Design and Development of Customer Support System using automation

Abdullah Said Saif Al Shidhani[1], Raza Hasan[1] and Salman Mahmood[2]

[1]Department of Computing, Middle East College, Muscat, Oman.

[2]Department of Information Technology, School of Science and Engineering, Malaysia University of Science and Technology, Selangor, Malaysia

ABSTRACT

When an organization provides a variety of services and it has several clients across the nation and at an international level, then it gets difficult to manage all the customers through face to face interaction. Moreover, as the COVID-19 spread, it becomes impossible to have face to face interaction and social distancing is required. Manually over the emails phone calls, it gets complex to manage the customers and solve their issues. The project is going to be designed and developed for the organization and its customers. Employees will be able to cater for the problems faced by the customers and by doing this quality of service will be enhanced. The organization will be helped to solve the complaints of the customers and to develop teamwork in the organization. The research will be having a database that can store thousands of queries of customers. By using this system organization will be able to identify the frequently occurring issues. This will increase the efficiency and security of the system for customer support. It will automate the tasks and processes, employees of the organization will be using the system remotely from the houses which will facilitate to have social distancing. The system will be automatically managed without the involvement of employees and employees can instantly get the solution to their problem.

Introduction

Olive Mid East is s one of the leading organizations in Oman which is providing software services to different customers not in Oman but also at international level. The organization develops user centric solutions for different businesses so that they can run business in a better way. Every day, there are many customers of organization which done different deals with them. When organization provides variety of services and it has variety of clients across the national and at international level, then it gets difficult to manage all the customers through face to face interaction(de Carvalho, Bartholo, and Duarte 2016). Customer support automation system will be designed. System will be Android-based involving customers and employees. As previously there are few application mostly systems are web based system. Due to COVID19 customer do not have face to face interaction due to which they faced problems so the system will help customers in providing solutions to their problems.

Literature Review

(Willcocks, Lacity, and Craig 2017) describes in their research that companies are suing different technologies to interact with their customers. They are moving towards automatic approach for dealing the customers. There is a common technique of rule-based service. This technique is implemented where high performing hum robot teams is created to interact with the customers automatically. This approach requires a lot of financial services for an organization develop the robotics but again there is team required for managing the activities performed by the robots. This research paper provides a view about the practical hardware-based technique for automatically dealing with the customers. This technique will not be sued in the current project because of economic feasibility as if it will be adopted it can make project becomes economical infeasible. Sometimes different problems can occur which might can become difficult for the robotic team to solve out.

The research of (Aniket Dole et al. 2015), elaborated about the voice recognition technique in the help desk management system. The paper has use machine learning algorithm for voice recognition. Help management system, takes the analyses of voice and try to solve the problem by understanding the voice of the customers and his words

which are uttered. This technique is inappropriate in the system as voice recognition system becomes unable to understand the voice if the user is in a hurry area or if around him there is a lot of noise. So system and customer should be in a specific environment for system to work. But in most of the scenarios it is not possible to be in such a environment where there is a lot noise, therefore this research has huge drawback.
This paper highlighted why voice recognition is not suitable in such type of systems where help is demanded. So, when system will be developed this technique would be avoided.
Another research is given by(Thayananthan 2019). The system has authentication and verification. Before taking queries from the customer, it is necessary that customer is legitimate or not. Customer identification process is important for help desk system otherwise illegitimate customers can make system unavailable for the legitimate customers. This can raise a question on the security of the system. The research states about the modules which are required for the customer help automation system. The main features to be in the system are input modules, connecting with customer and output module. The research indicates that the important module is ticking system in the help desk system. Through this module system collects the information of customers and track them. The interaction is done through emails, and channels of communications. The record of the customers are tracked down. By using this module, system can solve customer problems.
This paper provide help for the current project regarding the functional requirements. Ticking module is another module required to be in the customer help automation system. By using this module system will be able to track the records of the customer.
In the research of (Gebert et al. 2003), customer relationship management system is analyzed. The research states that financial service providers need this system to interact with the customers. Architecture of the CRM system is proposed by the paper which focuses on the system level and process level approach. There are different approaches of organizations towards CRM. Management of CRM involves data of the customers, their previous history, their feedback and complains. Customer provides the feedback about the services and system response to it.
The research presented by (Pohludka, Stverkova, and Ślusarczyk 2018) provides information about the implementation of customer management system. As per the research implementation of the system is most concerned while development of it. The research has implemented customer management system but before that interview and survey was conducted form the customers. The survey provides the clear picture about the requirements which are needed by the customers. As system is going to be developed solely for the help of customers so their support and opinion is much needed step before implementation.
This paper provides a way of implementation of the current project, when current project will be developed before that requirements form the customers will be gathered.

