

## 2025

Author(s)	Type	Stimulus	Decoding	Notes
Dold et al.	article	modulated Gold codes	reconvolution, CCA	Dareplane, experiment platform
Dong, Zheng, Pei, Gao, and Wang	article	NBRS	EEG2Code	240 classes
Fodor, Canturk, Le, Heisenberg, and Volosyak	proceedings	m-sequence	CCA	class augmentation
Fodor, Cantürk, Heisenberg, and Volosyak	article	m-sequence	CCA	number of electrodes, montage
Fodor and Volosyak	proceedings	m-sequence	GAT-CNN	Deep learning, multi-head attention and graph neural net, electrode importance
Fodor and Volosyak	proceedings	m-sequence	SVM, CNN	imperceptible stimulation with 60 Hz carrier
Gomel, Torre Tresols, Cimarost, Cabrera Castillo, and Dehais	proceedings	burst codes	xDAWN and Riemannian	dry EEG, invisible stimuli
Gomel, Torre Tresols, Cimarost, Cabrera Castillo, and Dehais	proceedings	burst codes	xDAWN, LDA	confidence feedback
Guyonnet-Hencke et al.	article	Gold code	CCA	auditory hearing diagnostics
Kiser, Cantürk, and Volosyak	proceedings	m-sequence	CCA	authentication
Le, Fodor, Cantürk, and Volosyak	proceedings	m-sequence	CCA	authentication
Martín-Fernández, Martínez-Cagigal, Moreno-Calderón, Santamaría-Vázquez, and Hornero	article	m-sequence	CCA	stimulus opacity
Martín-Fernández, Martínez-Cagigal, Moreno-Calderón, Santamaría-Vázquez, Pascual-Roa, and Hornero	proceedings	m-sequence	CCA	realistic background and opacity
Martínez-Cagigal, Thielen, Hornero, and Desain	article			Editorial c-VEP
Martínez-Cagigal et al.	proceedings	m-sequence	CCA	asynchronous, early stopping
Martínez-Cagigal, Santamaría-Vázquez, Pérez-Velasco, Martín-Fernández, and Hornero	article	binary and sequence	CCA	binary and non-binary codes, spatial frequency, calibration time, comfort
Moreno-Calderón, Martínez-Cagigal, Martín-Fernández, Santamaría-Vázquez, Pascual-Roa, and Hornero	proceedings	m-sequence	CCA	mixed reality versus screen

Moreno-Calderón, Martínez-Cagigal, Martín-Fernández, Santamaría-Vázquez, and Hornero	article	m-sequence	CCA	mixed reality versus screen
Nair and Cecotti Santamaría-Vázquez et al.	preprint	m-sequence	CCA, Bayesian LDA, CNN	deep learning, siamese network
Scheppink, Cantürk, and Volosyak	proceedings	m-sequence	CCA	calibration-free, deep learning scene/object based stimulation
Tangermann et al.	article			review learning from small datasets
Thielen, Tangermann, Aarnoutse, Ramsey, and Vansteensel	article	modulated Gold codes	reconvolution, CCA	implanted, invasive, sEEG
Thielen	article	m-sequence, de Bruijn sequence, Golay sequence, Gold sequence, Gold code set, modulated	reconvolution, CCA	BCI inefficiency, performance predictors, binary stimulus sequences
Thielen	dataset	m-sequence, de Bruijn sequence, Golay sequence, Gold sequence, Gold code set, modulated		binary stimulus sequences, EEG, ECG, SART, resting-state
Vodila, van Lohuizen, and Thielen	proceedings	modulated Gold codes	reconvolution CCA	gaze-independent, covert attention, alpha, ERP, c-VEP
Yu, Rao, Chen, Liu, and Jiang	article	Gold code	DBFENet, EEGNet, etc.	Robot arm, scene segmentation, deep learning
Zheng, Dong, Pei, Gao, and Wang	preprint	NBRS	FBCCA	calibration-free, 504 targets

2024				
Author(s)	Type	Stimulus	Decoding	Notes
Ahmadi, Desain, and Thielen Cantürk and Volosyak Cabrera Castillos and Dehais Dehais, Castillos, Ladouce, and Clisson Fodor, Herschel, Cantürk, Heisenberg, and Volosyak C. Huang et al. E. Lai, Mai, Ji, Li, and Meng	article proceedings dataset article article article proceedings	modulated Gold codes m-sequence burst codes burst codes m-sequence white noise DIBS non-binary m-sequence	reconvolution, CCA CCA Riemannian, logistic regression CCA TRCA filterbank task related component analysis (FBTRCA), LSTM CCA	Bayesian dynamic stopping language model (ChatGPT) grating stimuli grating stimuli, dry EEG, comfort, eye-strain classification certainty feedback visual tracking asynchronous learning curve
Martínez-Cagigal, Álvaro Fernández-Rodríguez, Santamaría-Vázquez, Martín-Fernández, and Hornero Y. Miao et al.	article	white noise	TDCA, linear modeling, transfer learning EEG2Code, EEGNet, Shallow-ConvNet, DeepConvNet, ShallowNet CCA	minimal calibration, subject-to-subject transfer deep learning, transfer-learning, fine-tuning
Z. Miao, Meunier, Žák, and Grosse-Wentrup	proceedings	m-sequence		
Narayanan, Ahmadi, Desain, and Thielen Qu et al. Scheppink, Ahmadi, Desain, Tangermann, and Thielen Shi et al. Sun et al. Thielen, Sosulski, and Tangermann Thielen, Farquhar, and Desain Velut, Chevallier, Corsi, and Dehais Zheng, Dong, et al. Zheng, Tian, et al.	proceedings article proceedings article article proceeding dataset proceedings article dataset	modulated Gold codes m-sequence modulated Gold codes white-noise m-sequence modulated Gold codes modulated Gold codes burst codes NBRS NBRS	CCA CCA CCA TDCA TDCA reconvolution, CCA, UMM CNN, SPDNet, transfer learning FBCCA	gaze-independent, covert attention biometrics auditory, c-AEP maximum information rate small stimuli (0.5, 1, 2, 3 visual degrees) calibration-free, instantaneous, cumulative subject-to-subject transfer calibration-free, c-VEP versus SSVEP c-VEP versus SSVEP

2023					
Author(s)	Type	Stimulus	Decoding	Notes	
Ahmadi and Desain Cabrera Castillos, Darmet, and Dehais Cabrera Castillos Darmet, Ladouce, and Dehais Fernández-Rodríguez, Martínez-Cagigal, Santamaría-Vázquez, Ron-Angevin, and Hornero Henke et al. Z. Huang, Liao, Ou, Chen, and Zhang E. Lai, Mai, and Meng Martínez-Cagigal et al.	preprint article  dataset proceedings article  proceedings article  proceedings article  proceedings article  proceedings article  proceedings article  proceedings article  dataset proceedings article article	modulated Gold codes m-sequence, burst codes  m-sequence, burst codes m-sequence m-sequence  m-sequence m-sequence  m-sequence, non-binary m-sequences non-binary m-sequence  m-sequence non-binary m-sequence,  m-sequence, APA sequence, Gold codes, Golay sequence, de Bruijn sequence m-sequence, Gold codes, Golay sequence, de Bruijn sequence, modulated codes modulated Gold codes  m-sequence  m-sequence	CCA CNN  TRCA, EEG2Code, CNN CCA  CCA Combined EEGNet  FBTRCA, LSTM CCA  CCA  CCA EEG-inception  reconvolution, CCA  reconvolution, CCA  CCA  TRCA	Bayesian dynamic stopping  Eyestrain spatial frequency  Background music Biometrics  fatigue Eyestrain, fatigue  Dynamic stopping  Games  Simulated EEG  Empirical EEG  Gender VEPdgets, Dry EEG c-VEP versus SSVEP	

**2022**

<b>Author(s)</b>	<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Dehais et al.	article			Dry EEG, flight simulator, active and passive BCI
Stawicki and Volosyak	article	m-sequence	transfer learning	Session-to-session transfer
Sun, Zheng, Pei, Gao, and Wang	article	shifted Gold code	FBTRCA	120 targets
Ying, Wei, and Zhou	article	m-sequence	Riemannian, transfer learning	Subject-to-subject transfer
Zarei and Asl	article	m-sequence	spatiotemporal beamformer	
Zarei and Asl	article	m-sequence	spatiotemporal beamformer	Improved covariance estimator
Zheng, Pei, Gao, Zhang, and Wang	article	Gold codes	TRCA	Brain-switch

**2021**

<b>Author(s)</b>	<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Kaya, Bohorquez, and Özdamar	article	quasi steady-state	CLAD	
Martínez-Cagigal et al.	article			Review c-VEP
Thielen, Marsman, Farquhar, and Desain	article	modulated Gold codes	reconvolution, CCA	calibration-free
Torres and Daly	article	APA sequence, de Bruijn sequence, Golay sequence, m-sequence, Gold code, Kasami sequence	CCA, ICA, PCA, MLP	Synthetic EEG
Verbaarschot et al.	article	modulated Gold codes	CCA	ALS versus healthy participants

2020					
Author(s)	Type	Stimulus	Decoding	Notes	
Behboodi, Mahnam, Marateb, and Rabbani	article	m-sequence, TFO, 6FO	CCA		
Gembler, Rezeika, Benda, and Volosyak	article	m-sequence, quintary sequence	FBCCA	Presentation rate (60, 120, 240), comfort	
Gembler, Benda, Rezeika, Stawicki, and Volosyak	article	m-sequence	CCA	Asynchronous, language model	
Gembler	dissertation			c-VEP	
Gembler, Stawicki, Rezeika, Benda, and Volosyak	proceedings	m-sequence	FBCCA	Asynchronous, multi-session	
Z. Huang, Zheng, Wu, and Wang	article	m-sequence	transfer-learning	Subject-to-subject transfer	
Volosyak, Rezeika, Benda, Gembler, and Stawicki	article	m-sequence	CCA	SSVEP, SSMVEP, c-VEP, BCI illiteracy	
Shirzhiyan et al.	article	periodic, quasi-periodic, chaotic codes	CCA	Fatigue	
Turi, Gayraud, and Clerc	article	m-sequence	CCA		
Yasinzai and Ider	article	m-sequence, random sequence, SOP sequences	CCA	calibration-free, language model	

