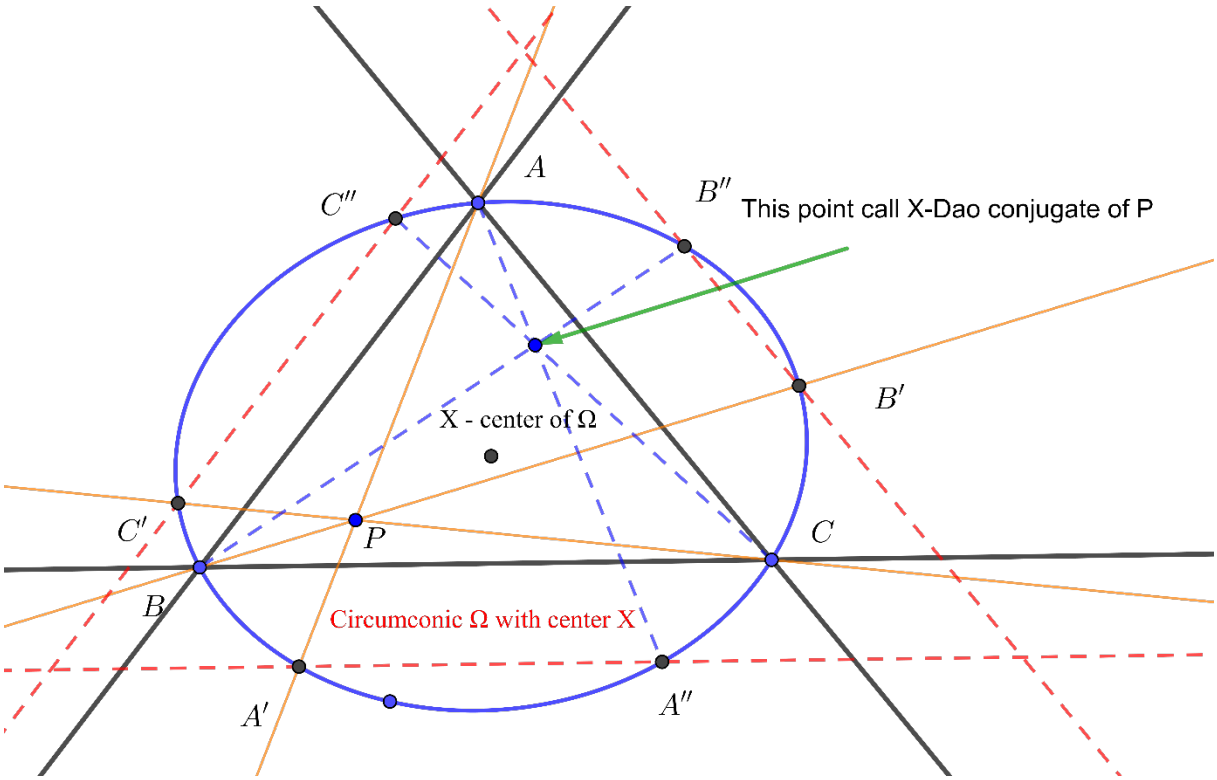
Dao Thanh Oai was born on January 10, 1986 in Vietnam. He is an engineer with many innovative solutions for Vietnam Electricity and has won a number of awards and titles from domestic organizations. For example, the first prize for creative ideas of Vietnam Electricity Group in 2019 and the third prize for scientific and technological innovation in 2022 [1]-[8].

He is also an amateur mathematician with a large number of remarkable discoveries in classical geometry. Some of the theorems named after him include: Dao's theorem on six circumcenter [9]-[11], Dao's eight circles theorem [12]-[14], Dao's theorem on conic [15][18] …… To date at least 39 discoveries have been named after him in the Encyclopedia of Triangle Centers [19]. In particular, there are now several of thousands of points in the Encyclopedia of Triangle Centers that relate to the concept of X-Dao conjugate [20]. I will have a few lines of introduction about X-Dao conjugate later.

