

Editorial

*Turkish Journal of Electromechanics & Energy in its Fifth Year,
and Portrait of a Pioneer in Engineering: Al-Jazari*

June, 2020

We are proud to present the fifth volume of Turkish Journal of Electromechanics & Energy (TJEE). During this five years' journey, we appreciate our authors, reviewers and editorial board members for their contribution in our endeavour.

The current issue of the TJEE (Vol 5, No:1 January-June 2020) consists of five articles. Two of these articles have been selected from the ICADET-2019 conference which was held in Bayburt, Turkey during September 19-21, 2019. The first study by Güney et al. addresses temperature control of an electric furnace with intuitive control methods. The second paper by Tozlu et al. studies the thermoeconomic analyses of a power plant. The third study by Tekbaş et.al. addresses ageing experiments of mastics and silicones used in bonding of range hood glass. The forty study by Yaman et. al. addresses vibration characteristics analysis of adhesively bonded different joints. The fifty study by Ghayad et al. addresses a new efficient self-adjusting PSO algorithm to enhance reactive power response of VSC-HVDC system.

As we go through our fifth year, we aim TJEE to be indexed in respected databases. A good news which encourages us is that our journal has been included in ROAD, Semantic Scholar, DRJI, and Egyptian Knowledge Bank databases.

This volume's commemoration is devoted to Abu'l-'Izz ibn Ismā'īl ibn ar-Razāz al-Jazarī, or shortly Al-Jazari, who was an inventor and famous for engineering solutions. He lived in the Golden Age of Islam during 13th century. He is regarded as "master of water", and founder of the robotics due to the mechanisms he devised and built. Even though there is no consensus, it is widely accepted that he lived in 1136-1206 period when Artuqids ruled the Eastern Anatolia and Al-Jazeera. The name "Jazari" refers to peninsula of Mesopotamia (the region between Euphrates and Tigris rivers) where he lived. In some sources, it was claimed that he was born and lived in Cizre (called also as Jazeera), a territory belongs to Diyarbakır Sanjak during Ottoman Empire period, currently a town of Şırnak city in south east of Turkey.

Al-Jazari, as his father before him, served as served a mechanical engineer for the Artuqid kings of Diyarbakir for several decades (at least between 1174-1200). Prior to his death, he completed an outstanding book on engineering entitled "Al-Jami' bayn al-'ilm wa-'l-'amal al-nafi' fi sinat'at al-hiyal" (Compendium on the Theory and Practice of the Mechanical Arts) in Arabic [1-3]. In his book, Al-Jazari described about fifty mechanical devices in six different including water clocks, protractor, a door locking mechanism, hand washing device (a wudhu machine) and machines for raising water,

etc. [4]. Famous science historian Fuat Sezgin noted that “He described 50 machines and objects in total with an engineering point of view. He elaborated 50 of those machines in complete manner, and approximately a hundred of those with detailed pictures so that those can be manufactured without too much difficulty” [5]. Figure 1 shows some of the mechanisms from his book.