2019				
Author(s)	Type	Stimulus	Decoding	Notes
Ahmadi	dataset	modulated Gold codes		
Ahmadi	dataset	modulated Gold codes		
Ahmadi, Borhanazad, Tump, Farquhar, and Desain	proceedings	modulated Gold codes	CCA	Number of electrodes, montage
Ahmadi, Borhanazad, Tump, Farquhar, and Desain	article	modulated Gold codes	CCA	Number of electrodes, montage
Başaklar, Tuncel, and İder	article	m-sequence	CCA	Presentation rate (60, 120, 240 Hz)
Borhanazad, Thielen, Farquhar, and Desain	proceedings	modulated Gold codes	CCA	Presentation rate (40, 60, 90, 120 Hz)
Desain, Thielen, van den Broek, and Farquhar	patent	modulated Gold codes	CCA	
Gembler and Volosyak	article	m-sequence	CCA	Language model
Gembler, Stawicki, Rezeika, and Volosyak	proceedings	m-sequence	FBCCA	Presentation rate (30, 60, 120 Hz), age (young, elderly)
Gembler, Stawicki, Saboor, and Volosyak	article	m-sequence	FBCCA	Language model, dynamic stopping
Gembler, Benda, Saboor, and Volosyak	proceedings	m-sequence	FBCCA	Language model, dynamic stopping
Grigoryan, Filatov, and Kaplan	article	m-sequence	CCA	Presentation rate (30, 60, 120 Hz)
Kadioğlu, Yıldız, Closas, Fried-Oken, and Erdoğmuş	article	m-sequence	Maximum likelihood	Color (green-red), fusion of c-VEP and eye tracker
Kaya, Bohorquez, and Ozdamar	proceedings	quasi steady-state	CLAD	QSSVEP
Kaya, Bohórquez, and Özdamar	article	quasi steady-state	CLAD	QSSVEP
Kaya	dissertation			QSSVEP
Luo and Huang	proceedings	m-sequence	LDA, transfer learning	Subject-to-subject transfer
Matsuno, Itakura, Mizuno, and Mito	proceedings			frequency-hopping VEP
Nagel and Spüler	article	optimized random sequences	EEG2Code	Asynchronous, non-control state
Nagel and Spüler	article	random sequences	EEG2Code	c-VEP
Nagel	dissertation			For psychological experiments (button presses without behavior)
Peng and Huang	proceedings	m-sequence	sLDA	Fatigue
Shirzhiyan et al.	article	m-sequence, chaotic codes	CCA, spatiotemporal beam-forming	
Turi and Clerc	article	m-sequence		Static stopping number of cycles
Zhao, Wang, Liu, Pei, and Chen	article	m-sequence	FBCCA, FBTRCA	Biometrics
Zheng, Wang, Pei, and Chen	proceedings	Gold codes	TRCA	Brain switch

## 2018

<b>Author(s)</b>	<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Başaklar, İder, and Tuncel	proceedings	m-sequence		Presentation rate (60, 120, 240 Hz)
Dimitriadis and Marimpis	article	m-sequence	SVM	PAC, healthy and patients
Gembler, Stawicki, Saboor, et al.	proceedings	m-sequence	CCA	Presentation rate (60, 120, 200 Hz)
Gembler, Stawicki, Rezeika, et al.	proceedings	m-sequence	CCA	Language model
Liu, Wei, and Lu	article	Golay sequence, APA sequence	CCA	
Nagel, Dreher, Rosenstiel, and Spüler	article	m-sequence		Monitor raster latency, P300, SSVEP, c-VEP
Nagel, Rosenstiel, and Spüler	proceedings	optimized random sequences	CCA, regression	
Nagel and Spüler	article	random and optimized sequences	Ridge regression, EEG2Code	
Nezamfar, Mohseni Salehi, Higer, and Erdoganmus	article	m-sequence	RDA	Color (green-red), c-VEP versus eye tracker
Spüler and Kurek	article	m-sequence	CCA, SVM	ASSR versus c-AEP
Turi, Gayraud, and Clerc	preprint	m-sequence		calibration-free, language model
Wei et al.	article	grouping modulation, Golay complementary sequences, APA sequence	CCA	

## 2017

<b>Author(s)</b>	<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Aminaka and Rutkowski	chapter	m-sequence	CCA, SVM	Color (green-blue), 40 Hz
Isaksen, Mohebbi, and Puthusserypady	article	m-sequence, Gold code, Barker code	correlation	
Nagel, Rosenstiel, and Spüler	proceedings	m-sequence, random codes	CCA	
Spüler	article	m-sequence	CCA	
Thielen, Marsman, Farquhar, and Desain	chapter	modulated Gold codes	reconvolution, CCA	Dry EEG, static and dynamic stopping calibration-free
Wei, Gong, and Lu	article	grouping modulation, Golay sequence, APA sequence	CCA	
Wittevrongel, Van Wolputte, and Van Hulle	article	m-sequence	beamformer	

**2016**

<b>Author(s)</b>	<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Desain, Thielen, van den Broek, and Farquhar	patent	modulated Gold codes	CCA	
Isaksen, Mohebbi, and Puthusserypady	proceedings	m-sequence	Barker code, Gold code	
Nezamfar, Salehi, Moghadamfalahi, and Erdoganmus	article	m-sequence		FlashType, color (red-green), 110 Hz, language model
Riechmann, Finke, and Ritter	article	m-sequence	SVM (linear)	Color (green-red, black-white), shape, background, 120 Hz, virtual agent
Sato and Washizawa	proceedings	m-sequence	CCA, MLP, Lasso regression, Linear regression	
Thielen, Farquhar, and Desain	proceedings	modulated Gold codes	reconvolution, CCA	
Wei, Feng, and Lu	article	m-sequence	CCA	Stimulus characteristics: size (0.67, 1.7, 2.8, 3.8, 5.4, 7.1, 8.9 dva), color (white, red, green, blue, yellow), proximity (3.8, 4.8, 5.8, 6.8 dva), length (15, 31, 63, 127 bits), lag (2, 4, 6, 8, 10 bits)
Wei, Huang, Li, and Lu	article	m-sequence, Golay sequence	CCA	

## 2015

<b>Author(s)</b>		<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Aminaka, Rutkowski	Makino, and	proceedings	m-sequence	CCA	Color (green-blue, white-black), presentation rate (30, 40 Hz)
Aminaka, Rutkowski	Makino, and	proceedings	m-sequence	CCA, SVM	Color (green-blue, white-black), presentation rate (30, 40 Hz), CCA versus SVM
Aminaka, Rutkowski	Makino, and	proceedings	m-sequence	SVM	Color (green-blue, white-black), presentation rate (30, 40 Hz), pass-band optimization (6-21 Hz)
Aminaka, Rutkowski	Makino, and	proceedings	m-sequence	SVM	Color (green-blue, white-black), presentation rate (30, 40 Hz), SVM (linear, polynomial, rbf, sigmoid)
Mohebbi et al.	proceedings	Gold code		correlation	Wheelchair
Nezamfar, Salehi, and Erdogan	proceedings	m-sequence		maximum likelihood	Color (red-green, blue-yellow, black-white), presentation rate (30, 60, 110 Hz)
Sato and Washizawa	proceedings	m-sequence		correlation	Automatic repeat request
Spüler	proceedings	m-sequence		CCA, SVM	Windows applications
Thielen, van den Broek, Farquhar, and Desain	article	modulated Gold codes		reconvolution, CCA	
Waytowich and Krusienski	article	m-sequence		CCA	Foveal versus peripheral stimulation

## 2014

<b>Author(s)</b>		<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Kapeller et al.	article	m-sequence		CCA, LDA	Invasive, video application
Tu et al.	article			CSP, SVM, Naive Bayes, LDA	Color (red-green), CTVEP

**2013**

<b>Author(s)</b>	<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Bohórquez, Lozano, Kao, Toft-Nielsen, and Özdamar	proceedings	temporally jittered SSVEP	CLAD	
Kapeller et al.	proceedings	m-sequence	CCA, LDA	
Riechmann, Finke, and Ritter	proceedings	hierarchical codebook	SVM	
Spüler, Rosenstiel, and Bogdan	proceedings	m-sequence	OCSVM,	Robot, SSVEP versus c-VEP
Spüler, Rosenstiel, and Bogdan	proceedings	m-sequence	OCSVM	Color (red-green, black-white)
Spüler, Walter, Rosenstiel, and Bogdan	article	m-sequence	CCA, OCSVM	Unsupervised online calibration
Spüler, Walter, Rosenstiel, and Bogdan				Unsupervised online calibration
				c-VEP, ERN, P300, TMSEP, CCEP

**2012**

<b>Author(s)</b>	<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Nakanishi and Mitsukura	proceedings	m-sequence, periodic codes	periodicity detection	
Spüler, Rosenstiel, and Bogdan	proceedings	m-sequence	CCA, OCSVM	
Spüler, Rosenstiel, and Bogdan	article	m-sequence	CCA, OCSVM	Online unsupervised adaptation with ERN

**2011**

<b>Author(s)</b>	<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Bin et al.	article	m-sequence	CCA	
S. M. Lai, Zhang, Hung, Niu, and Chang	article			Color (red-green), CTVEP
Nezamfar, Orhan, Purwar, et al.	article	m-sequence	template matching, Bayesian fusion	
Nezamfar, Orhan, Erdogmus, et al.	proceedings	m-sequence	correlation, naive Bayes	Presentation rate (15, 30 Hz)

**2009**

<b>Author(s)</b>	<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Bin, Gao, Wang, Hong, and Gao	article	m-sequence	correlation	ERP versus SSVEP versus c-VEP

**2008**

<b>Author(s)</b>	<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Desain, Farquhar, Blankespoor, and Gielen	proceedings	Gold codes	reconvolution	Auditory
Farquhar, Blankespoor, Vlek, and Desain	proceedings	Gold codes		Auditory
Momose	proceedings	m-sequence		Hybrid P300 and c-VEP

**2007**

<b>Author(s)</b>	<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Momose	proceedings	m-sequence		

**2006**

<b>Author(s)</b>	<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Bohórquez and Özdamar	article	m-sequence	CLAD	Auditory

**2002**

<b>Author(s)</b>	<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Hanagata and Momose	proceedings			

**1992**

<b>Author(s)</b>	<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Sutter	article	m-sequence	correlation	Invasive, ALS patient

**1984**

<b>Author(s)</b>	<b>Type</b>	<b>Stimulus</b>	<b>Decoding</b>	<b>Notes</b>
Sutter	proceedings			

