

# Prof. ÇAĞATAY CANDAN

## Personal Information

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## Biography

Cagatay Candan is a professor at the Department of Electrical & Electronics Engineering of Middle East Technical University, Ankara, Turkey. He received his B.S., M.S., and Ph.D. degrees, all in electrical engineering, from Middle East Technical University, Ankara, Turkey (1996), Bilkent University, Ankara, Turkey (1998) and Georgia Institute of Technology, Atlanta, USA (2004), respectively. His research interests include statistical signal processing and its applications in array signal processing, radar signal processing and communications.

## Education Information

Doctorate, Georgia Institute of Technology, College Of Engineering, Electrical And Computer Engineering Department, United States Of America 1998 - 2004

Postgraduate, Ihsan Dogramaci Bilkent University, Faculty Of Engineering, Elektrik-Elektronik Mühendisliği , Turkey 1996 - 1998

Undergraduate, Middle East Technical University, Odtu Muhendislik Fakultesi Ankara Kampusu, Elektrik-Elektronik Mühendisliği Bölümü, Turkey 1992 - 1996

## Foreign Languages

English, C1 Advanced

## Research Areas

Electrical and Electronics Engineering, Engineering and Technology

## Academic Titles / Tasks

Professor, Middle East Technical University, Faculty Of Engineering, Department Of Electrical And Electronics Engineering, 2015 - Continues

Associate Professor, Middle East Technical University, Faculty Of Engineering, Department Of Electrical And Electronics Engineering, 2010 - 2015

Assistant Professor, Middle East Technical University, Faculty Of Engineering, Department Of Electrical And Electronics Engineering, 2004 - 2010

## Advising Theses

Candan Ç., AN EFFICIENT METHOD FOR FUNDAMENTAL FREQUENCY ESTIMATION OF PERIODIC SIGNALS WITH HARMONICS, Postgraduate, U.ÇELEBİ(Student), 2020

Candan Ç., Koç S. S. , Low velocity moving target detection with synthetic aperture radar, Postgraduate, G.NARİN(Student), 2019

CANDAN Ç., Methods for source localization from time difference of arrival measurements and their performance improvement in ill-conditioned cases, Postgraduate, N.ÇELENK(Student), 2018

CANDAN Ç., Joint precoder and decoder design in multiuser downlink MIMO communications for common, private and common+private information transmission, Postgraduate, U.EZGİ(Student), 2017

CANDAN Ç., KOÇ S. S. , Subspace based radar signal processing methods for array tapering and sidelobe blanking, Postgraduate, D.DİNLER(Student), 2017

CANDAN Ç., Optimal multiple hypothesis testing with an application in side lobe blanker design and invariance applications in detection and synchronization, Doctorate, O.COŞKUN(Student), 2017

CANDAN Ç., Classification of human motion using radar micro-doppler signatures with hidden markov models, Postgraduate, M.ONUR(Student), 2016

CANDAN Ç., Application of F-test method on model order selection and related problems, Postgraduate, A.YAZAR(Student), 2015

CANDAN Ç., A comparison of sparse signal recovery and approximate bayesian inference methods for sparse channel estimation, Postgraduate, A.UÇAR(Student), 2015

CANDAN Ç., Dimension reduced robust beamforming for towed arrays, Postgraduate, E.TOPÇU(Student), 2015

CANDAN Ç., KOÇ S. S. , The application of micro doppler features in target classification, Postgraduate, Ö.TOPUZ(Student), 2014

CANDAN Ç., Radar resource management techniques for multi-function phased array radars /, Postgraduate, Ö.ÇAYIR(Student), 2014

CANDAN Ç., Design of moving target indication filters with non-uniform pulse repetition intervals, Postgraduate, M.İSPİR(Student), 2013

CANDAN Ç., ÇİLOĞLU T., MEMS sensor based underwater AHRS (Attitude and Heading Reference System) aided by compass and pressure sensor, Postgraduate, M.ERÇİN(Student), 2012

CANDAN Ç., Energy-efficient packet size optimization for cognitive radio sensor networks, Postgraduate, M.CAN(Student), 2011

CANDAN Ç., Energy-efficient packet size optimization for cognitive radio sensor networks, Postgraduate, M.Can(Student), 2011