Methodology

There is a need of changings at every stage in the customer help management. As it is seen from comparison that iterative model is suitable where feedback from customer is required (Gavilan, Vazquez and Camacho 2015). For management project requirements are changed accordingly so iterative model is suitable. Also risk assessment is important in these projects which are not possible by waterfall model so for development of this project we will use iterative methodology (K.U. Sarker et al. 2020)(Kamal Uddin Sarker 2020)(Raza Hasan, Sarker, and Deraman 2020)(Kamal Uddin Sarker et al. 2019)(AL Hamdania et al. 2020)(K.U. Sarker, Deraman, and Hasan 2018)(Khalifa 2019).

Design and Implementation

Figure 1. shows use case diagram of the application.

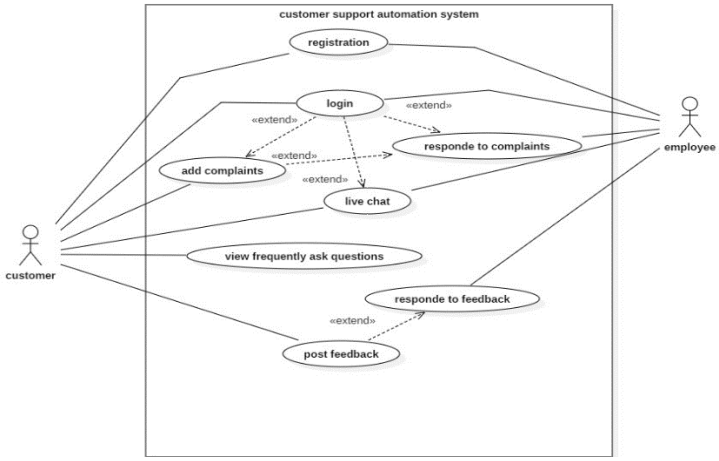

Figure 1. Use Case Diagram.

Figure 2. shows data flow diagram (DFD Level 0).

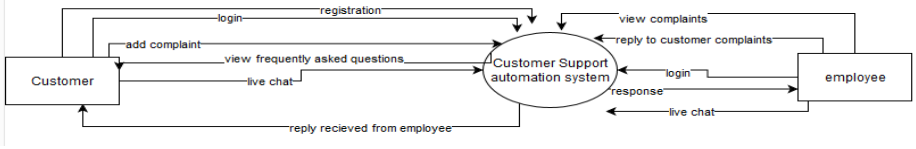

Figure 2. DFD Level 0.

Figure 3. shows data flow diagram (DFD Level 1).

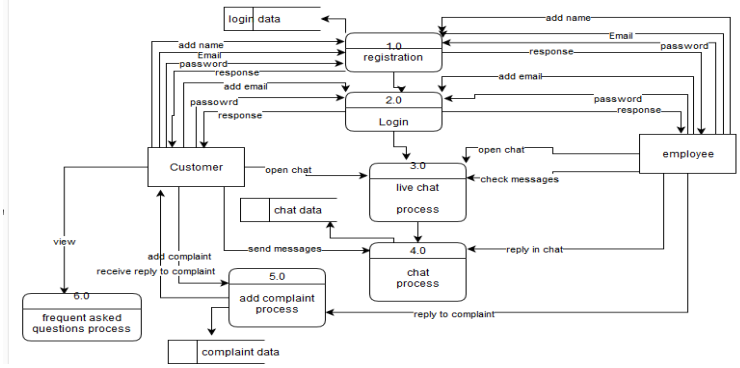

Figure 3. DFD Level 1.

Figure 4. shows the entity relationship diagram.