## References

- Ahmadi, S. (2019a). *High density EEG measurement*. Radboud University. Retrieved from <https://doi.org/10.34973/psaf-mq72> doi: 10.34973/psaf-mq72
- Ahmadi, S. (2019b). *Sensor tying*. Radboud University. Retrieved from <https://doi.org/10.34973/ehq6-b836> doi: 10.34973/ehq6-b836
- Ahmadi, S., Borhanazad, M., Tump, D., Farquhar, J., & Desain, P. (2019a). Low channel count montages using sensor tying for VEP-based BCI. *Journal of Neural Engineering*, 16, 066038. Retrieved from <https://doi.org/10.1088/1741-2552/ab4057> doi: 10.1088/1741-2552/ab4057
- Ahmadi, S., Borhanazad, M., Tump, D., Farquhar, J., & Desain, P. (2019b). Sensor tying, optimal montages for VEP-based BCI. In *8th Graz Brain-Computer Interface Conference 2019* (pp. 27–31). Retrieved from <https://doi.org/10.3217/978-3-85125-682-6-06> doi: 10.3217/978-3-85125-682-6-06
- Ahmadi, S., & Desain, P. (2023). A model-based dynamic stopping method for c-VEP BCI. In N. Mrachacz-Kersting, J. Collinger, D. Mattia, D. Valeriani, M. Vansteensel, & G. Müller-Putz (Eds.), *Proceedings of the 10th International Brain-Computer Interface Meeting 2023: Balancing Innovation and Translation*. Retrieved from <https://doi.org/10.3217/978-3-85125-962-9-168> doi: 10.3217/978-3-85125-962-9-168
- Ahmadi, S., Desain, P., & Thielen, J. (2024). A bayesian dynamic stopping method for evoked response brain-computer interfacing. *Frontiers in Human Neuroscience*, 18. Retrieved from <https://doi.org/10.3389/fnhum.2024.1437965> doi: 10.3389/fnhum.2024.1437965
- Aminaka, D., Makino, S., & Rutkowski, T. M. (2015a). Chromatic and high-frequency cVEP-based BCI paradigm. In *2015 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)* (pp. 1906–1909). Retrieved from <https://doi.org/10.1109/EMBC.2015.7318755> doi: 10.1109/EMBC.2015.7318755
- Aminaka, D., Makino, S., & Rutkowski, T. M. (2015b). Classification accuracy improvement of chromatic and high-frequency code-modulated visual evoked potential-based BCI. In *International Conference on Brain Informatics and Health* (pp. 232–241). Retrieved from [https://doi.org/10.1007/978-3-319-23344-4\\_23](https://doi.org/10.1007/978-3-319-23344-4_23) doi: 10.1007/978-3-319-23344-4\_23
- Aminaka, D., Makino, S., & Rutkowski, T. M. (2015c). EEG filtering optimization for code-modulated chromatic visual evoked potential-based brain-computer interface. In *International Workshop on Symbiotic Interaction* (pp. 1–6). Retrieved from [https://doi.org/10.1007/978-3-319-24917-9\\_1](https://doi.org/10.1007/978-3-319-24917-9_1) doi: 10.1007/978-3-319-24917-9\_1
- Aminaka, D., Makino, S., & Rutkowski, T. M. (2015d). SVM classification study of code-modulated visual evoked potentials. In *2015 Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (APSIPA)* (pp. 1065–1070). Retrieved from <https://doi.org/10.1109/APSIPA.2015.7415435> doi: 10.1109/APSIPA.2015.7415435
- Aminaka, D., & Rutkowski, T. M. (2017). A sixteen-command and 40 Hz carrier frequency code-modulated visual evoked potential BCI. In *Brain-Computer Interface Research* (pp. 97–104). Springer. Retrieved from [https://doi.org/10.1007/978-3-319-64373-1\\_10](https://doi.org/10.1007/978-3-319-64373-1_10) doi: 10.1007/978-3-319-64373-1\_10
- Başaklar, T., İder, Y. Z., & Tuncel, Y. (2018). Effects of high stimulus presentation rate on c-VEP based BCIs. In *2018 Medical Technologies National Congress (TIPTEKNO)* (pp. 1–4). Retrieved from <https://doi.org/10.1088/2057-1976/ab0cee> doi: 10.1088/2057-1976/ab0cee
- Başaklar, T., Tuncel, Y., & İder, Y. Z. (2019). Effects of high stimulus presentation rate on EEG template characteristics and performance of c-VEP based BCIs. *Biomedical Physics & Engineering Express*, 5, 035023. Retrieved from <https://doi.org/10.1088/2057-1976/ab0cee> doi: 10.1088/2057-1976/ab0cee
- Behboodi, M., Mahnam, A., Marateb, H., & Rabbani, H. (2020). Optimization of visual stimulus sequence in a brain-computer interface based on code modulated visual evoked potentials. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 28(12), 2762–2772. Retrieved from <https://doi.org/10.1109/TNSRE.2020.3044947> doi: 10.1109/TNSRE.2020.3044947
- Bin, G., Gao, X., Wang, Y., Hong, B., & Gao, S. (2009). VEP-based brain-computer interfaces: time, frequency, and code modulations. *IEEE Computational Intelligence Magazine*, 4(4), 22–26. Retrieved from <https://doi.org/10.1109/MCI.2009.934562> doi: 10.1109/MCI.2009.934562
- Bin, G., Gao, X., Wang, Y., Li, Y., Hong, B., & Gao, S. (2011). A high-speed BCI based on code modulation VEP. *Journal of Neural Engineering*, 8(2), 025015. Retrieved from <https://doi.org/10.1088/1741-2550/8/2/025015> doi: 10.1088/1741-2550/8/2/025015
- Bohórquez, J., Lozano, S., Kao, A., Toft-Nielsen, J., & Özdamar, Ö. (2013). Deconvolution and modeling of overlapping visual evoked potentials. In *2013 29th southern biomedical engineering conference* (pp. 31–32). Retrieved from <https://doi.org/10.1109/SBEC.2013.24> doi: 10.1109/SBEC.2013.24

- Bohórquez, J., & Özdamar, Ö. (2006). Signal to noise ratio analysis of maximum length sequence deconvolution of overlapping evoked potentials. *The Journal of the Acoustical Society of America*, 119(5), 2881–2888. Retrieved from <https://doi.org/10.1121/1.2191609> doi: 10.1121/1.2191609
- Borhanazad, M., Thielen, J., Farquhar, J., & Desain, P. (2019). The effect of high and low frequencies in c-VEP BCI. In *8th Graz Brain-Computer Interface Conference 2019* (pp. 128–132). Retrieved from <https://doi.org/10.3217/978-3-85125-682-6-24> doi: 10.3217/978-3-85125-682-6-24
- Cabrera Castillos, K. (2023). *4-class code-VEP EEG data*. Zenodo. Retrieved from <https://doi.org/10.5281/zenodo.8255618> doi: 10.5281/zenodo.8255618
- Cabrera Castillos, K., & Dehais, F. (2024). *5-class burst c-VEP with dry EEG*. Zenodo. Retrieved from <https://doi.org/10.5281/zenodo.13838406> doi: 10.5281/zenodo.13838406
- Cabrera Castillos, K., Ladouce, S., Darmet, L., & Dehais, F. (2023). Burst c-VEP based BCI: Optimizing stimulus design for enhanced classification with minimal calibration data and improved user experience. *NeuroImage*, 284, 120446. Retrieved from <https://doi.org/10.1016/j.neuroimage.2023.120446> doi: 10.1016/j.neuroimage.2023.120446
- Cantürk, A., & Volosyak, I. (2024). A novel ChatGPT-driven communication aid based on code-modulated visual evoked potentials (cVEP). In *9th graz brain-computer interface conference 2024* (pp. 41–46). Retrieved from <https://doi.org/10.3217/978-3-99161-014-4-008> doi: 10.3217/978-3-99161-014-4-008
- Darmet, L., Ladouce, S., & Dehais, F. (2023). Shortened calibration of code-VEP based BCI by improved deep learning architecture and golden subjects pre-training. In *11th International IEEE EMBS Conference on Neural Engineering*. Retrieved from <https://hal.science/hal-03984091/>
- Dehais, F., Castillos, K. C., Ladouce, S., & Clisson, P. (2024). Leveraging textured flickers: a leap toward practical, visually comfortable, and high-performance dry EEG code-VEP BCI. *Journal of Neural Engineering*, 21(6), 066023. Retrieved from <https://doi.org/10.1088/1741-2552/ad8ef7> doi: 10.1088/1741-2552/ad8ef7
- Dehais, F., Ladouce, S., Darmet, L., Nong, T.-V., Ferraro, G., Torre Tresols, J., ... Labedan, P. (2022). Dual passive reactive brain-computer interface: A novel approach to human-machine symbiosis. *Frontiers in Neuroergonomics*, 3, 824780. Retrieved from <https://doi.org/10.3389/fnrgo.2022.824780> doi: 10.3389/fnrgo.2022.824780
- Desain, P., Farquhar, J., Blankespoor, J., & Gielen, S. (2008). Detecting spread spectrum pseudo random noise tags in EEG/MEG using a structure-based decomposition. In *4th International Brain-Computer Interface Workshop and Training Course 2008*. Retrieved from [https://www.tugraz.at/fileadmin/user\\_upload/Institute/INE/Proceedings/Proceedings\\_BCI\\_Conference\\_2008.pdf](https://www.tugraz.at/fileadmin/user_upload/Institute/INE/Proceedings/Proceedings_BCI_Conference_2008.pdf)
- Desain, P., Thielen, J., van den Broek, P., & Farquhar, J. (2016). *Brain computer interface using broadband evoked potentials*. Google Patents. Retrieved from <https://patents.google.com/patent/WO2016012390A1/en> (US Patent App. 15/328,083)
- Desain, P., Thielen, J., van den Broek, P., & Farquhar, J. (2019). *Brain computer interface using broadband evoked potentials*. Google Patents. (US Patent App. 10/314,508)
- Dimitriadiis, S. I., & Marimpis, A. D. (2018). Enhancing performance and bit rates in a brain-computer interface system with phase-to-amplitude cross-frequency coupling: evidences from traditional c-VEP, fast c-VEP, and SSVEP designs. *Frontiers in Neuroinformatics*, 12. Retrieved from <https://doi.org/10.3389/fninf.2018.00019> doi: 10.3389/fninf.2018.00019
- Dold, M., Pereira, J., Sajonz, B., Coenen, V. A., Thielen, J., Janssen, M., & Tangermann, M. (2025). Dareplane: a modular open-source software platform for BCI research with application in closed-loop deep brain stimulation. *Journal of Neural Engineering*, 22, 026029. Retrieved from <https://doi.org/10.1088/1741-2552/adbb20> doi: 10.1088/1741-2552/adbb20
- Dong, Y., Zheng, L., Pei, W., Gao, X., & Wang, Y. (2025). A 240-target VEP-based BCI system employing narrow-band random sequences. *Journal of Neural Engineering*, 22(2), 026024. Retrieved from <https://doi.org/10.1088/1741-2552/adbfc1> doi: 10.1088/1741-2552/adbfc1
- Farquhar, J., Blankespoor, J., Vlek, R., & Desain, P. (2008). Towards a noise-tagging auditory BCI-paradigm. In *4th International Brain-Computer Interface Workshop and Training Course 2008*. Retrieved from [https://www.tugraz.at/fileadmin/user\\_upload/Institute/INE/Proceedings/Proceedings\\_BCI\\_Conference\\_2008.pdf](https://www.tugraz.at/fileadmin/user_upload/Institute/INE/Proceedings/Proceedings_BCI_Conference_2008.pdf)
- Fernández-Rodríguez, Á., Martínez-Cagigal, V., Santamaría-Vázquez, E., Ron-Angevin, R., & Hornero, R. (2023). Influence of spatial frequency in visual stimuli for cVEP-based BCIs: evaluation of performance and user experience. *Frontiers in Human Neuroscience*, 17. Retrieved from <https://doi.org/10.3389/fnhum.2023.1288438> doi: 10.3389/fnhum.2023.1288438