It must be said that most of the classical geometry theorems named after individuals were extended by Dao Thanh Oai, some of them were extended in many ways or some results were generalizations of many theorems. In [11] Nguyen Tien Dung show that Dao's theorem on six circumcenter is a generalization of Kosnita's theorem. In [16] Tran Minh Ngoc show that Dao's theorem on conic is a generalization of 5 famous theorem, include: Droz-Farny line theorem, Goormaghtigh theorem, Zaslavsky theorem, Colling theorem, Carnot theorem, Bliss problem, Nixon theorem. In [21] Dao Thanh Oai given a result is a generalization of 5 famous theorem, include: Napoleon's theorem, Bottema's theorem, Van Aubel's theorem, Finsler–Hadwiger theorem, Brahmagupta theorem. Napoleon's theorem is extended by Dao Thanh Oai in many ways, you can see in [22]-[26]. In [25] Theorem 9.1 Dao Thanh Oai give a generalization of Tuker circles. Tucker circles a generalization of many circles as: Cosine Circle, circum circle, First Lemoine Circle, Gallatly Circle, Kenmotu Circle, Taylor Circle, Apollonius Circle, The Conway circles and Floor van Lamoen circle are also special case of Turker circle [26]. So it can be said that this result of Dao Thanh Oai also extends all these circles. From this general case, Dao Thanh Oai also found many new families of circles [25]. Dao Thanh Oai give generalization of Simson's line [28]-[30]. Dao Thanh Oai also give generaliztion of Sawayama Lemma and Thebault's theorem in [31]. Dao Thanh Oai give a generalization of Gosard's perspector in [32]-[33]. Dao Thanh Oai give a generalization of Pary circle [34]-[35] and Lester circle [34]-[37]. In [37], Dao Thanh Oai also give generalization of some other geometry classical theorem: Newton line theorem, Van Aubel theorem, first Droz-Farny circle.

Now let's go back to the concept of X- Dao conjugate: In may 2021, Dao Thanh Oai given a generalization of isogonal conjugate as follows: *Let $\triangle ABC$ be a triangle, P a point on its plane and Ω an arbitrary circumconic of $\triangle ABC$. Lines AP, BP, CP cut again Ω at A', B', C' respectively, and parallel lines through these points to BC, CA, AB cut Ω again at A", B", C" respectively. Then lines AA", BB", CC" concurent.*



If barycentric coordinates of the center X of Ω are X=x:y:z: and P=p:q:r , then D, the point of intersection of AA", BB", CC" is: D=D(X,P)=x∗(x−y−z)∗q∗r::

The point D above call the X-Dao conjugate of P, this conjugate is a generalization of all known kinds of conjugaties:

- When Ω is the circumcircle of ABC, X-Dao's conjugate become the isogonal conjugate of P.

- When Ω is the Steiner circumellipse of ABC, X-Dao's conjugate become the isotomic conjugate of P.

- When Ω is the circumconic of ABC with center X(1249), X-Dao's conjugate become the Polar conjugate of P.

Professor César Eliud Lozada is a person help him calculate the coordinates of the X-Dao conjugate [20][38]. Dao explains that the X-Dao conjugate is a special case of a theorem he discovered:

Theorem (Dao-[38]) - Let ABC be a triangle and Omega be arbitrary circumconic. Let two points Ab, Ac lie on BC; two point Bc, Ba lie on CA; two points Ca, Cb lie on AB. Let the lines AAb, AAc meet the circumconic again at A'b, A'c define B'c, B'a and C'a, C'b cyclically, let A'bA'c meets BC = A' define B', C' cyclically. Then A', B', C' are collinear if and only if Ab, Ac, Bc, Ba, Ca, Cb lie on a conic.

References

[1]- Kỹ sư Đào Thanh Oai và giải pháp mang lại giá trị làm lợi hàng chục tỷ đồng, available at https://petrotimes.vn/ky-su-dao-thanh-oai-va-giai-phap-mang-lai-gia-tri-lam-loi-hang-chuc-ty-dong-604897.html