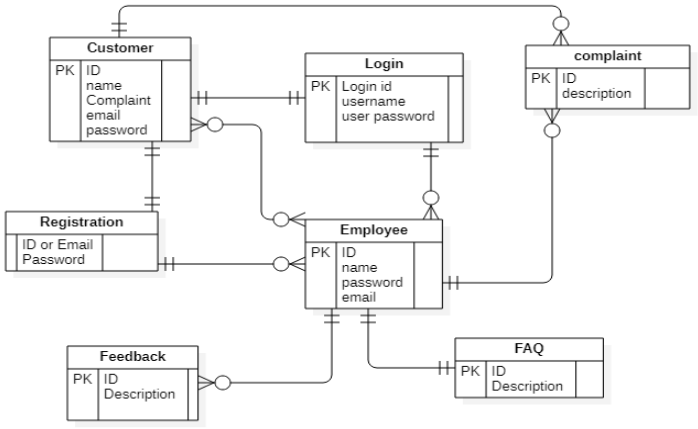

Figure 4. ERD Diagram.

Figure 5. shows the registration screen, Figure 6. Shows login screen and Figure 7. Shows the main screen of the application developed as the first prototype.

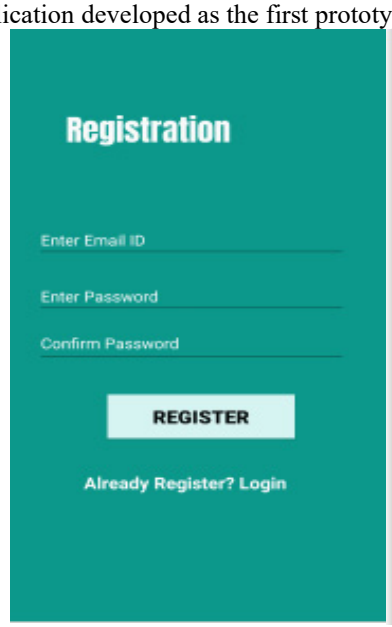

Figure 5. Registration Screen.

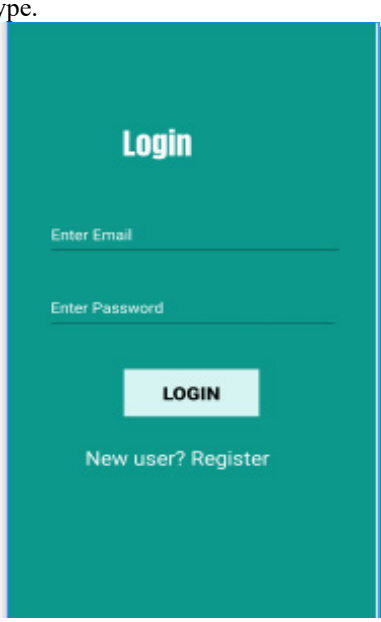

Figure 6. Login Screen.

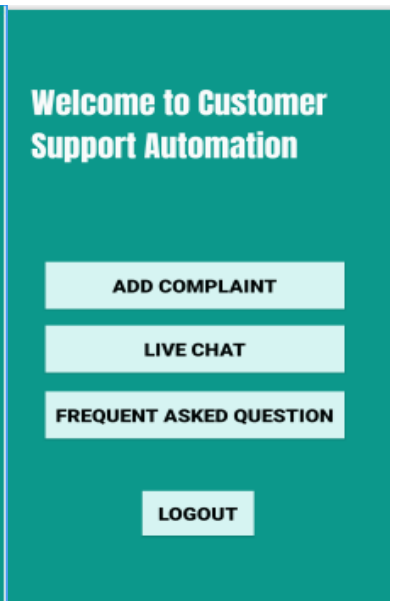

Figure 7. Main Screen.

Results and Discussion

Different questionnaires are developed based on the system and distribute among the different organizations and gathered different responses define in the section below. The questionnaire development method was Google form. The percentage analysis method is used for finding the results of the response.

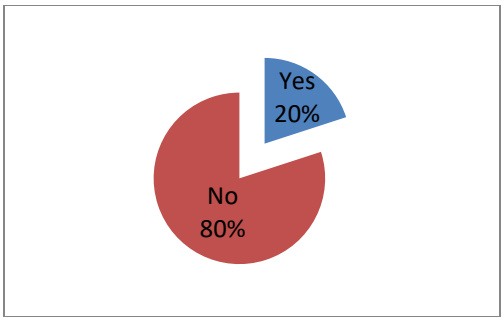

Figure 8. Question 1.

Figure 8. shows the result of the above pie chart clearly shows that the majority organization 80% does not use any customer support system and only 20% organization has a customer support system.