- Fodor, M., Cantürk, A., Heisenberg, G., & Volosyak, I. (2025). Streamlining cVEP paradigms: Effects of a minimized electrode montage on brain–computer interface performance. *Brain Sciences*, 15(6), 549. Retrieved from <https://doi.org/10.3390/brainsci15060549> doi: 10.3390/brainsci15060549
- Fodor, M., Canturk, A., Le, T.-P.-N., Heisenberg, G., & Volosyak, I. (2025). Evaluation of efficient and performance-retaining cVEP-BCI class augmentation. In 2025 13th international conference on brain-computer interface (bci) (pp. 1–6). Retrieved from <https://doi.org/10.1109/BCI65088.2025.10931291> doi: 10.1109/BCI65088.2025.10931291
- Fodor, M., Herschel, H., Cantürk, A., Heisenberg, G., & Volosyak, I. (2024). Evaluation of different visual feedback methods for brain—computer interfaces (BCI) based on code-modulated visual evoked potentials (cVEP). *Brain Sciences*, 14(8), 846. Retrieved from <https://doi.org/10.3390/brainsci14080846> doi: 10.3390/brainsci14080846
- Fodor, M., & Volosyak, I. (2025a). Graph-attentive CNN for cVEP-BCI with insights into electrode significance. In *International work-conference on artificial neural networks* (pp. 558–571). Retrieved from [https://doi.org/10.1007/978-3-032-02728-3\\_45](https://doi.org/10.1007/978-3-032-02728-3_45) doi: 0.1007/978-3-032-02728-3\_45
- Fodor, M., & Volosyak, I. (2025b). Towards visual-fatigue-free BCI with imperceptible visual evoked potentials (I-VEP). In 2025 ieee international conference on systems, man, and cybernetics (smc) (pp. 3812–3818). Retrieved from <https://doi.org/10.1109/SMC58881.2025.11343413> doi: 10.1109/SMC58881.2025.11343413
- Gembler, F. (2020). *Parameter optimization for brain-computer interfaces based on visual evoked potentials* (Unpublished doctoral dissertation). Universität Bielefeld.
- Gembler, F., Benda, M., Rezeika, A., Stawicki, P. R., & Volosyak, I. (2020). Asynchronous c-VEP communication tools—efficiency comparison of low-target, multi-target and dictionary-assisted BCI spellers. *Scientific Reports*, 10(1), 1–13. Retrieved from <https://doi.org/10.1038/s41598-020-74143-4> doi: 10.1038/s41598-020-74143-4
- Gembler, F., Benda, M., Saboor, A., & Volosyak, I. (2019). A multi-target c-VEP-based BCI speller utilizing n-gram word prediction and filter bank classification. In 2019 IEEE International Conference on Systems, Man and Cybernetics (SMC) (pp. 2719–2724). Retrieved from <https://doi.org/10.1109/SMC.2019.8914235> doi: 10.1109/SMC.2019.8914235
- Gembler, F., Rezeika, A., Benda, M., & Volosyak, I. (2020). Five shades of grey: Exploring quintary m-sequences for more user-friendly c-VEP-based BCIs. *Computational Intelligence and Neuroscience*, 2020. Retrieved from <https://doi.org/10.1155/2020/7985010> doi: 10.1155/2020/7985010
- Gembler, F., Stawicki, P., Rezeika, A., Benda, M., & Volosyak, I. (2020). Exploring session-to-session transfer for brain-computer interfaces based on code-modulated visual evoked potentials. In 2020 ieee international conference on systems, man, and cybernetics (smc) (pp. 1505–1510). Retrieved from <https://doi.org/10.1109/SMC42975.2020.9282826> doi: 10.1109/SMC42975.2020.9282826
- Gembler, F., Stawicki, P., Rezeika, A., Saboor, A., Benda, M., & Volosyak, I. (2018). Effects of monitor refresh rates on c-VEP BCIs. In *International Workshop on Symbiotic Interaction* (pp. 53–62). Retrieved from [https://doi.org/10.1007/978-3-319-91593-7\\_6](https://doi.org/10.1007/978-3-319-91593-7_6) doi: 10.1007/978-3-319-91593-7\_6
- Gembler, F., Stawicki, P., Rezeika, A., & Volosyak, I. (2019). A comparison of cVEP-based BCI-performance between different age groups. In *International Work-Conference on Artificial Neural Networks* (pp. 394–405). Retrieved from [https://doi.org/10.1007/978-3-030-20521-8\\_33](https://doi.org/10.1007/978-3-030-20521-8_33) doi: 10.1007/978-3-030-20521-8\_33
- Gembler, F., Stawicki, P., Saboor, A., Benda, M., Grichnik, R., Rezeika, A., & Volosyak, I. (2018). A dictionary driven mental typewriter based on code-modulated visual evoked potentials (cVEP). In 2018 IEEE International Conference on Systems, Man, and Cybernetics (SMC) (pp. 619–624). Retrieved from <https://doi.org/10.1109/SMC.2018.00114> doi: 10.1109/SMC.2018.00114
- Gembler, F., Stawicki, P., Saboor, A., & Volosyak, I. (2019). Dynamic time window mechanism for time synchronous VEP-based BCIs—performance evaluation with a dictionary-supported BCI speller employing SSVEP and c-VEP. *PLOS One*, 14(6), e0218177. Retrieved from <https://doi.org/10.1371/journal.pone.0218177> doi: 10.1371/journal.pone.0218177
- Gembler, F., & Volosyak, I. (2019). A novel dictionary-driven mental spelling application based on code-modulated visual evoked potentials. *Computers*, 8(2). Retrieved from <https://doi.org/10.3390/computers8020033> doi: 10.3390/computers8020033
- Gomel, J., Torre Tresols, J., Cimarost, P., Cabrera Castillo, K., & Dehais, F. (2025a). Pre-decision feedback in code-modulated visual evoked potentials brain-computer interface for an 11-class keypad typing task. In 2025 ieee international conference on systems, man, and cybernetics (smc) (pp. 3800–3805). Retrieved from <https://doi.org/10.1109/SMC58881.2025.11343413>

- [doi.org/10.1109/SMC58881.2025.11342868](https://doi.org/10.1109/SMC58881.2025.11342868) doi: 10.1109/SMC58881.2025.11342868
- Gomel, J., Torre Tresols, J., Cimarost, P., Cabrera Castillo, K., & Dehais, F. (2025b). Star-burst paradigm: implementation of an “invisible” dry-EEG reactive BCI. In *11th international brain-computer interface meeting 2025*. Retrieved from <https://hal.science/hal-05300721/>
- Grigoryan, R., Filatov, D., & Kaplan, A. (2019). High-speed brain-computer communication interface based on code-modulated visual evoked potentials. *Bulletin of Russian State Medical University*(2). Retrieved from <https://doi.org/10.24075/brsmu.2019.019> doi: 10.24075/brsmu.2019.019
- Guyonnet-Hencke, T., Portoles, O., de Vries, M., Koderman, E., Winkler, A., Goodall, J., ... van Kesteren, M. (2025). Rapid cortical auditory evoked potentials audiometry. *International Journal of Audiology*, 1–11. Retrieved from <https://doi.org/10.1080/14992027.2025.2478523> doi: 10.1080/14992027.2025.2478523
- Hanagata, J., & Momose, K. (2002). A method for detecting gazed target using visual evoked potentials elicited by pseudorandom stimuli. In *Proc. 5th asia pacific conf. medical and biological engineering and 11th int. conf. biomedical engineering (icbme)*.
- Henke, L., Rulffs, P., Adepoju, F., Stawicki, P., Cantürk, A., & Volosyak, I. (2023). Investigating the influence of background music on the performance of a cVEP-based BCI. In *2023 IEEE International Conference on Systems, Man, and Cybernetics (SMC)* (pp. 1104–1109). Retrieved from <https://doi.org/10.3390/healthcare11071014> doi: 10.3390/healthcare11071014
- Huang, C., Shi, N., Miao, Y., Chen, X., Wang, Y., & Gao, X. (2024). Visual tracking brain-computer interface. *iScience*, 27(4). Retrieved from <https://doi.org/10.1016/j.isci.2024.109376> doi: 10.1016/j.isci.2024.109376
- Huang, Z., Liao, Z., Ou, G., Chen, L., & Zhang, Y. (2023). Authentication using c-vep evoked in a mild-burdened cognitive task. *Frontiers in Human Neuroscience*, 17, 1240451. Retrieved from <https://doi.org/10.3389/fnhum.2023.1240451> doi: 10.3389/fnhum.2023.1240451
- Huang, Z., Zheng, W., Wu, Y., & Wang, Y. (2020). Ensemble or pool: A comprehensive study on transfer learning for c-VEP BCI during interpersonal interaction. *Journal of Neuroscience Methods*, 343, 108855. Retrieved from <https://doi.org/10.1016/j.jneumeth.2020.108855> doi: 10.1016/j.jneumeth.2020.108855
- Isaksen, J., Mohebbi, A., & Puthusserypady, S. (2016). A comparative study of pseudorandom sequences used in a c-VEP based BCI for online wheelchair control. In *2016 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)* (pp. 1512–1515). Retrieved from <https://doi.org/10.1109/EMBC.2016.7590997> doi: 10.1109/EMBC.2016.7590997
- Isaksen, J., Mohebbi, A., & Puthusserypady, S. (2017). Optimal pseudorandom sequence selection for online c-VEP based BCI control applications. *PLOS One*, 12(9), e0184785. Retrieved from <https://doi.org/10.1371/journal.pone.0184785> doi: 10.1371/journal.pone.0184785
- Kadioğlu, B., Yıldız, İ., Closas, P., Fried-Oken, M. B., & Erdoğmuş, D. (2019). Robust fusion of c-VEP and gaze. *IEEE Sensors Letters*, 3(1), 1–4. Retrieved from <https://doi.org/10.1109/LSENS.2018.2878705> doi: 10.1109/LSENS.2018.2878705
- Kapeller, C., Hintermüller, C., Abu-Alqumsan, M., Prückl, R., Peer, A., & Guger, C. (2013). A BCI using VEP for continuous control of a mobile robot. In *2013 35th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)* (pp. 5254–5257). Retrieved from <https://doi.org/10.1109/EMBC.2013.6610734> doi: 10.1109/EMBC.2013.6610734
- Kapeller, C., Kamada, K., Ogawa, H., Prueckl, R., Schärling, J., & Guger, C. (2014). An electrocorticographic BCI using code-based VEP for control in video applications: a single-subject study. *Frontiers in Systems Neuroscience*, 8, 139. Retrieved from <https://doi.org/10.3389/fnsys.2014.00139> doi: 10.3389/fnsys.2014.00139
- Kaya, I. (2019). *High rate quasi-steady-state pattern visual evoked potentials for brain-computer interface* (Unpublished doctoral dissertation). University of Miami.
- Kaya, I., Bohórquez, J., & Özdamar, Ö. (2019). A BCI gaze sensing method using low jitter code modulated VEP. *Sensors*, 19(17), 3797. Retrieved from <https://doi.org/10.3390/s19173797> doi: 10.3390/s19173797
- Kaya, I., Bohorquez, J., & Özdamar, Ö. (2021). BCI performance improvement by special low jitter quasi-steady-state VEP paradigm. *Modern Approaches to Augmentation of Brain Function*, 121–139. Retrieved from [https://doi.org/10.1007/978-3-030-54564-2\\_7](https://doi.org/10.1007/978-3-030-54564-2_7) doi: 10.1007/978-3-030-54564-2\_7
- Kaya, I., Bohorquez, J. E., & Ozdamar, O. (2019). Brain computer interface switch based on quasi-steady-state visual evoked potentials. In *2019 9th international ieee/embs conference on neural engineering (ner)* (pp. 1175–1178).