CANDAN Ç., ÇİLOĞLU T., A sequential classification algorithm for autoregressive processes, Postgraduate, G.OTLU(Student), 2011

CANDAN Ç., ÇİLOĞLU T., Speech enhancement utilizing phase continuity between consecutive analysis windows, Postgraduate, E.MEHMETCİK(Student), 2011

CANDAN Ç., ÇİLOĞLU T., CFAR processing with multiple exponential smoothers for nonhomogeneous environments, Postgraduate, B.GÜRAKAN(Student), 2010

CANDAN Ç., An overview of detection in MIMO radar, Postgraduate, Ş.BİLGİ(Student), 2010

CANDAN Ç., On the detection of sinusoidal signals under sinusoidal interference, Postgraduate, B.BALCI(Student), 2010

CANDAN Ç., Multiuser receivers for CDMA downlink, Postgraduate, Ö.AGAH(Student), 2008

YILMAZ A. Ö. , CANDAN Ç., A study of precoding schemes for OFDM systems, Postgraduate, F.SELCEN(Student), 2008

CANDAN Ç., Cluster based user scheduling schemes to exploit multiuser diversity in wireless broadcast channels, Postgraduate, Y.SOYDAN(Student), 2008

CANDAN Ç., Frequency invariant beamforming and its application to wideband direction of arrival estimation, Postgraduate, E.BABATAŞ(Student), 2008

CANDAN Ç., Joint frequency offset and channel estimation, Postgraduate, M.AVAN(Student), 2008

CANDAN Ç., An implementation and algorithm development for UWB through the wall imaging system, Postgraduate, K.KAŞAK(Student), 2007

CANDAN Ç., Downlink transmission techniques for multi user multi input multi output wireless communications, Postgraduate, A.COŞKUN(Student), 2007

CANDAN Ç., An image encryption algorithm robust to post-encryption bitrate conversion, Postgraduate,

S.BAHAETTİN(Student), 2006

CANDAN Ç., An examination of super resolution methods, Postgraduate, Y.BARIŞ(Student), 2006

## Articles Published in Journals That Entered SCI, SSCI and AHCI Indexes

- I. **Maximum likelihood autoregressive model parameter estimation with noise corrupted independent snapshots**  
ÇAYIR Ö., CANDAN Ç.  
Signal Processing, vol.186, 2021 (Journal Indexed in SCI)
- II. **Frequency estimation of a single real-valued sinusoid: An invariant function approach**  
Candan Ç., Çelebi U.  
Signal Processing, vol.185, 2021 (Journal Indexed in SCI)
- III. **Maximum-likelihood direction of arrival estimation under intermittent jamming**  
Bilgi Akdemir Ş., CANDAN Ç.  
Digital Signal Processing: A Review Journal, vol.113, 2021 (Journal Indexed in SCI)
- IV. **Proper Definition and Handling of Dirac Delta Functions [Lecture Notes]**  
CANDAN Ç.  
IEEE Signal Processing Magazine, vol.38, no.3, pp.186-203, 2021 (Journal Indexed in SCI)
- V. **A Space-Time Coded Mills Cross MIMO Architecture to Improve DOA Estimation and Its Performance Evaluation by Field Experiments**  
Ungan C. U. , CANDAN Ç., ÇİLOĞLU T.  
IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SYSTEMS, vol.56, no.3, pp.1807-1818, 2020 (Journal Indexed in SCI)
- VI. **Transmit beamformer design with a PAPR constraint to trade-off between beampattern shape and power efficiency**  
ÇAYIR Ö., CANDAN Ç.  
DIGITAL SIGNAL PROCESSING, vol.99, 2020 (Journal Indexed in SCI)
- VII. **Making linear prediction perform like maximum likelihood in Gaussian autoregressive model parameter estimation**  
CANDAN Ç.  
SIGNAL PROCESSING, vol.166, 2020 (Journal Indexed in SCI)
- VIII. **Chebyshev Center Computation on Probability Simplex With alpha-Divergence Measure**  
CANDAN Ç.  
IEEE SIGNAL PROCESSING LETTERS, vol.27, pp.1515-1519, 2020 (Journal Indexed in SCI)
- IX. **Properly Handling Complex Differentiation in Optimization and Approximation Problems**  
CANDAN Ç.  
IEEE SIGNAL PROCESSING MAGAZINE, vol.36, no.2, pp.117-124, 2019 (Journal Indexed in SCI)
- X. **Performance Improvement of Time-Balance Radar Schedulers Through Decision Policies**  
ÇAYIR Ö., CANDAN Ç.  
IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SYSTEMS, vol.54, no.4, pp.1679-1691, 2018 (Journal Indexed in SCI)
- XI. **Design of Maisel sidelobe blankers with a guarantee on the gap to optimality**  
COŞKUN O., CANDAN Ç.  
IET RADAR SONAR AND NAVIGATION, vol.10, no.9, pp.1619-1626, 2016 (Journal Indexed in SCI)
- XII. **On the design of staggered moving target indicator filters**  
ISPIR M., CANDAN Ç.  
IET RADAR SONAR AND NAVIGATION, vol.10, no.1, pp.205-215, 2016 (Journal Indexed in SCI)
- XIII. **Fine resolution frequency estimation from three DFT samples: Case of windowed data**  
Candan C.  
SIGNAL PROCESSING, vol.114, pp.245-250, 2015 (Journal Indexed in SCI)