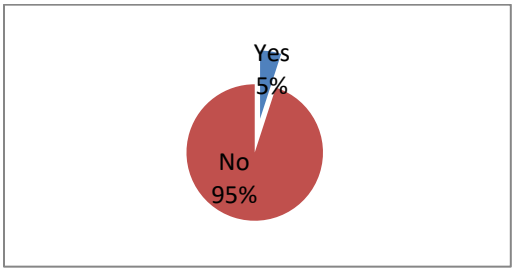

Figure 9. Question 2.

This question is asked because those organizations that already use customer support system having a tracking system for customer or not. Only 5% organization responds that their system contains customer record tracking feature as shown in Figure 9.

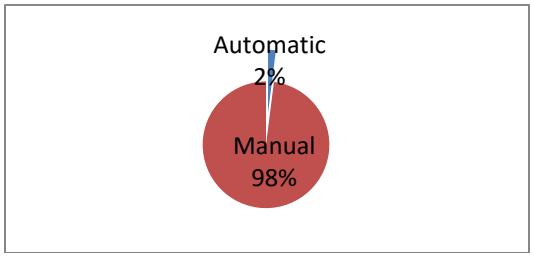

Figure 10. Question 3.

Figure 10. shows that only 2% organization uses automatic customer support system while others use manual based customer support system that is managed by the organization database administrator.

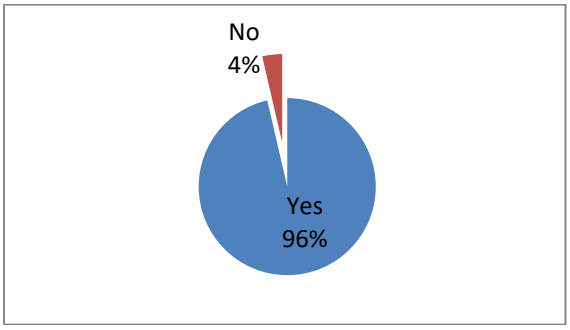

Figure 11. Question 4.

This question is added into the questionnaire to recognize thinking of people that automatic customer helpful for their business or not. The result of this question shows that 96% of people think that automatic customer support systems are useful for their business and only 4% disagree with this point as shown in Figure 11.

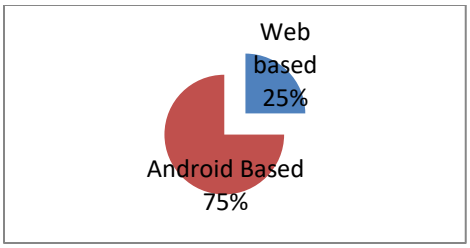

Figure 12. Question 5.

This question is included due to recognizing the demand of the system, either web based or android based is suitable for an organization. The majority of the organizations (75%) want an android based system rather than web based as shown in Figure 12.

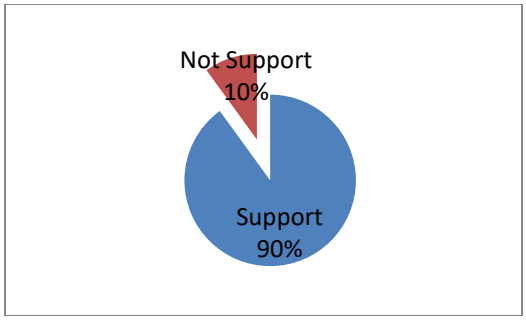

Figure 13. Question 6.

This question is included to find out that organization wants an automatic chart feature in the system or not and the majority of the organization (90%) want a chat feature in the system and only 10 % do not want this feature because they may think the system does not understand what is the major problem of the customer as shown in Figure 13.

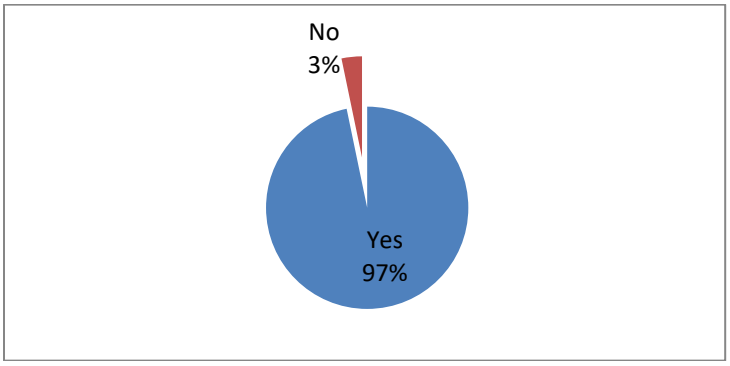

Figure 14. Question 7.