[2]-Trung tâm Dịch vụ sửa chữa EVN đạt giải Nhất tại cuộc thi Ý tưởng sáng tạo trẻ, available at https://evnpsc.com.vn/d6/vi-VN/news2/Trung-tam-Dich-vu-sua-chua-EVN-dat-giai-Nhat-tai-cuoc-thi-Y-tuong-sang-tao-tre-1-702-87
[3]-Kỹ sư Đào Thanh Oai: Từ đam mê toán học đến sáng kiến làm lợi nhiều tỷ đồng, available at https://www.evn.com.vn/d6/vanhoa-evn/Ky-su-Dao-Thanh-Oai-Tu-dam-me-toan-hoc-den-sang-kien-lam-loi-nhieu-ty-dong-200-827-84593.aspx
[4]- Bí thư chi đoàn Đào Thanh Oai vinh dự nhận giải thưởng Lý Tự Trọng năm 2021, available at https://www.evn.com.vn/d6/vanhoa-evn/Ky-su-Dao-Thanh-Oai-va-giai-phap-mang-lai-gia-tri-lam-loi-hang-chuc-ty-dong-200-815-84511.aspx
[5]-Kỹ sư ngành điện với sáng kiến mới về công nghệ góp phần làm lợi hàng tỷ đồng, đạt giải thưởng cao, available at https://danviet.vn/ky-su-nganh-dien-voi-sang-kien-moi-ve-cong-nghe-gop-phan-lam-loi-hang-ty-dong-dat-giai-thuong-cao-20230602153020862.htm
[6]- Bài cuối: 'Chỉ mong là mắt xích cần mẫn để đất nước vươn xa, Available at https://baochinhphu.vn/bai-cuoi-chi-mong-la-mat-xich-can-man-de-dat-nuoc-vuon-xa-102289574.htm
[7]- EVN có 5 công trình đạt Giải thưởng Sáng tạo KHCN Việt Nam, https://baochinhphu.vn/evn-co-5-cong-trinh-dat-giai-thuong-sang-tao-khcn-viet-nam-102230630152545496.htm
[8]- Kỹ sư Đào Thanh Oai: "Còn sức là còn học hỏi và cống hiến", available at https://evn.com.vn/d/vi-VN/news/Ky-su-Dao-Thanh-Oai-Con-suc-la-con-hoc-hoi-va-cong-hien-60-846-503669
[9]- Dergiades, Nikolaos (2014). "*Dao's Theorem on Six Circumcenters associated with a Cyclic Hexagon*", Forum Geometricorum, Volume 14. pages. 243–246. ISSN 1534-1178
[10]- Telv, Cohl (2014). "*A Purely Synthetic Proof of Dao's Theorem on Six Circumcenters Associated with a Cyclic Hexagon*", Forum Geometricorum, Volume 14, pages 261–264. ISSN 1534-1178
[11]- Nguyen, Tien Dung (2017). "*A Simple proof of Dao's Theorem on Sixcircumcenters*", Global Journal of Advanced Research on Classical and Modern Geometries Volume 6, pages 58–61. ISSN 2284-5569
[12]- Dao, O.T.: Problem 3845, Crux Mathematicorum, 39, Issue May 2013
[13]- Nguyen Chuong Chi, A Purely Synthetic Proof of the Dao's Eight Circles Theorem, International Journal of Computer Discovered Mathematics (IJCDM), Volume 6, 2021, pp. 87–91, available at https://drive.google.com/file/d/1SzzAhzMjaH2iwtc-qxjlNqhbIDNUN6oZ/view
[14]- Ákos G.Horváth, A note on the centers of a closed chain of circles, available at https://arxiv.org/pdf/1804.10345
[15]- Nguyen Ngoc Giang, A proof of Dao theorem, Global Journal of Advanced Research on Classical and Modern Geometries, ISSN: 2284-5569, Vol.4, (2015), Issue 2, page 102-105, available at http://geometry-math-journal.ro/pdf/Volume4-Issue2/5.pdf
[16]-Tran Minh Ngoc, *A Purely Synthetic Proof of Dao's Theorem On A Conic And Its Applications*, International Journal of Computer Discovered Mathematics, November 2018, Volume 3, pp.145-152, available at https://www.journal-1.eu/2018/Tran-Minh-Ngoc-Synthetic-Proof.pdf
[17]- Tran Hoang Son, *A synthetic proof of Dao's generalization of Goormaghtigh's theorem*, Global Journal of Advanced Research on Classical and Modern Geometries, ISSN 2284-5569, volume 3, pages 125–129, available at http://geometry-math-journal.ro/pdf/Volume3-Issue2/8.pdf
[18]- Nguyen Minh Ha and Pham Nam Khanh, *Another simple proof of the Goormaghtigh theorem and the generalized Goormaghtigh theorem*, Journal of Classical Geometry, Volum 4, available at http://jcgeometry.org/Articles/Volume4/MinHaNamKhanh.pdf
[19]- César Eliud Lozada, Alphabetical index of terms in ETC, available at https://faculty.evansville.edu/ck6/encyclopedia/Alphabetical_Index.html
[20]- César Eliud Lozada, Preamble before X(44687)Encyclopedia of Triangle Centers, available at https://faculty.evansville.edu/ck6/encyclopedia/ETCpart23.html#X44687
[21]- https://mathoverflow.net/questions/374762
[22]- https://mathoverflow.net/questions/426823
[23]- Dao Thanh Oai, *Equilateral triangles and Kiepert perspectors in complex numbers*, Forum Geometricorum, 15 (2015) 105-114, ISSN 1534-1178
[24]- Dao Thanh Oai (2015). 99.09 A family of Napoleon triangles associated with the Kiepert configuration. The Mathematical Gazette, 99, pp 151-153
[25]- Dao Thanh Oai, Some new equilateral triangle in plane geometry, Global Journal of Advanced Research on Classical and Modern Geometries ISSN: 2284-5569, Vol.7, (2018), Issue 2, pp.73-91, available at http://geometry-math-journal.ro/pdf/Volume7-Issue2/5.pdf
[26]- H. Humenberger, B. Schuppar, M. de Villiers. Geometric Proofs and Further Generalizations of Dao Than Oai's Napoleon Hexagon Theorem, Global Journal of Advanced Research on Classical and

