total control in practicing MOOC, up to you to practice, confidence can improve quality, up to you to improve the quality of MOOC
Dependent Variable	Behavior Intention	An indication of a person's willingness to engage in a given behavior.

D. Research Model and hypotheses

Figure 1 illustrates the model that will be validated as extracted from using SmartPLS to analyze the data. Here is the relationship between the independent variables to the dependent variables through the mediator. According to [9], "data analyzed by SmartPLS has two-step, mainly the assessment of the measurement model and structural model."

The hypotheses to be tested are:

H1. Autonomous motivation positively influences perceived behavioral control.

H2. Controlled motivation positively influences perceived behavioral control

H3. Perceived behavioral control positively influences behavioral intention
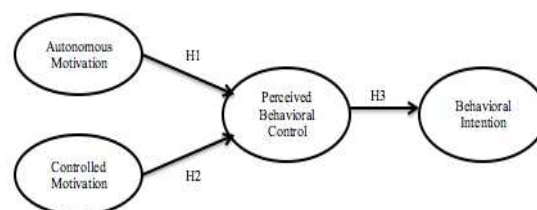
Fig. 1.   Research Model

III. RESULTS AND DISCUSSION

A. Assessment of Measurement Model

The measurement model is examined by looking at the relationship between the latent variable in the model before assessing the hypotheses and relationship. The model significance may be established based on numerous research that has been examined by analyzing indicator reliability, assessment of convergent Validity, and assessment of discriminant validity of the model. [10].

B. Indicator Reliability

The factor loading values are used to assess indicator reliability [10]. Based on [11], factor loadings that were above the threshold of 0.6 were significant. The final model, after showing that factor loading is considered satisfactory for all items, for further analysis is shown in Figure 2.
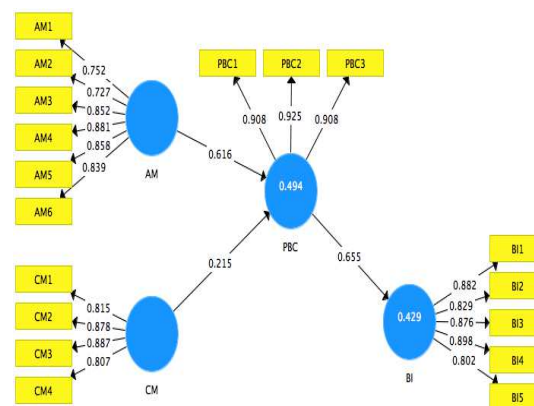
Fig. 2.   Measurement Model

170

C. Assessment of Convergent Validity

Convergent Validity is the degree to which one measure of a concept correlates favorably with other measures of that factor [12]. Convergent Validity is established where the average variance (AVE) values for every item are over 0.5, and the composite reliability (CR) values are above 0.7, suggesting greater levels of reliability [13]. These values are illustrated in Table 2.

TABLE II.   Factor Loadings, AVE, CR, and Cronbach's alpha

	Composite Reliability	Item Loading	AVE	Cronbach's Alpha
Autonomous Motivation	0.925		0.673	0.902
AM1		0.752		
AM2		0.727		
AM3		0.852		
AM4		0.881		
AM5		0.858		
AM6		0.839		
Controlled Motivation	0.910		0.718	0.868
CM1		0.815		
CM2		0.878		
CM3		0.887		
CM4		0.807		
Perceived Behavior Control	0.938		0.835	0.901
PBC1		0.908		
PBC2		0.925		
PBC3		0.908		
Behavioral Intention	0.933		0.737	0.910
BI1		0.882		
BI2		0.829		
BI3		0.876		
BI4		0.898		
BI5		0.802		

D. Assessment of Discriminant Validity

Discriminant validity in this context means that construct should have average variance (AVE) values higher than the highest squared correlation of the construct with others in the same framework. In this study, [14] criterion was used in which a construct had to contribute to more variation among its assigned indicators than any other of construct [15].

TABLE III.   Discriminant Validity Using Fornell-Larcker Criterion

	AM	BI	CM	PBC
AM	**0.820**			
BI	0.721	**0.858**		
CM	0.260	0.414	**0.847**	
PBC	0.672	0.655	0.375	**0.914**

Table 3 indicated that endogenous construct to be satisfactory when values higher than the highest squared correlation of the construct with others in the same framework.

E. Structural Model Evaluation

The structural model with the relevant path coefficients and standard errors, are shown in figure 3 structure model. The significance of the values for a 95% confidence level is outlined in table 4.

This model is also used to describe the importance of the hypothesized relationship between autonomous motivation, controlled motivation, perceived behavior control, and behavior intention.

Fig. 3.   Structure Model

Table 4, show the mean deviation, t-statistic and p-value for path coefficient and standard error of the path for the structural model using the PLS-algorithm and bootstrapping process in SmartPLS 3.0 for the relationship between autonomous motivation, controlled motivation, perceived behavior control and behavior intention.