- Kiser, A., Cantürk, A., & Volosyak, I. (2025). Towards secure transaction authentication using a cVEP-based BCI. In *International work-conference on artificial neural networks* (pp. 533–547). Retrieved from [https://doi.org/10.1007/978-3-032-02728-3\\_43](https://doi.org/10.1007/978-3-032-02728-3_43) doi: 10.1007/978-3-032-02728-3\_43
- Lai, E., Mai, X., Ji, M., Li, S., & Meng, J. (2024). High-frequency discrete-interval binary sequence in asynchronous c-VEP-based BCI for visual fatigue reduction. *IEEE Journal of Biomedical and Health Informatics*, 28(5), 2769–2780. Retrieved from <https://doi.org/10.1109/BIBM58861.2023.10385977> doi: 10.1109/BIBM58861.2023.10385977
- Lai, E., Mai, X., & Meng, J. (2023). High-performance deep neural network pretrained with contrastive learning for asynchronous high-frequency c-VEP detection. In *2023 IEEE International Conference on Bioinformatics and Biomedicine (BIBM)* (pp. 2515–2521). Retrieved from <https://doi.org/10.1109/BIBM58861.2023.10385977> doi: 10.1109/BIBM58861.2023.10385977
- Lai, S. M., Zhang, Z., Hung, Y. S., Niu, Z., & Chang, C. (2011). A chromatic transient visual evoked potential based encoding/decoding approach for brain–computer interface. *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, 1(4), 578–589. Retrieved from <https://doi.org/10.1109/JETCAS.2011.2178734> doi: 10.1109/JETCAS.2011.2178734
- Le, T. P. N., Fodor, M. A., Cantürk, A., & Volosyak, I. (2025). Feasibility of secure transaction authentication using a cVEP-based BCI. In *2025 13th international conference on brain-computer interface (bci)* (pp. 1–6). Retrieved from <https://doi.org/10.1109/BCI65088.2025.10931547> doi: 10.1109/BCI65088.2025.10931547
- Liu, Y., Wei, Q., & Lu, Z. (2018). A multi-target brain-computer interface based on code modulated visual evoked potentials. *PLOS One*, 13(8), e0202478. Retrieved from <https://doi.org/10.1371/journal.pone.0202478> doi: 10.1371/journal.pone.0202478
- Luo, D., & Huang, Z. (2019). A subject-transfer study on detecting c-VEP. In *2019 Chinese Automation Congress (CAC)* (pp. 2956–2959). Retrieved from <https://doi.org/10.1109/CAC48633.2019.8996478> doi: 10.1109/CAC48633.2019.8996478
- Martínez-Cagigal, V., Martín-Fernández, A., Santamaría-Vázquez, E., Pascual-Roa, B., Ruiz-Gálvez, R., & Hornero, R. (2025). Advancing asynchronous c-VEP-based BCIs: A pilot study. In J. L. Pons, J. Tornero, & M. Akay (Eds.), *Converging clinical and engineering research on neurorehabilitation v* (pp. 690–693). Cham: Springer Nature Switzerland. Retrieved from [https://doi.org/10.1007/978-3-031-77588-8\\_135](https://doi.org/10.1007/978-3-031-77588-8_135) doi: 10.1007/978-3-031-77588-8\_135
- Martínez-Cagigal, V., Santamaría-Vázquez, E., & Hornero, R. (2023). Toward early stopping detection for non-binary c-vep-based bcis: A pilot study. In I. Rojas, G. Joya, & A. Catala (Eds.), *Advances in Computational Intelligence* (pp. 580–590). Cham: Springer Nature Switzerland. Retrieved from [https://doi.org/10.1007/978-3-031-43078-7\\_47](https://doi.org/10.1007/978-3-031-43078-7_47) doi: 10.1007/978-3-031-43078-7\_47
- Martínez-Cagigal, V., Santamaría-Vázquez, E., Pérez-Velasco, S., Marcos-Martínez, D., Moreno-Calderón, S., & Hornero, R. (2023). Non-binary m-sequences for more comfortable brain–computer interfaces based on c-VEPs. *Expert Systems with Applications*, 232, 120815. Retrieved from <https://doi.org/10.1016/j.eswa.2023.120815> doi: 10.1016/j.eswa.2023.120815
- Martínez-Cagigal, V., Santamaría-Vázquez, E., Pérez-Velasco, S., Martín-Fernández, A., & Hornero, R. (2025). Reevaluating performance in c-VEP BCIs: The impact of calibration time. *Biocybernetics and Biomedical Engineering*, 45(4), 685–696. Retrieved from <https://doi.org/10.1016/j.bbe.2025.10.006> doi: 10.1016/j.bbe.2025.10.006
- Martínez-Cagigal, V., Thielen, J., Hornero, R., & Desain, P. (2025). The role of code-modulated evoked potentials in next-generation brain-computer interfacing. *Frontiers in Human Neuroscience*, 19, 1548183. Retrieved from <https://doi.org/10.3389/fnhum.2025.1548183> doi: 10.3389/fnhum.2025.1548183
- Martínez-Cagigal, V., Thielen, J., Santamaría-Vázquez, E., Pérez-Velasco, S., Desain, P., & Hornero, R. (2021). Brain–computer interfaces based on code-modulated visual evoked potentials (c-VEP): a literature review. *Journal of Neural Engineering*, 18, 061002. Retrieved from <https://doi.org/10.1088/1741-2552/ac38cf> doi: 10.1088/1741-2552/ac38cf
- Martín-Fernández, A., Martínez-Cagigal, V., Moreno-Calderón, S., Santamaría-Vázquez, E., & Hornero, R. (2025). Enhancing user experience in c-VEP-based BCI: Effects of visual stimulus opacity on performance and visual fatigue. *Biomedical Signal Processing and Control*, 108, 107894. Retrieved from <https://doi.org/10.1016/j.bspc.2025.107894> doi: 10.1016/j.bspc.2025.107894
- Martín-Fernández, A., Martínez-Cagigal, V., Moreno-Calderón, S., Santamaría-Vázquez, E., Pascual-Roa, B., & Hornero, R. (2025). Exploring code-modulated visual evoked potentials spellers in realistic scenarios. In *International work-conference on artificial neural networks* (pp. 521–532). Retrieved from [https://doi.org/10.1007/978-3-032-02728-3\\_42](https://doi.org/10.1007/978-3-032-02728-3_42) doi: 10.1007/978-3-032-02728-3\_42