To check the probability of usage of a system this question is included in the questionnaire and the majority of the organization says yes to use this system because of its advantages (97%). Only 3% do not want to use this system because they already have a manual customer support system and they prefer to use the manual support system as shown in Figure 14.

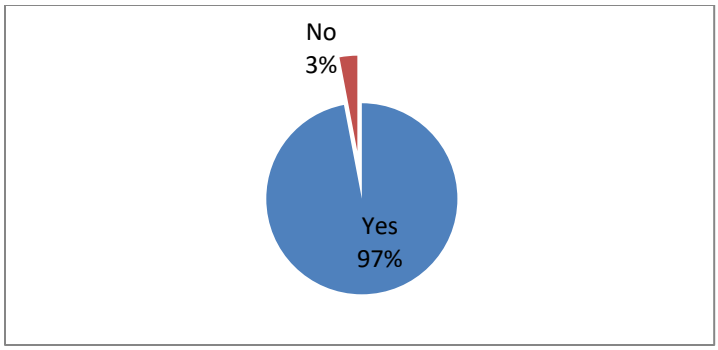

Figure 15. Question 8.

This question is included in the questionnaire because it is necessary to discover that the organization support customer posting on the system not. Customers can connect easily with the organization by using this feature of the system and get feedback from the system automatically. The result of this question clearly shows that 97% of organizations want this feature in the system as shown in Figure 15.

The result of the above analysis clearly shows that it is the need of time to develop an automatic customer support system that helps the organization to deal with customer problems and keep track of customer records. Few organizations already use manual customer support systems but they are not an automatic system and need to develop an android based system because of organization demand. In the manual system, the organization must retain one person on the system to monitor customer complaints and providing feedback to the clients but an automatic system deals with the customer itself, and in this way, this system will enhance the reputation of the organization plus reduce human load. The developed system also ensures the security of both including customers and the organization itself.

Conclusion

The project is going to be designed and developed for the organization and its customers. Employees will be able to cater the problems faced by the customers and by doing this quality of service will be enhanced. Organization will be helped to solve the complaints of the customers and to develop teamwork in the organization. The project will be having a database which can store thousands of queries of customers. By using this system organization will be able to identify the frequently occurring issues. The contribution of the system will be towards the customer sector of the business. It will increase the efficiency and security of the system for customer support. It will automate the tasks and processes, employees of the organization will be use the system remotely form the houses which will facilitate to have social distancing. The system will be automatically managed without involvement of employees and employees can instantly get the solution of their problem. The contribution of the system will be towards the customer sector of the business. It will increase the efficiency and security of the system for customer support. It will automate the tasks and processes, employees of the organization will be use the system remotely form the houses which will facilitate to have social distancing. The system will be automatically managed without involvement of employees and employees can instantly get the solution of their problem.

Limitation is the security mechanism which can be enhanced further to secure the data and can be helpful in making an e-commerce application capabilities for future(R. Hasan et al. 2015a)(R. Hasan et al. 2015b)(R. Hasan, Mahmood, and Raghav 2012).

Data stored in the application can be useful to do predictive analysis using churn prediction to keep track of the registered users. Also, learning material availability can also help users to enhance their capabilities to excel for their future(Siddiqui et al. 2012)(Raza Hasan and Mahmood 2012)(R. Hasan, Ali, and Hayat 2015)(Bhatti et al. 2017)(Raza Hasan et al. 2019)(Hayat et al. 2018)(Raza Hasan et al. 2018)(Al Raisia et al. 2020)(Naidu et al. 2020)(Mahmood et al. 2019)(R. Hasan et al. 2019)(Mohammed et al. 2019)(Raza Hasan et al. 2019)(Mustafa et al. 2019)(Raza Hasan, Palaniappan, Mahmood, Naidu, et al. 2020)(Sattar et al. 2020)(Raza Hasan, Palaniappan, Mahmood, Abbas, et al. 2020)(Raza Hasan, Palaniappan, Mahmood, Sarker, et al. 2020)(Agarwal et al. 2021).

Acknowledgements
We would like to thank Middle East College, Department of Computing for the support.