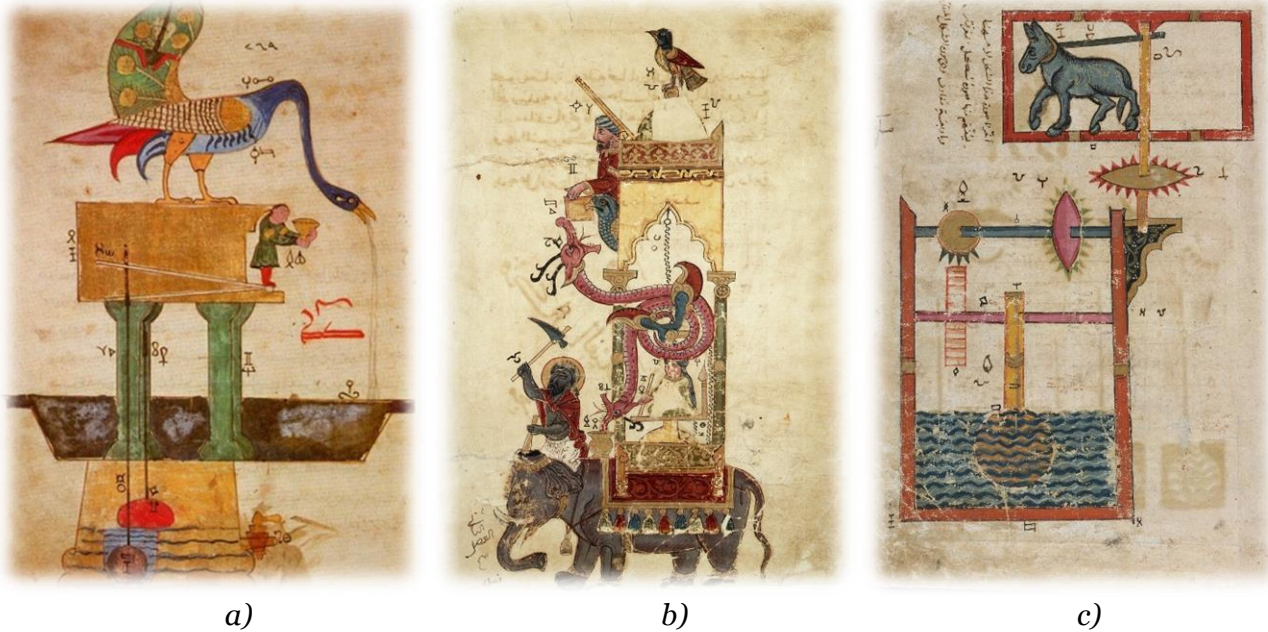


Fig. 1. Examples to Al-Jazari's machines, a) Wash basin design in the form of peacock [2], b) Elephant clock [6], c) A waterwheel mechanism powered by an animal [7].

“Elephant water clock” is one of his famous and intricate designs (Fig 1.b) which has been reproduced by others a lot [8]. The clock works as follows “every half hour, the bird on the dome whistled; the man below dropped a ball into the dragon's mouth; and the driver hit the elephant with his goad” [6]. Waterwheels for different purposes were also designed and developed by Al-Jazari. In one of them, it is used for raising water from pools or wells using a donkey which moves around the pole with the lever arm attached to its neck; its motion causes the wheels to rotate, thus raising the large ladle out of the water at regular intervals. The water is then discharged into the irrigation channel [7].

References and suggested further reading:

- 1- Abu 'l-'Ezz Ibn Isma'il ibn Al-Razzāz Al-Jazari, "Compendium on the theory and practice of the mechanical arts: Al-Jami' bain al-'ilm wa-l-'amal an-nafi' fi sina'at al-hiyal", (with the Arabic, and English Introductions by Fuat Sezgin), Institute for the History of Arabic-Islamic Science, Frankfurt am Main, 2002.
- 2- Al-Hassani, Salim T. S. , “Al-Jazari: The Mechanical Genius”, published on February 9th, 2001 at <https://muslimheritage.com/al-jazari-the-mechanical-genius/>
- 3- Hill, D.R., “The Book of Knowledge of Ingenious Mechanical Devices”, Springer, Dordrecht and Boston, 1974.
- 4- Unat, Y., “Overview on al-Jazari and his Mechanical Devices”, Published on: 25th February 2008, Available at : <https://muslimheritage.com/overview-on-al-jazari-and-his-mechanical-devices/#ftn7>, Last access date: 03/09/2020.
- 5- Sezgin, F., “İslam'da Bilim ve Teknik”, Cilt:1, (Science and Technique in Islam, v.1), p.37, İstanbul Büyükşehir Belediyesi Kültür A.Ş. Yayınları, İstanbul, Nisan 2008.
- 6- The Metropolitan Museum of Art Collection, <https://www.metmuseum.org/art/collection/search/451402>, Last access date: 03/09/2020.
- 7- The Metropolitan Museum of Art Collection, <https://www.metmuseum.org/art/collection/search/451298>, Last access date: 03/09/2020.
- 8- Sezgin, F., “İslam'da Bilim ve Teknik”, Cilt:3, (Science and Technique in Islam, v.3), p.100-102, İstanbul Büyükşehir Belediyesi Kültür A.Ş. Yayınları, İstanbul, Nisan 2008.

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