- Martínez-Cagigal, V., Álvaro Fernández-Rodríguez, Santamaría-Vázquez, E., Martín-Fernández, A., & Hornero, R. (2024). Assessing calibration durations for c-VEP-based BCIs: Insights from non-binary patterns and spatial frequency variations. In *9th Graz Brain-Computer Interface Conference 2024* (pp. 230–235). Retrieved from <https://doi.org/10.3217/978-3-99161-014-4-041> doi: 10.3217/978-3-99161-014-4-041
- Matsuno, S., Itakura, N., Mizuno, T., & Mito, K. (2019). Examination of multi-optioning for cVEP-based BCI by fluctuation of indicator lighting intervals and luminance. In *2019 IEEE International Conference on Systems, Man and Cybernetics (SMC)* (pp. 2743–2747). Retrieved from <https://doi.org/10.1109/SMC.2019.8914445> doi: 10.1109/SMC.2019.8914445
- Miao, Y., Shi, N., Huang, C., Song, Y., Chen, X., Wang, Y., & Gao, X. (2024). High-performance c-VEP-BCI under minimal calibration. *Expert Systems with Applications*, 249, 123679. Retrieved from <https://doi.org/10.1016/j.eswa.2024.123679> doi: 10.1016/j.eswa.2024.123679
- Miao, Z., Meunier, A., Žák, M. R., & Grosse-Wentrup, M. (2024). Exploring artificial neural network models for c-VEP decoding in a brain-artificial intelligence interface. In *2024 ieee international conference on bioinformatics and biomedicine (bibr)* (pp. 4178–4183). Retrieved from <https://eprints.cs.univie.ac.at/8197/>
- Mohebbi, A., Engelholm, S. K., Puthusserypady, S., Kjaer, T. W., Thomsen, C. E., & Sorensen, H. B. (2015). A brain computer interface for robust wheelchair control application based on pseudorandom code modulated visual evoked potential. In *2015 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)* (pp. 602–605). Retrieved from <https://doi.org/10.1109/EMBC.2015.7318434> doi: 10.1109/EMBC.2015.7318434
- Momose, K. (2007). Evaluation of an eye gaze point detection method using VEP elicited by multi-pseudorandom stimulation for brain computer interface. In *2007 29th Annual International Conference of the IEEE Engineering in Medicine and Biology Society* (pp. 5063–5066). Retrieved from <https://doi.org/10.1109/IEMBS.2007.4353478> doi: 10.1109/IEMBS.2007.4353478
- Momose, K. (2008). Simultaneous detection method of P300 event-related potentials and eye gaze point using multi-pseudorandom and flash stimulation for brain computer interface. In *2008 30th Annual International Conference of the IEEE Engineering in Medicine and Biology Society* (pp. 666–669). Retrieved from <https://doi.org/10.1109/IEMBS.2008.4649240> doi: 10.1109/IEMBS.2008.4649240
- Moreno-Calderón, S., Martínez-Cagigal, V., Santamaría-Vázquez, E., Pérez-Velasco, S., Marcos-Martínez, D., & Hornero, R. (2023). Combining brain-computer interfaces and multiplayer video games: an application based on c-VEPs. *Frontiers in Human Neuroscience*, 17. Retrieved from <https://doi.org/10.3389/fnhum.2023.1227727> doi: 10.3389/fnhum.2023.1227727
- Moreno-Calderón, S., Martínez-Cagigal, V., Martín-Fernández, A., Santamaría-Vázquez, E., & Hornero, R. (2025). Toward the integration of mixed reality and brain-computer interfaces based on code-modulated visual evoked potentials. *Biocybernetics and Biomedical Engineering*, 45(3), 528–538. Retrieved from <https://doi.org/10.1016/j.bbe.2025.06.003> doi: 10.1016/j.bbe.2025.06.003
- Moreno-Calderón, S., Martínez-Cagigal, V., Martín-Fernández, A., Santamaría-Vázquez, E., Pascual-Roa, B., & Hornero, R. (2025). Exploring the integration of c-VEP-based BCI spellers in mixed reality: A pilot study. In *Advances in Computational Intelligence* (pp. 584–594). Retrieved from [https://doi.org/10.1007/978-3-032-02728-3\\_47](https://doi.org/10.1007/978-3-032-02728-3_47) doi: 10.1007/978-3-032-02728-3\_47
- Nagel, S. (2019). *Towards a home-use BCI: fast asynchronous control and robust non-control state detection* (Unpublished doctoral dissertation). Universität Tübingen.
- Nagel, S., Dreher, W., Rosenstiel, W., & Spüler, M. (2018). The effect of monitor raster latency on VEPs, ERPs and brain-computer interface performance. *Journal of Neuroscience Methods*, 295, 45–50. Retrieved from <https://doi.org/10.1016/j.jneumeth.2017.11.018> doi: 10.1016/j.jneumeth.2017.11.018
- Nagel, S., Rosenstiel, W., & Spüler, M. (2017). Random visual evoked potentials (rVEP) for brain-computer interface (BCI) control. In *7th Graz Brain-Computer Interface Conference 2017* (pp. 349–354). Retrieved from <https://doi.org/10.3217/978-3-85125-533-1-64> doi: 10.3217/978-3-85125-533-1-64
- Nagel, S., Rosenstiel, W., & Spüler, M. (2018). Finding optimal stimulation patterns for BCIs based on visual evoked potentials. In *Proceedings of the 7th International Brain-Computer Interface Meeting. BCI Society* (pp. 164–165). Retrieved from <https://bcisociety.org/wp-content/uploads/2019/03/2018AbstractBook.pdf>
- Nagel, S., & Spüler, M. (2018). Modelling the brain response to arbitrary visual stimulation patterns for a flexible high-speed brain-computer interface. *PLOS One*, 13(10), e0206107. Retrieved from <https://doi.org/10.1371/journal.pone.0206107> doi: 10.1371/journal.pone.0206107
- Nagel, S., & Spüler, M. (2019a). Asynchronous non-invasive high-speed BCI speller with robust non-control state detection. *Scientific Reports*, 9(1), 1–9. Retrieved from <https://doi.org/10.1038/s41598-019-44645-x> doi: 10.1038/s41598-019-44645-x

- Nagel, S., & Spüler, M. (2019b). World's fastest brain-computer interface: combining EEG2Code with deep learning. *PLOS One*, 14(9), e0221909. Retrieved from <https://doi.org/10.1371/journal.pone.0221909> doi: 10.1371/journal.pone.0221909
- Nair, K., & Cecotti, H. (2025). Deep learning architectures for code-modulated visual evoked potentials detection. *arXiv preprint arXiv:2511.21940*. Retrieved from <https://doi.org/10.48550/arXiv.2511.21940> doi: 10.48550/arXiv.2511.21940
- Nakanishi, M., & Mitsukura, Y. (2012). Periodicity detection for BCI based on periodic code modulation visual evoked potentials. In *2012 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)* (pp. 665–668). Retrieved from <https://doi.org/10.1109/ICASSP.2012.6287971> doi: 10.1109/ICASSP.2012.6287971
- Narayanan, S., Ahmadi, S., Desain, P., & Thielen, J. (2024). Towards gaze-independent c-VEP BCI: A pilot study. In *9th Graz Brain-Computer Interface Conference 2024* (pp. 343–348). Retrieved from <https://doi.org/10.3217/978-3-99161-014-4-060> doi: 10.3217/978-3-99161-014-4-060
- Nezamfar, H., Mohseni Salehi, S., Higger, M., & Erdoganmus, D. (2018). Code-VEP vs. eye tracking: A comparison study. *Brain Sciences*, 8(7), 130. Retrieved from <https://doi.org/10.3390/brainsci8070130> doi: 10.3390/brainsci8070130
- Nezamfar, H., Orhan, U., Erdoganmus, D., Hild, K., Purwar, S., Oken, B., & Fried-Oken, M. (2011). On visually evoked potentials in eeg induced by multiple pseudorandom binary sequences for brain computer interface design. In *2011 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)* (pp. 2044–2047). Retrieved from <https://doi.org/10.1109/ICASSP.2011.5946914> doi: 10.1109/ICASSP.2011.5946914
- Nezamfar, H., Orhan, U., Purwar, S., Hild, K., Oken, B., & Erdoganmus, D. (2011). Decoding of multichannel EEG activity from the visual cortex in response to pseudorandom binary sequences of visual stimuli. *International Journal of Imaging Systems and Technology*, 21(2), 139–147. Retrieved from <https://doi.org/10.1002/ima.20288> doi: 10.1002/ima.20288
- Nezamfar, H., Salehi, S. S. M., & Erdoganmus, D. (2015). Stimuli with opponent colors and higher bit rate enable higher accuracy for c-VEP BCI. In *2015 IEEE Signal Processing in Medicine and Biology Symposium (SPMB)* (pp. 1–6). Retrieved from <https://doi.org/10.1109/SPMB.2015.7405476> doi: 10.1109/SPMB.2015.7405476
- Nezamfar, H., Salehi, S. S. M., Moghadamfalahi, M., & Erdoganmus, D. (2016). Flashtype<sup>TM</sup>: A context-aware c-VEP-based BCI typing interface using EEG signals. *IEEE Journal of Selected Topics in Signal Processing*, 10(5), 932–941. Retrieved from <https://doi.org/10.1109/JSTSP.2016.2552140> doi: 10.1109/JSTSP.2016.2552140
- Peng, F., & Huang, Z. (2019). A c-VEP BCI system for psychological experiments. In *2019 12th International Congress on Image and Signal Processing, BioMedical Engineering and Informatics (CISP-BMEI)* (pp. 1–5). Retrieved from <https://doi.org/10.1109/CISP-BMEI48845.2019.8966018> doi: 10.1109/CISP-BMEI48845.2019.8966018
- Qu, H., Zhao, H., Wei, Q., Pei, W., Gao, X., & Wang, Y. (2024). Combing multiple visual stimuli to enhance the performance of VEP-based biometrics. *IEEE Transactions on Information Forensics and Security*, 19, 7982–7993. Retrieved from <https://doi.org/10.1109/TIFS.2024.3452628> doi: 10.1109/TIFS.2024.3452628
- Riechmann, H., Finke, A., & Ritter, H. (2013). Hierarchical codebook visually evoked potentials for fast and flexible BCIs. In *2013 35th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)* (pp. 2776–2779). Retrieved from <https://doi.org/10.1109/EMBC.2013.6610116> doi: 10.1109/EMBC.2013.6610116
- Riechmann, H., Finke, A., & Ritter, H. (2016). Using a cVEP-based brain-computer interface to control a virtual agent. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 24(6), 692–699. Retrieved from <https://doi.org/10.1109/TNSRE.2015.2490621> doi: 10.1109/TNSRE.2015.2490621
- Santamaría-Vázquez, E., Martínez-Cagigal, V., & Hornero, R. (2023). Bit-wise reconstruction of non-binary visual stimulation patterns from EEG using deep learning: A promising alternative for user-friendly high-speed c-VEP-based BCIs. In I. Rojas, G. Joya, & A. Catala (Eds.), *Advances in Computational Intelligence* (pp. 603–614). Cham: Springer Nature Switzerland. Retrieved from [https://doi.org/10.1007/978-3-031-43078-7\\_49](https://doi.org/10.1007/978-3-031-43078-7_49) doi: 10.1007/978-3-031-43078-7\_49
- Santamaría-Vázquez, E., Martínez-Cagigal, V., Ruiz-Gálvez, R., Martín-Fernández, A., Pascual-Roa, B., & Hornero, R. (2025). Towards calibration-free user-friendly c-VEP-based BCIs: An exploratory study using deep-learning. In J. L. Pons, J. Tornero, & M. Akay (Eds.), *Converging clinical and engineering research on neurorehabilitation v* (pp. 685–689). Cham: Springer Nature Switzerland. Retrieved from [https://doi.org/10.1007/978-3-031-77588-8\\_134](https://doi.org/10.1007/978-3-031-77588-8_134) doi: 10.1007/978-3-031-77588-8\_134