Modern Geometries, Vol.12, (2023), Issue 1, pp.158-168, available at https://geometry-math-journal.ro/pdf/Volume12-Issue1/10.pdf
[27]- https://mathoverflow.net/questions/363139
[28]- Nguyen Van Linh, Another synthetic proof of Dao's generalization of the Simson line theorem, Forum Geometricorum, 16 (2016) 57--61.
[29]- Nguyen Le Phuoc and Nguyen Chuong Chi (2016). 100.24 A synthetic proof of Dao's generalisation of the Simson line theorem. The Mathematical Gazette, 100, pp 341-345.
[30]- Leo Giugiuc, A proof of Dao's generalization of the Simson line theorem, tạp chí Global Journal of Advanced Research on Classical and Modern Geometries, ISSN: 2284-5569, Vol.5, (2016), Issue 1, page 30-32, available at http://geometry-math-journal.ro/pdf/Volume5-Issue1/4.pdf
[31]- Dao Thanh Oai, Another Generalization of the Sawayama and Thebault's Theorem, International Journal of Computer Discovered Mathematics (IJCDM) ISSN 2367-7775 c IJCDM September 2016, Volume 1, No.3, pp.36-39, available at https://journal-1.eu/2016-3/Dao-Thanh-Oai-Another-Generalization-pp.36-39.pdf
[32]- César Eliud Lozada, *Preamble before X(44687)*, Encyclopedia of Triangle Centers , available at https://faculty.evansville.edu/ck6/encyclopedia/ETCpart23.html#X44687
[33]- Vladimir Shelomovskii, Gossard perspector, Art of Problem Solving, available at https://artofproblemsolving.com/wiki/index.php/Gossard_perspector
[34]- Dao Thanh Oai, *A Simple Proof of Gibert's Generalization of the Lester Circle Theorem*, Forum Geometricorum, volume 14, pages 201–202, ISSN 1534-1178
[35]- Ngo Quang Duong, Generalization of the Lester circle, Global Journal of Advanced Research on Classical and Modern Geometries, Vol.10, (2021), Issue 1, pages 49–61, ISSN 2284-5569, available at http://geometry-math-journal.ro/wp-content/uploads/2021/01/5.pdf
[36]- César Eliud Lozada, *Preamble before X(42740)*, Encyclopedia of Triangle Centers, available at https://faculty.evansville.edu/ck6/encyclopedia/ETCpart22.html#X42740
[37]- Dao Thanh Oai, *Generalizations of some famous classical Euclidean geometry theorems*", International Journal of Computer Discovered Mathematics, Vol.1, (2016), Issue 3, pages 13–20, ISSN 2367-7775, available at https://www.journal-1.eu/2016-3/Dao-Thanh-Oai-Generalizations-pp.12-20.pdf
[38]-Dao Thanh Oai, *Is it a new discovery on conic section?*, Mathoverflow, available at https://mathoverflow.net/questions/392241