- XIV. **Direction finding accuracy of sequential lobing under target amplitude fluctuations**  
CANDAN Ç., KOC S.  
IET RADAR SONAR AND NAVIGATION, vol.9, no.1, pp.92-103, 2015 (Journal Indexed in SCI)
- XV. **A fine-resolution frequency estimator using an arbitrary number of DFT coefficients**  
ORGUNER U., CANDAN Ç.  
SIGNAL PROCESSING, vol.105, pp.17-21, 2014 (Journal Indexed in SCI)
- XVI. **A unified framework for derivation and implementation of Savitzky-Golay filters**  
CANDAN Ç., Inan H.  
SIGNAL PROCESSING, vol.104, pp.203-211, 2014 (Journal Indexed in SCI)
- XVII. **The moment function for the ratio of correlated generalized gamma variables**  
CANDAN Ç., Orguner U.  
STATISTICS & PROBABILITY LETTERS, vol.83, no.10, pp.2353-2356, 2013 (Journal Indexed in SCI)
- XVIII. **Analysis and Further Improvement of Fine Resolution Frequency Estimation Method From Three DFT Samples**  
Candan C.  
IEEE SIGNAL PROCESSING LETTERS, vol.20, no.9, pp.913-916, 2013 (Journal Indexed in SCI)
- XIX. **An Upper Bound on the Capacity Loss Due to Imprecise Channel State Information for General Memoryless Fading Channels**  
Candan C.  
IEEE COMMUNICATIONS LETTERS, vol.17, no.7, pp.1348-1351, 2013 (Journal Indexed in SCI)
- XX. **Capacity of Zero-Outage Scheme Under Imprecise Channel State Information**  
Candan C.  
IEEE COMMUNICATIONS LETTERS, vol.17, no.1, pp.127-130, 2013 (Journal Indexed in SCI)
- XXI. **A Low Complexity Two-Stage Target Detection Scheme for Resource Limited Radar Systems**  
Candan C.  
IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SYSTEMS, vol.49, no.1, pp.594-601, 2013 (Journal Indexed in SCI)
- XXII. **Conjugate directions based order recursive implementation of post-Doppler adaptive target detectors**  
CANDAN Ç., EROL Y. B.  
IET RADAR SONAR AND NAVIGATION, vol.6, no.7, pp.577-586, 2012 (Journal Indexed in SCI)
- XXIII. **CFAR processing with switching exponential smoothers for nonhomogeneous environments**  
GURAKAN B., CANDAN Ç., ÇİLOĞLU T.  
DIGITAL SIGNAL PROCESSING, vol.22, no.3, pp.407-416, 2012 (Journal Indexed in SCI)
- XXIV. **An Accurate and Efficient Two-Stage Channel Estimation Method Utilizing Training Sequences with Closed Form Expressions**  
Candan C.  
IEEE TRANSACTIONS ON COMMUNICATIONS, vol.59, no.12, pp.3259-3264, 2011 (Journal Indexed in SCI)
- XXV. **Digital Wideband Integrators With Matching Phase and Arbitrarily Accurate Magnitude Response**  
Candan C.  
IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS II-EXPRESS BRIEFS, vol.58, no.9, pp.610-614, 2011 (Journal Indexed in SCI)
- XXVI. **A Method For Fine Resolution Frequency Estimation From Three DFT Samples**  
Candan C.  
IEEE SIGNAL PROCESSING LETTERS, vol.18, no.6, pp.351-354, 2011 (Journal Indexed in SCI)
- XXVII. **On the Eigenstructure of DFT Matrices**  
CANDAN Ç.  
IEEE SIGNAL PROCESSING MAGAZINE, vol.28, no.2, pp.105-108, 2011 (Journal Indexed in SCI)
- XXVIII. **Transmit Precoding for Flat-Fading MIMO Multiuser Systems With Maximum Ratio Combining Receivers**  
Coskun A., CANDAN Ç.

- IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY, vol.60, no.2, pp.710-716, 2011 (Journal Indexed in SCI)
- XXIX. **A Feedback Quantization Scheme Leveraging Fairness and Throughput for Heterogeneous Multi-User Diversity Systems**  
SOYDAN Y., CANDAN Ç.
- IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY, vol.59, no.5, pp.2610-2614, 2010 (Journal Indexed in SCI)
- XXX. **Efficient Methods of Clutter Suppression for Coexisting Land and Weather Clutter Systems**  
CANDAN Ç., YILMAZ A. Ö.
- IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SYSTEMS, vol.45, no.4, pp.1641-1650, 2009 (Journal Indexed in SCI)
- XXXI. **Digital computation of linear canonical transforms**  
Koc A., Ozaktas H. M. , CANDAN Ç., KUTAY M. A.
- IEEE TRANSACTIONS ON SIGNAL PROCESSING, vol.56, no.6, pp.2383-2394, 2008 (Journal Indexed in SCI)
- XXXII. **On higher order approximations for hermite-gaussian functions and discrete fractional Fourier transforms**  
Candan C.
- IEEE SIGNAL PROCESSING LETTERS, vol.14, no.10, pp.699-702, 2007 (Journal Indexed in SCI)
- XXXIII. **An efficient filtering structure for Lagrange interpolation**  
Candan C.
- IEEE SIGNAL PROCESSING LETTERS, vol.14, no.1, pp.17-19, 2007 (Journal Indexed in SCI)
- XXXIV. **Derivation of length extension formulas for complementary sets of sequences using orthogonal filterbanks**  
Candan C.
- ELECTRONICS LETTERS, vol.42, no.24, pp.1427-1429, 2006 (Journal Indexed in SCI)
- XXXV. **Sampling and series expansion theorems for fractional Fourier and other transforms**  
Candan C., OZAKTAS H.
- SIGNAL PROCESSING, vol.83, no.11, pp.2455-2457, 2003 (Journal Indexed in SCI)
- XXXVI. **The discrete fractional Fourier transform**  
Candan C., KUTAY M. A. , OZAKTAS H.
- IEEE TRANSACTIONS ON SIGNAL PROCESSING, vol.48, no.5, pp.1329-1337, 2000 (Journal Indexed in SCI)
- XXXVII. **The discrete harmonic oscillator, Harper's equation, and the discrete fractional Fourier transform**  
BARKER L., Candan C., HAKIOGLU T., KUTAY M., OZAKTAS H.
- JOURNAL OF PHYSICS A-MATHEMATICAL AND GENERAL, vol.33, no.11, pp.2209-2222, 2000 (Journal Indexed in SCI)
- XXXVIII. **Space-bandwidth-efficient realizations of linear systems**  
KUTAY M., ERDEN M., OZAKTAS H., ARIKAN O., GULERYUZ O., Candan C.
- OPTICS LETTERS, vol.23, no.14, pp.1069-1071, 1998 (Journal Indexed in SCI)

## **Refereed Congress / Symposium Publications in Proceedings**

- I. **Parameter Estimation for Bursty-Intermittent Observations Patlamali-Kesikli Gozlemler icin Parametre Kestirimi**  
Cagatay Candan Ç.  
28th Signal Processing and Communications Applications Conference, SIU 2020, Gaziantep, Turkey, 5 - 07 October 2020
- II. **A Computationally Efficient Fine Frequency Estimation Method for Harmonic Signals Harmonik Isaretlerin Hassas Frekans Kestirimi Icin Dusuk Islem Yuklu Bir Yontem**  
Çelebi U., Candan Ç.  
28th Signal Processing and Communications Applications Conference, SIU 2020, Gaziantep, Turkey, 5 - 07 October 2020
- III. **Slow moving target detection for airborne radar systems by dynamic programming on SAR images**

Gurer G., Koc S., Candan Ç., Orguner U.