- Sato, J.-i., & Washizawa, Y. (2015). Reliability-based automatic repeat request for short code modulation visual evoked potentials in brain computer interfaces. In *2015 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)* (pp. 562–565). Retrieved from <https://doi.org/10.1109/EMBC.2015.7318424> doi: 10.1109/EMBC.2015.7318424
- Sato, J.-i., & Washizawa, Y. (2016). Neural decoding of code modulated visual evoked potentials by spatio-temporal inverse filtering for brain computer interfaces. In *2016 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)* (pp. 1484–1487). Retrieved from <https://doi.org/10.1109/EMBC.2016.7590990> doi: 10.1109/EMBC.2016.7590990
- Scheppink, H. A., Ahmadi, S., Desain, P., Tangermann, M., & Thielen, J. (2024). Towards auditory attention decoding with noise-tagging: A pilot study. In *9th Graz Brain-Computer Interface Conference 2024* (pp. 337–342). Retrieved from <https://doi.org/10.3217/978-3-99161-014-4-059> doi: 10.3217/978-3-99161-014-4-059
- Scheppink, H. A., Cantürk, A., & Volosyak, I. (2025). BCI with intuitive object control based on code-modulated visual evoked potentials. In *International work-conference on artificial neural networks* (pp. 572–583). Retrieved from [https://doi.org/10.1007/978-3-032-02728-3\\_46](https://doi.org/10.1007/978-3-032-02728-3_46) doi: 10.1007/978-3-032-02728-3\_46
- Shi, N., Miao, Y., Huang, C., Li, X., Song, Y., Chen, X., ... Gao, X. (2024). Estimating and approaching the maximum information rate of noninvasive visual brain-computer interface. *NeuroImage*, 289, 120548. Retrieved from <https://doi.org/10.1016/j.neuroimage.2024.120548> doi: 10.1016/j.neuroimage.2024.120548
- Shirzhiyan, Z., Keihani, A., Farahi, M., Shamsi, E., GolMohammadi, M., Mahnam, A., ... Jafari, A. H. (2019). Introducing chaotic codes for the modulation of code modulated visual evoked potentials (c-VEP) in normal adults for visual fatigue reduction. *PLOS One*, 14(3), e0213197. Retrieved from <https://doi.org/10.1371/journal.pone.0213197> doi: 10.1371/journal.pone.0213197
- Shirzhiyan, Z., Keihani, A., Farahi, M., Shamsi, E., GolMohammadi, M., Mahnam, A., ... Jafari, A. H. (2020). Toward new modalities in VEP-based BCI applications using dynamical stimuli: Introducing quasi-periodic and chaotic VEP-based BCI. *Frontiers in Neuroscience*, 14. Retrieved from <https://doi.org/10.3389/fnins.2020.534619> doi: 10.3389/fnins.2020.534619
- Spüler, M. (2015). A brain-computer interface (BCI) system to use arbitrary Windows applications by directly controlling mouse and keyboard. In *2015 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)* (pp. 1087–1090). Retrieved from <https://doi.org/10.1109/EMBC.2015.7318554> doi: 10.1109/EMBC.2015.7318554
- Spüler, M. (2017). A high-speed brain-computer interface (BCI) using dry EEG electrodes. *PLOS One*, 12(2), e0172400. Retrieved from <https://doi.org/10.1371/journal.pone.0172400> doi: 10.1371/journal.pone.0172400
- Spüler, M., & Kurek, S. (2018). Alpha-band lateralization during auditory selective attention for brain–computer interface control. *Brain-Computer Interfaces*, 5(1), 23–29. Retrieved from <https://doi.org/10.1080/2326263X.2017.1415496> doi: 10.1080/2326263X.2017.1415496
- Spüler, M., Rosenstiel, W., & Bogdan, M. (2012a). One class SVM and canonical correlation analysis increase performance in a c-VEP based brain-computer interface (BCI). In *ESANN*. Retrieved from <https://www.esann.org/sites/default/files/proceedings/legacy/es2012-18.pdf>
- Spüler, M., Rosenstiel, W., & Bogdan, M. (2012b). Online adaptation of a c-VEP brain-computer interface (BCI) based on error-related potentials and unsupervised learning. *PLOS One*, 7(12), e51077. Retrieved from <https://doi.org/10.1371/journal.pone.0051077> doi: 10.1371/journal.pone.0051077
- Spüler, M., Rosenstiel, W., & Bogdan, M. (2013a). Unsupervised BCI calibration as possibility for communication in CLIS patients. In *Proceedings of the Fifth International Brain-Computer Interface Meeting* (Vol. 2013). Retrieved from <https://doi.org/10.3217/978-3-85125-260-6-122> doi: 10.3217/978-3-85125-260-6-122
- Spüler, M., Rosenstiel, W., & Bogdan, M. (2013b). Unsupervised online calibration of a c-VEP brain-computer interface (BCI). In *International Conference on Artificial Neural Networks* (pp. 224–231). Retrieved from [https://doi.org/10.1007/978-3-642-40728-4\\_28](https://doi.org/10.1007/978-3-642-40728-4_28) doi: 10.1007/978-3-642-40728-4\_28
- Spüler, M., Walter, A., Rosenstiel, W., & Bogdan, M. (2013). Spatial filtering based on canonical correlation analysis for classification of evoked or event-related potentials in EEG data. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 22(6), 1097–1103. Retrieved from <https://doi.org/10.1109/TNSRE.2013.2290870> doi: 10.1109/TNSRE.2013.2290870
- Stawicki, P., & Volosyak, I. (2022). cVEP training data validation – towards optimal training set composition from multi-day data. *Brain Sciences*, 12(2). Retrieved from <https://doi.org/10.3390/brainsci12020234> doi: 10.3390/brainsci12020234

- Sun, Q., Zhang, S., Dong, G., Pei, W., Gao, X., & Wang, Y. (2024). High-density electroencephalogram facilitates the detection of small stimuli in code-modulated visual evoked potential brain–computer interfaces. *Sensors*, 24(11), 3521. Retrieved from <https://doi.org/10.3390/s24113521> doi: 10.3390/s24113521
- Sun, Q., Zheng, L., Pei, W., Gao, X., & Wang, Y. (2022). A 120-target brain-computer interface based on code-modulated visual evoked potentials. *Journal of Neuroscience Methods*, 375, 109597. Retrieved from <https://doi.org/10.1016/j.jneumeth.2022.109597> doi: 10.1016/j.jneumeth.2022.109597
- Sutter, E. E. (1984). The visual evoked response as a communication channel. In *Proceedings of the IEEE Symposium on Biosensors* (pp. 95–100).
- Sutter, E. E. (1992). The brain response interface: communication through visually-induced electrical brain responses. *Journal of Microcomputer Applications*, 15(1), 31–45. Retrieved from [https://doi.org/10.1016/0745-7138\(92\)90045-7](https://doi.org/10.1016/0745-7138(92)90045-7) doi: 10.1016/0745-7138(92)90045-7
- Tangermann, M., Chevallier, S., Dold, M., Guetschel, P., Kobler, R., Papadopoulo, T., & Thielen, J. (2025). Learning from small datasets—review of workshop 6 of the 10th international BCI meeting 2023. *Journal of Neural Engineering*.
- Thielen, J. (2023). Effects of stimulus sequences on brain-computer interfaces using code-modulated visual evoked potentials: An offline simulation. In I. Rojas, G. Joya, & A. Catala (Eds.), *Advances in Computational Intelligence* (pp. 555–568). Cham: Springer Nature Switzerland. Retrieved from [https://doi.org/10.1007/978-3-031-43078-7\\_45](https://doi.org/10.1007/978-3-031-43078-7_45) doi: 10.1007/978-3-031-43078-7\_45
- Thielen, J. (2025a). Addressing BCI inefficiency in c-VEP-based BCIs: A comprehensive study of neurophysiological predictors, binary stimulus sequences, and user comfort. *Biomedical Physics & Engineering Express*. Retrieved from <https://doi.org/10.1088/2057-1976/ade316> doi: 10.1088/2057-1976/ade316
- Thielen, J. (2025b). *Binary stimulus sequences for brain-computer interfaces (BCI) using the code-modulated-visual evoked potential (c-VEP)*. Radboud University. Retrieved from <https://doi.org/10.34973/6dw9-0924> doi: 10.34973/6dw9-0924
- Thielen, J., Cornelje, G., van der Werff, F., & Desain, P. (2023). A comparison of stimulus sequences for code-modulated visual evoked potential (c-VEP) based BCI. In N. Mrachacz-Kersting, J. Collinger, D. Mattia, D. Valeriani, M. Vansteensel, & G. Müller-Putz (Eds.), *Proceedings of the 10th International Brain-Computer Interface Meeting 2023: Balancing Innovation and Translation*. Retrieved from <https://doi.org/10.3217/978-3-85125-962-9-139> doi: 10.3217/978-3-85125-962-9-139
- Thielen, J., Farquhar, J., & Desain, P. (2016). Re(convolution: accurate response prediction for BBVEP-based BCI. In G. R. Müller-Putz, J. E. Huggins, & D. Steyrl (Eds.), *Proceedings of the Sixth International Brain-Computer Interface Meeting: BCI Past, Present, and Future*. Retrieved from <https://doi.org/10.3217/978-3-85125-467-9-34> doi: 10.3217/978-3-85125-467-9-34
- Thielen, J., Farquhar, J., & Desain, P. (2024). *Broad-Band Visually Evoked Potentials: Re(convolution in Brain-Computer Interfacing*. Radboud University. Retrieved from <https://doi.org/10.34973/1ecz-1232> doi: 10.34973/1ecz-1232
- Thielen, J., Marsman, P., Farquhar, J., & Desain, P. (2017). Re(convolution: Accurate response prediction for broad-band evoked potentials-based brain computer interfaces. In *Brain-Computer Interface Research* (pp. 35–42). Springer. Retrieved from [https://doi.org/10.1007/978-3-319-64373-1\\_4](https://doi.org/10.1007/978-3-319-64373-1_4) doi: 10.1007/978-3-319-64373-1\_4
- Thielen, J., Marsman, P., Farquhar, J., & Desain, P. (2021). From full calibration to zero training for a code-modulated visual evoked potentials for brain–computer interface. *Journal of Neural Engineering*, 18(5), 056007. Retrieved from <https://doi.org/10.1088/1741-2552/abecef> doi: 10.1088/1741-2552/abecef
- Thielen, J., Marsman, P., Farquhar, J., & Desain, P. (2023). *From full calibration to zero training for a code-modulated visual evoked potentials brain computer interface*. Radboud University. Retrieved from <https://doi.org/10.34973/9txv-z787> doi: 10.34973/9txv-z787
- Thielen, J., Sosulski, J., & Tangermann, M. (2024). Exploring new territory: Calibration-free decoding for c-VEP BCI. In *9th Graz Brain-Computer Interface Conference 2024* (pp. 325–330). Retrieved from <https://doi.org/10.3217/978-3-99161-014-4-057> doi: 10.3217/978-3-99161-014-4-057
- Thielen, J., Tangermann, M., Aarnoutse, E. J., Ramsey, N. F., & Vansteensel, M. J. (2025). Towards an sEEG-based BCI using code-modulated VEP: A case study showing the influence of electrode location on decoding efficiency. *Clinical neurophysiology: official journal of the International Federation of Clinical Neurophysiology*, 173, 213–215. Retrieved from <https://doi.org/10.1016/j.clinph.2025.03.034> doi: 10.1016/j.clinph.2025.03.034
- Thielen, J., van den Broek, P., Farquhar, J., & Desain, P. (2015). Broad-band visually evoked potentials: re(convolution in brain-computer interfacing. *PLOS One*, 10(7), e0133797. Retrieved from <https://doi.org/10.1371/journal.pone.0133797> doi: 10.1371/journal.pone.0133797