References

Agarwal, Aparna et al. 2021. "Educational Association Mining on the Use of Media Platforms for E-Learning." In *Proceedings of 2nd International Conference on Computation, Automation and Knowledge Management, ICCAKM 2021*,.

Aniket Dole, Hrushikesh Sansare, Ritesh Harekar, and Sprooha Athalye. 2015. "Intelligent Chat Bot for Banking System." *International Journal of Emerging Trends & Technology in Computer Science (IJETTCS*.

Bhatti, A.H., R. Hasan, A.A. Farsi, and S.I.A. Kazmi. 2017. "Dynamic Technology Tool to Support Active Learning in Mathematics." In *Proceedings - 2017 International Symposium on Educational Technology, ISET 2017*,.

de Carvalho, J.B., R. Bartholo, and F. Duarte. 2016. "Hospitality Experience: Creating Value by the Front-Desk Work Analysis and Organizational Innovation." *Tékhne*.

Gavilan, Francisco, Rafael Vazquez, and Eduardo F Camacho. 2015. "An Iterative Model Predictive Control Algorithm for UAV Guidance." *IEEE Transactions on Aerospace and Electronic Systems* 51(3): 2406–19.

Gebert, Henning, Malte Geib, Lutz Kolbe, and Walter Brenner. 2003. "Knowledge-Enabled Customer Relationship Management: Integrating Customer Relationship Management and Knowledge Management Concepts[1]." *Journal of Knowledge Management*.

AL Hamdania, Halima et al. 2020. "Design and Implementation of Educational Application for Directorate of Traffic Safety, Oman." *Journal of Student Research*.

Hasan, R. et al. 2019. "SMART Virtual Dental Learning Environment." In *2019 4th MEC International Conference on Big Data and Smart City, ICBDSC 2019*,.

Hasan, R., S.I. Ali, and M.S. Hayat. 2015. "Enhancing Student's Learning Experience at Middle East College by Using Blended Learning." In *Proceedings of the 2015 Science and Information Conference, SAI 2015*,.

Hasan, R., S. Mahmood, M.S. Hayat, and S.I. Ali. 2015a. "Consumption of E-Banking Services by Consumers in Pakistan." In *IEEE International Conference on Circuit, Power and Computing Technologies, ICCPCT 2015*,.

———. 2015b. "Role of Financial Institutions in Boosting E-Banking in Pakistan." In *2015 2nd World Symposium on Web Applications and Networking, WSWAN 2015*,.

Hasan, R., S. Mahmood, and A. Raghav. 2012. "Overview on Computer Forensics Tools." In *Proceedings of the 2012 UKACC International Conference on Control, CONTROL 2012*,.

Hasan, Raza et al. 2018. "Student Academic Performance Prediction by Using Decision Tree Algorithm." In *2018 4th International Conference on Computer and Information Sciences: Revolutionising Digital Landscape for Sustainable Smart Society, ICCOINS 2018 - Proceedings*, IEEE, 1–5. https://ieeexplore.ieee.org/document/8510600/.

———. 2019. "Enhancing the Teaching and Learning Process Using Video Streaming Servers and Forecasting Techniques." *Sustainability (Switzerland)* 11(7): 2049. https://www.mdpi.com/2071-1050/11/7/2049.

Hasan, Raza, Sellappan Palaniappan, Salman Mahmood, Vikas Rao Naidu, et al. 2020. "A Review: Emerging Trends of Big Data in Higher Educational Institutions." In *Lecture Notes in Networks and Systems*, , 289–97. http://link.springer.com/10.1007/978-981-15-2329-8_29.

Hasan, Raza, Sellappan Palaniappan, Salman Mahmood, Kamal Uddin Sarker, et al. 2020. "Modelling and Predicting Student's Academic Performance Using Classification Data Mining Techniques." *International Journal of Business Information Systems* 34(3): 403–22.

Hasan, Raza, Sellappan Palaniappan, Salman Mahmood, Ali Abbas, et al. 2020. "Predicting Student Performance in Higher Educational Institutions Using Video Learning Analytics and Data Mining Techniques." *Applied Sciences (Switzerland)*.

Hasan, Raza, and Salman Mahmood. 2012. "Survey and Evaluation of Simulators Suitable for Teaching for Computer Architecture and Organization Supporting Undergraduate Students at Sir Syed University of Engineering & Technology." In *Proceedings of the 2012 UKACC International Conference on Control, CONTROL 2012*, , 1043–45.