2019 IEEE Radar Conference, RadarConf 2019, Massachusetts, United States Of America, 22 - 26 April 2019

- IV. **A low-complexity precoder-decoder design in multiuser downlink MIMO communication systems for common and private information transmission Ortak ve Özel Bilginin Gönderildiği Çok Kullanicili aşağı Bağlantılı MIMO Haberleşme Sistemlerinde Düşük Karmaşıklikli Bir Ön Kodlayıcı ve Kod Çözücü Tasarımı**  
Deniz U. E. , Candan Ç.  
26th IEEE Signal Processing and Communications Applications Conference, SIU 2018, İzmir, Turkey, 2 - 05 May 2018, pp.1-4
- V. **Study of angle of arrival estimation performance of MVDR and Capon methods under intermittent interference Kesikli karıştırma durumunda MVDR ve capon yöntemlerinin geliş açisi kestirim performansinin incelenmesi**  
Akdemir S. B. , Candan Ç.  
26th IEEE Signal Processing and Communications Applications Conference, SIU 2018, İzmir, Turkey, 2 - 05 May 2018, pp.1-4
- VI. **A Study on the Performance of a Complementary Auxiliary Antenna Pattern for Maisel Sidelobe Blanker**  
DINLER D., CANDAN Ç., KOC S.  
IEEE Radar Conference, Oklahoma, United States Of America, 23 - 27 April 2018, pp.1178-1182
- VII. **On the Impact of Fast-Time and Slow-Time Preprocessing Operations on Adaptive Target Detectors**  
GÜVENSEN G. M. , CANDAN Ç.  
IEEE Radar Conference, Oklahoma, United States Of America, 23 - 27 April 2018, pp.1183-1188
- VIII. **An investigation of least squares based methods for source localization from time difference of arrival measurements Varies Zaman Farki Ölçümleri ile Kaynak Konumlandırma En Küçük Kareler Temelli Yöntemlerin İncelenmesi**  
Celenk N., Candan Ç.  
25th Signal Processing and Communications Applications Conference, SIU 2017, Antalya, Turkey, 15 - 18 May 2017
- IX. **Classification of Human Motion Using Radar Micro-Doppler Signatures with Hidden Markov Models**  
PADAR M. O. , ERTAN A. E. , CANDAN Ç.  
IEEE Radar Conference (RadarConf), Pennsylvania, United States Of America, 2 - 06 May 2016, pp.718-723
- X. **On The Optimality of Maisel Sidelobe Blanking System**  
Coskun O., CANDAN Ç.  
23rd Signal Processing and Communications Applications Conference (SIU), Malatya, Turkey, 16 - 19 May 2015, pp.585-591
- XI. **Analysis Window Length Selection For Linear Signal Models**  
Yazar A., CANDAN Ç.  
23rd Signal Processing and Communications Applications Conference (SIU), Malatya, Turkey, 16 - 19 May 2015, pp.1301-1304
- XII. **Removing Grating Lobes in Sparse Sensor Arrays with a Nonlinear Approach**  
Epcacan E., ÇİLOĞLU T., CANDAN Ç., Mehmetcik E.  
23rd Signal Processing and Communications Applications Conference (SIU), Malatya, Turkey, 16 - 19 May 2015, pp.1950-1953
- XIII. **On Generalized Eigenvector Space For Target Detection in Reduced Dimensions**  
GÜVENSEN G. M. , CANDAN Ç., Koc S., ORGUNER U.  
IEEE International Radar Conference (RadarCon), Virginia, United States Of America, 10 - 15 May 2015, pp.1316-1321
- XIV. **The Radar Application of Micro Doppler Features from Human Motions**  
ALEMDAROĞLU O. T. , CANDAN Ç., Koc S.  
IEEE International Radar Conference (RadarCon), Virginia, United States Of America, 10 - 15 May 2015, pp.374-379
- XV. **On The Optimality of Maisel Sidelobe Blanking Structure**

COŞKUN O., CANDAN Ç.