- Torres, J. A. R., & Daly, I. (2021). How to build a fast and accurate code-modulated brain-computer interface. *Journal of Neural Engineering*, 18, 046052. Retrieved from <https://doi.org/10.1088/1741-2552/abfaac> doi: 10.1088/1741-2552/abfaac
- Tu, Y., Hung, Y. S., Hu, L., Huang, G., Hu, Y., & Zhang, Z. (2014). An automated and fast approach to detect single-trial visual evoked potentials with application to brain-computer interface. *Clinical Neurophysiology*, 125(12), 2372–2383. Retrieved from <https://doi.org/10.1016/j.clinph.2014.03.028> doi: 10.1016/j.clinph.2014.03.028
- Turi, F., & Clerc, M. (2019). Adaptive parameter setting in a code modulated visual evoked potentials BCI. *HAL Open Science*. Retrieved from <https://inria.hal.science/hal-02303562/document>
- Turi, F., Gayraud, N., & Clerc, M. (2018). Zero-calibration cVEP BCI using word prediction: a proof of concept. *arXiv preprint arXiv:1810.03428*. Retrieved from <https://doi.org/10.48550/arXiv.1810.03428> doi: 10.48550/arXiv.1810.03428
- Turi, F., Gayraud, T., & Clerc, M. (2020). Auto-calibration of c-VEP BCI by word prediction. *HAL Open Science*. Retrieved from <https://hal.science/hal-02844024/document>
- Velut, S., Chevallier, S., Corsi, M.-C., & Dehais, F. (2024). Deep Riemannian neural architectures for domain adaptation in burst cVEP-based brain computer interface. In *Esann 2024* (pp. 571–576). Retrieved from <https://hal.science/hal-04720928/>
- Verbaarschot, C., Tump, D., Lutu, A., Borhanazad, M., Thielen, J., van den Broek, P., ... Desain, P. (2021). A visual brain-computer interface as communication aid for patients with amyotrophic lateral sclerosis. *Clinical Neurophysiology*, 132(10), 2404–2415. Retrieved from <https://doi.org/10.1016/j.clinph.2021.07.012> doi: 10.1016/j.clinph.2021.07.012
- Vodila, R., van Lohuizen, J., & Thielen, J. (2025). Toward a gaze-independent brain-computer interface using the code-modulated visual evoked potentials. In *2025 ieee 35th international workshop on machine learning for signal processing (mlsp)* (pp. 1–6). Retrieved from <https://doi.org/10.1109/MLSP62443.2025.11204258> doi: 10.1109/MLSP62443.2025.11204258
- Volosyak, I., Adepoju, F., Stawicki, P., Rulffs, P., Cantürk, A., & Henke, L. (2023). Gender influence on cvep-based bci performance. In I. Rojas, G. Joya, & A. Catala (Eds.), *Advances in Computational Intelligence* (pp. 591–602). Cham: Springer Nature Switzerland. Retrieved from [https://doi.org/10.1007/978-3-031-43078-7\\_48](https://doi.org/10.1007/978-3-031-43078-7_48) doi: 10.1007/978-3-031-43078-7\_48
- Volosyak, I., Rezeika, A., Benda, M., Gembler, F., & Stawicki, P. (2020). Towards solving of the illiteracy phenomenon for VEP-based brain-computer interfaces. *Biomedical Physics & Engineering Express*, 6(3), 035034. Retrieved from <https://doi.org/10.1088/2057-1976/ab87e6> doi: 10.1088/2057-1976/ab87e6
- Waytowich, N. R., & Krusienski, D. J. (2015). Spatial decoupling of targets and flashing stimuli for visual brain-computer interfaces. *Journal of Neural Engineering*, 12(3), 036006. Retrieved from <https://doi.org/10.1088/1741-2560/12/3/036006> doi: 10.1088/1741-2560/12/3/036006
- Wei, Q., Feng, S., & Lu, Z. (2016). Stimulus specificity of brain-computer interfaces based on code modulation visual evoked potentials. *PLOS One*, 11(5), e0156416. Retrieved from <https://doi.org/10.1371/journal.pone.0156416> doi: 10.1371/journal.pone.0156416
- Wei, Q., Gong, H., & Lu, Z. (2017). Grouping modulation with different codes for improving performance in cVEP-based brain-computer interfaces. *Electronics Letters*, 53(4), 214–216. Retrieved from <https://doi.org/10.1049/el.2016.4006> doi: 10.1049/el.2016.4006
- Wei, Q., Huang, Y., Li, M., & Lu, Z. (2016). VEP-based brain-computer interfaces modulated by Golay complementary series for improving performance. *Technology and Health Care*, 24(s2), S541–S549. Retrieved from <https://doi.org/10.3233/THC-161180> doi: 10.3233/THC-161180
- Wei, Q., Liu, Y., Gao, X., Wang, Y., Yang, C., Lu, Z., & Gong, H. (2018). A novel c-VEP BCI paradigm for increasing the number of stimulus targets based on grouping modulation with different codes. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 26(6), 1178–1187. Retrieved from <https://doi.org/10.1109/TNSRE.2018.2837501> doi: 10.1109/TNSRE.2018.2837501
- Wittevrongel, B., Van Wolputte, E., & Van Hulle, M. M. (2017). Code-modulated visual evoked potentials using fast stimulus presentation and spatiotemporal beamformer decoding. *Scientific Reports*, 7(1), 15037. Retrieved from <https://doi.org/10.1038/s41598-017-15373-x> doi: 10.1038/s41598-017-15373-x
- Wolf, P., & Götzelmüller, T. (2023). VEPdgets: Towards richer interaction elements based on visually evoked potentials. *Sensors*, 23(22), 9127. Retrieved from <https://doi.org/10.3390/s23229127> doi: 10.3390/s23229127

- Xu, H., Hsu, S.-H., Nakanishi, M., Lin, Y., Jung, T.-P., & Cauwenberghs, G. (2023). Stimulus design for visual evoked potential based brain-computer interfaces. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*. Retrieved from <https://doi.org/10.1109/TNSRE.2023.3280081> doi: 10.1109/TNSRE.2023.3280081
- Yasinzai, M. N., & Ider, Y. Z. (2020). New approach for designing cVEP BCI stimuli based on superposition of edge responses. *Biomedical Physics & Engineering Express*, 6(4), 045018. Retrieved from <https://doi.org/10.1088/2057-1976/ab98e7> doi: 10.1088/2057-1976/ab98e7
- Ying, J., Wei, Q., & Zhou, X. (2022). Riemannian geometry-based transfer learning for reducing training time in c-VEP BCIs. *Scientific Reports*, 12(1), 1–15. Retrieved from <https://doi.org/10.1038/s41598-022-14026-y> doi: 10.1038/s41598-022-14026-y
- Yu, F., Rao, Z., Chen, N., Liu, L., & Jiang, M. (2025). ArmBCIsys: Robot arm bci system with time-frequency network for multiobject grasping. *IEEE Transactions on Neural Networks and Learning Systems*, 1–15. Retrieved from <https://doi.org/10.1109/TNNLS.2025.3579332> doi: 10.1109/TNNLS.2025.3579332
- Zarei, A., & Asl, B. M. (2022a). Automatic detection of code-modulated visual evoked potentials using novel covariance estimators and short-time EEG signals. *Computers in Biology and Medicine*, 105771. Retrieved from <https://doi.org/10.1016/j.combiomed.2022.105771> doi: 10.1016/j.combiomed.2022.105771
- Zarei, A., & Asl, B. M. (2022b). Classification of code-modulated visual evoked potentials using adaptive modified covariance beamformer and EEG signals. *Computer Methods and Programs in Biomedicine*, 221, 106859. Retrieved from <https://doi.org/10.1016/j.cmpb.2022.106859> doi: 10.1016/j.cmpb.2022.106859
- Zhao, H., Wang, Y., Liu, Z., Pei, W., & Chen, H. (2019). Individual identification based on code-modulated visual-evoked potentials. *IEEE Transactions on Information Forensics and Security*, 14(12), 3206–3216. Retrieved from <https://doi.org/10.1109/TIFS.2019.2912272> doi: 10.1109/TIFS.2019.2912272
- Zheng, L., Dong, Y., Pei, W., Gao, X., & Wang, Y. (2025). Implementing a calibration-free bci with a large instruction set of 504 targets. Available at SSRN 5205963. Retrieved from <http://doi.org/10.2139/ssrn.5205963> doi: 10.2139/ssrn.5205963
- Zheng, L., Dong, Y., Tian, S., Pei, W., Gao, X., & Wang, Y. (2024). A calibration-free c-VEP based BCI employing narrow-band random sequences. *Journal of Neural Engineering*, 21, 026023. Retrieved from <https://doi.org/10.1088/1741-2552/ad3679> doi: 10.1088/1741-2552/ad3679
- Zheng, L., Pei, W., Gao, X., Zhang, L., & Wang, Y. (2022). A high-performance brain switch based on code-modulated visual evoked potentials. *Journal of Neural Engineering*, 19, 016002. Retrieved from <https://doi.org/10.1088/1741-2552/ac494f> doi: 10.1088/1741-2552/ac494f
- Zheng, L., Tian, S., Dong, Y., Pei, W., Gao, X., & Wang, Y. (2024). A large dataset for VEP based brain-computer interfaces employing narrow-band code modulation and frequency-phase modulation. *Brain-Apparatus Communication: A Journal of Bacomics*, 3(1), 2383860. Retrieved from <https://doi.org/10.1080/27706710.2024.2383860> doi: 10.1080/27706710.2024.2383860
- Zheng, L., Wang, Y., Pei, W., & Chen, H. (2019). A fast brain switch based on multi-class code-modulated VEPs. In *2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)* (pp. 3058–3061). Retrieved from <https://doi.org/10.1109/EMBC.2019.8857617> doi: 10.1109/EMBC.2019.8857617