According to [11], the t-statistic of the path coefficients compared were calculated. T-statistic for all relationship of constructs was significant with value is above 1.96. P-value for all relationship of constructs was significant (< 0.05).

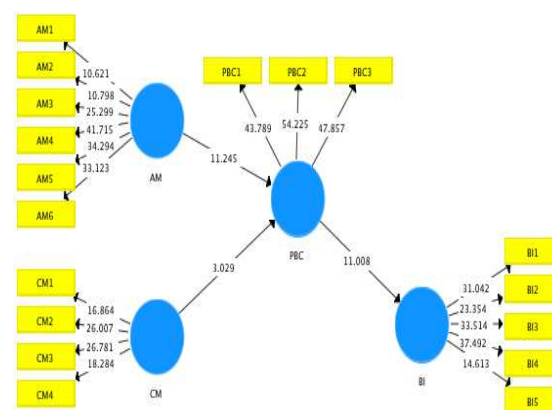From hypotheses 1, 2 that autonomous motivation and controlled motivation positively influences perceived behavioral control has a significant supported. [16] said that autonomous motivation and controlled motivation given attitudes linked to approach-oriented method to achieving that performance, and intention to engage in the long term.

TABLE IV.   Path coefficient relationship and Standard Error

Authorized licensed use limited to: UNIVERSITY OF TWENTE.. Downloaded on December 27,2021 at 11:12:55 UTC from IEEE Xplore. Restrictions apply.

Hypothesis	Relationship	Original Sample (O)	Sample Mean (M)	Standar Deviation (STDEV)	T-Statistic	P-Values	Desicion
H1	Autonomous Motivation → Perceived Behavioral Control	0.616	0.617	0.055	11.245	0.000	Supported
H2	Controlled Motivation → Perceived Behavioral Control	0.215	0.216	0.071	3.029	0.003	Supported
H3	Perceived Behavioral Control → Behavioral Intention	0.655	0.660	0.059	11.00	0.000	Supported

IV. CONCLUSION

This study demonstrates that students' autonomy has a significant factor in deciding their willingness to participate in MOOCs. As a result, the designer of MOOCs should continue to emphasize a learner-centered approach that encourages learners' autonomous and controlled personalization of the MOOC system.

The contribution of this study is for the body of knowledge and to the practice. Practice can help institutions initiate MOOC-based online education, as well as improve student participation and engagement.

Despite the autonomous and controlled environment of massive open online courses, the study reveals that facilitation and supervision are still required during MOOC learning to ensure good learner intention. When creating an effective online learning environment in MOOC design, institutions should take all of these characteristics factors, and the programs offered can be both effective and motivating the learners.

REFERENCES

[1] Mazoue, J. G. (2014). The MOOC Model: Challenging traditional education. *EDUCAUSE review online*. Retrieved from http://www.educause.edu/ero/article/mooc-model-challengingtraditional-education.

[2] Che, X., Luo, S., Wang, C., & Meinel, C. (2016). An attempt at MOOC localization for Chinese-speaking users. *International Journal of Information and Education Technology, 6*(2), 90-96.

[3] Rai, L., & Chunrao, D. (2016). Influencing factors of success and failure in MOOC and general analysis of learner behavior. *International Journal of Information and Education Technology, 6*(4), 262-268.

[4] Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*(1), 54-67.

[5] Elliot, A. J., Sheldon, K. M., & Church, M. A. (1997). Avoidance personal goals and subjective well-being. Personality and Social Psychology Bulletin, 23, 915–927.

[6] R Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. Journal of Personality and Social Psychology, 57, 749–761.

[7] Taylor, S., & Todd, P. A. (1995). Understanding information technology usage: A test of competing models. *Information Systems Research, 6*(2), 144–176.

[8] Venkatesh, V., James Y. L. Thong and Xin, Xu (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. MIS Quarterly, 36(1), pp. 157 - 178.

[9] Henseler, J., & Fassott, G. (2010). Testing moderating effects in PLS path models: An illustration of available procedures. In *Handbook of partial least squares* (pp. 713-735). Springer Berlin Heidelberg.

[10] Ringle, C. M., Sarstedt, M., & Straub, D. (2012). A critical look at the use of PLS-SEM in MIS Quarterly. *MIS Quarterly* (MISQ), 36(1).

[11] Chin, W. W. (2010). How to write up and report PLS analyses. In *Handbook of partial least squares* (pp. 655-690). Springer Berlin Heidelberg.

[12] Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing theory and Practice, 19*(2), 139-152.

[13] Nunnally, J. C., & Bernstein, I. H. (1994). The assessment of reliability. *Psychometric theory*, 3(1), 248-292.

[14] Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of marketing research*, 382-388.

[15] Urbach, N., & Ahlemann, F. (2010). Structural equation modeling in information systems research using partial least squares. *JITTA: Journal of Information Technology Theory and Application*, 11(2), 5.

[16] Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press.