IEEE Radar Conference - From Sensing to Information, Ohio, United States Of America, 19 - 23 May 2014, pp.1102-1107

**XVI. The Extraction of Micro-Doppler Features from Human Motions**

Alemdaroglu O. T. , CANDAN Ç., KOÇ S. S.

22nd IEEE Signal Processing and Communications Applications Conference (SIU), Trabzon, Turkey, 23 - 25 April 2014, pp.726-729

**XVII. Least Square and Min-Max Design of MTI Filters With Nonuniform Interpulse Periods**

ISPIR M., CANDAN Ç.

IEEE Radar Conference (RADAR), Ottawa, Canada, 29 April - 03 May 2013

**XVIII. Min-Max Design of MTI Filters with Non-uniform Pulse Repetition Intervals**

Ispir M., CANDAN Ç.

21st Signal Processing and Communications Applications Conference (SIU), CYPRUS, 24 - 26 April 2013

**XIX. Beamspace Approach for Detection of the Number of Coherent Sources**

CANDAN Ç., Koc S.

IEEE Radar Conference (RADAR), Georgia, United States Of America, 7 - 11 May 2012

**XX. On The Design of Mismatched Filters With An Adjustable Matched Filtering Loss**

Candan C.

2010 IEEE Radar Conference, Washington, Kiribati, 10 - 14 May 2010, pp.1311-1316

**XXI. On the Optimality of Detectors Defined Over The Ambiguity Plane**

Candan C.

2009 IEEE Radar Conference, California, United States Of America, 4 - 08 May 2009, pp.1082-1086

**XXII. On the Implementation of Optimal Receivers for LFM Signals using Fractional Fourier Transform**

Candan C.

2008 IEEE Radar Conference, Rome, Italy, 26 - 30 May 2008, pp.1833-1836

**XXIII. Efficient Methods of Doppler Processing for Coexisting Land and Weather Clutter**

CANDAN Ç., YILMAZ A. Ö.

2008 IEEE Radar Conference, Rome, Italy, 26 - 30 May 2008, pp.568-572

**XXIV. A transcoding robust data hiding method for image communication applications**

Candan C.

IEEE International Conference on Image Processing (ICIP 2005), Genoa, Italy, 11 - 14 September 2005, pp.2873-2876

## Activities in Scientific Journals

IEEE Signal Processing Magazine, Committee Member, 2021 - Continues

IEEE Communications Letters, Committee Member, 2021 - Continues

## Scientific Refereeing

IEEE TRANSACTIONS ON SIGNAL PROCESSING, SCI Journal, December 2020

IEEE SIGNAL PROCESSING LETTERS, Journal Indexed in SCI-E, September 2020

DIGITAL SIGNAL PROCESSING, Journal Indexed in SCI-E, July 2020

IEEE SIGNAL PROCESSING LETTERS, Journal Indexed in SCI-E, July 2020

DIGITAL SIGNAL PROCESSING, Journal Indexed in SCI-E, May 2020

DIGITAL SIGNAL PROCESSING, Journal Indexed in SCI-E, May 2020

IEEE SIGNAL PROCESSING LETTERS, Journal Indexed in SCI-E, March 2020

IEEE TRANSACTIONS ON SIGNAL PROCESSING, SCI Journal, December 2019

SIGNAL PROCESSING, Journal Indexed in SCI-E, November 2019

DIGITAL SIGNAL PROCESSING, Journal Indexed in SCI-E, October 2019  
IEEE SIGNAL PROCESSING LETTERS, Journal Indexed in SCI-E, May 2019  
IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SYSTEMS, SCI Journal, April 2019  
IEEE SIGNAL PROCESSING LETTERS, Journal Indexed in SCI-E, March 2019  
IEEE COMMUNICATIONS LETTERS, Journal Indexed in SCI-E, January 2019

## **Citations**

Total Citations (WOS):1169  
h-index (WOS):12

## **Awards**

Candan Ç., TÜBİTAK TEŞVİK ÖDÜLÜ, Tübitak, July 2015