Hasan, Raza, Kamal Uddin Sarker, and Aziz Deraman. 2020. "Ontological Practice for Software Quality Control." *International Journal of Business Information Systems*.

Hayat, M., Raza Hasan, S. Imran Ali, and Mohammed Kaleem. 2018. "Active Learning and Student Engagement Using Activity Based Learning." In *2017 International Conference on Infocom Technologies and Unmanned Systems: Trends and Future Directions, ICTUS 2017*, IEEE, 201–4.

http://ieeexplore.ieee.org/document/8286005/.
Khalifa, Najat. 2019. "ENHANCING MENTORING BETWEEN ALUMNI AND STUDENTS AT MIDDLE EAST COLLEGE: AN ANDROID MOBILE APPLICATION USING DATA MINING TECHNIQUES." *International Journal of Advanced Research in Computer Science* 10(3): 84–88. http://www.ijarcs.info/index.php/Ijarcs/article/view/6440.
Mahmood, Salman et al. 2019. "Raspberry PI and Role of IoT in Education." In *2019 4th MEC International Conference on Big Data and Smart City (ICBDSC)*, IEEE, 1–6. https://ieeexplore.ieee.org/document/8645598/.
Mohammed, Qais Ali et al. 2019. "DIGITAL EDUCATION USING FREE AND OPEN SOURCE TOOLS TO ENHANCE COLLABORATIVE LEARNING." *IJAEDU- International E-Journal of Advances in Education* 13: 50–57.
Mustafa, Muhammad et al. 2019. "A FRAMEWORK FOR COLLABORATIVE AND ACTIVE LEARNING FOR ENHANCING STUDENT ENGAGEMENT." *IJAEDU- International E-Journal of Advances in Education*.
Naidu, Vikas Rao et al. 2020. "Using Free and Open Source Tools in Smart Solution Development for the Agriculture Sector in Oman." *Journal of Student Research*.
Pohludka, Michal, Hana Stverkova, and Beata Ślusarczyk. 2018. "Implementation and Unification of the ERP System in a Global Company as a Strategic Decision for Sustainable Entrepreneurship." *Sustainability* 10(8): 2916. http://www.mdpi.com/2071-1050/10/8/2916.
Al Raisia, Juhaina et al. 2020. "Role of Interactive Multimedia to Support MOOC for Enhanced E-Learning in the Higher Education Sector in Oman." *Journal of Student Research*.
Sarker, K.U., A. Bin Deraman, R. Hasan, and A. Abbas. 2020. "SQ-Framework for Improving Sustainability and Quality into Software Product and Process." *International Journal of Advanced Computer Science and Applications* 11(9).
Sarker, K.U., A.B. Deraman, and R. Hasan. 2018. "Descriptive Logic for Software Engineering Ontology: Aspect Software Quality Control." In *2018 4th International Conference on Computer and Information Sciences: Revolutionising Digital Landscape for Sustainable Smart Society, ICCOINS 2018 - Proceedings*,.
Sarker, Kamal Uddin. 2020. "Explicit Specification Framework to Manage Software Project Effectively." *Indian Journal of Science and Technology*.
Sarker, Kamal Uddin, Aziz Bin Deraman, Raza Hasan, and Ali Abbas. 2019. "Ontological Practice for Big Data Management." *International Journal of Computing and Digital Systems*.
Sattar, Mian Usman et al. 2020. "Motivating Medical Students Using Virtual Reality Based Education." *International Journal of Emerging Technologies in Learning*.
Siddiqui, Osama Ahmed, Raza Hasan, Salman Mahmood, and Asim Rasheed Khan. 2012. "Simulators as a Teaching Aid for Computer Architecture and Organization." In *2012 4th International Conference on Intelligent Human-Machine Systems and Cybernetics*, IEEE, 110–13. http://ieeexplore.ieee.org/document/6305637/.
Thayananthan, Vijey. 2019. "Healthcare Management Using ICT and IoT Based 5G." *International Journal of Advanced Computer Science and Applications* 10(4). http://thesai.org/Publications/ViewPaper?Volume=10&Issue=4&Code=IJACSA&SerialNo=37.
Willcocks, Leslie, Mary Lacity, and Andrew Craig. 2017. "Robotic Process Automation: Strategic Transformation Lever for Global Business Services?" *Journal of Information Technology Teaching Cases*.