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Forskningsprofil

My primary research areas are centered around control of external devices using the electrophysiological signals from the body, especially from the brain and muscles. I am working with Brain-Computer Interfaces for stroke, cerebral palsy and multiple sclerosis rehabilitation and to allow control of assistive devices for individuals with severe motor impairments after e.g. spinal cord injury or ALS (amyotrophic lateral sclerosis). The assistive technology include robots, exoskeletons, and computers. Besides signal processing and pattern recognition, I focus on the application of the control interfaces in terms of induction of plasticity in the human nervous system, rehabilitation (movement restoration and replacement), and gaming for increased motivation in the rehabilitation process. Lastly, my research involves quantifying changes in the brain associated with various neurological conditions (stroke, Mild Cognitive Impairment etc.), and changes throughout the human nervous system in response to various types of interventions for rehabilitation and basic science using magnetic and electrical stimulation.

Kvalifikationer

Biomedical Engineering, PhD, Analysis of Movement-Related Cortical Potentials for Brain-Computer Interfacing in Stroke Rehabilitation
1 sep. 2012 → 15 okt. 2015
Dimissionsdato: 15 okt. 2015

Management - CBS, Research Management Course
26 okt. 2021 → 4 mar. 2022

Project management, Project management for Researchers
maj 2018 → aug. 2018

Adjunktpædagogikum
1 nov. 2015 → 31 dec. 2016

Biomedical Engineering, Master of Science
1 sep. 2010 → 30 jun. 2012

Entrepreneurship, Student Entrepreneurship at Aalborg University
2010 → 2012

Biomedical Engineering, Bachelor of Science
1 sep. 2007 → 30 jun. 2010

Ansættelse

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1 apr. 2021 → present

Publikationer

Experience of Virtual Help in a Simulated BCI Stroke Rehabilitation Serious Game and How to Measure It
Hougaard, B. I., Knoche, H., Kristensen, M. S. & Jochumsen, M. R., 26 apr. 2025, I: Sensors.

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Dinesen, B., Albertsen, A. E., Joensen, E. D. R., Spindler, H., Jensen, K. M., Kidholm, K., Frost, L., Dittman, L., Gunasegaram, M., Johnsen, S. P., Jochumsen, M. R. & Svenstrup, D., 18 feb. 2025, I: JMIR Research Protocols. 14, s. e64259 e64259.

Kommunikation med tankens kraft
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Mastering Tongue-Computer Interfaces: A Pilot Study on How Users Improve Over Time
Cardoso, A. S. S., Kæseler, R. L., Ammitzbøll, A., Hagen, E.-M., Blicher, J., Obál, I., Kirtas, O., Khan, J. S., Mohammadi, M., Jochumsen, M. R. & Struijk, L. N. S. A., 2025, (Accepteret/In press) *47th Annual International Conference of the IEEE Engineering in Medicine and Biology Society.*

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Utilizing machine learning to predict episodes of atrial fibrillation based on sleep parameters extracted from an in-bed sleep sensor
Gunasegaram, M., Dinesen, B., Røge, K., Svenstrup, D., Frost, L., Albertsen, A. E. & Jochumsen, M. R., okt. 2024.

Detection of Movement-Related Brain Activity Associated with Hand and Tongue Movements from Single-Trial Around-Ear EEG
Gulyás, D. & Jochumsen, M., 17 sep. 2024, I: Sensors (Basel, Switzerland). 24, 18, 6004.

Single-trial movement intention detection estimation in patients with Parkinson's disease: a movement-related cortical potential study
Jochumsen, M., Poulsen, K. B., Sørensen, S. L., Sulkjær, C. S., Corydon, F. K., Strauss, L. S. & Roos, J. B., 1 aug. 2024, I: Journal of Neural Engineering. 21, 4, 046036.

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The Effect of Caffeine on Movement-Related Cortical Potential Morphology and Detection
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"Future patient II" telerehabilitation for patients with heart failure: Protocol for a randomized controlled trial
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Evaluation of an adaptive hybrid tongue-brain control framework by individuals with amyotrophic lateral sclerosis
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Adapting to progressive paralysis: A tongue-brain hybrid robot interface for individuals with amyotrophic lateral sclerosis
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Brain patterns generated while using a tongue control interface: a preliminary study with two individuals with ALS
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Can water-based EEG caps record robust movement-related cortical potentials (MRCPs) for single and multiple joint movements?
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Implementing Performance Accommodation Mechanisms in Online BCI for Stroke Rehabilitation: A Study on Perceived Control and Frustration
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Modulating Heart Rate Variability through Deep Breathing Exercises and Transcutaneous Auricular Vagus Nerve Stimulation: A Study in Healthy Participants and in Patients with Rheumatoid Arthritis or Systemic Lupus Erythematosus
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Investigating the Dose-Response Relationship between Deep Breathing and Heart Rate Variability in Healthy Participants and Across-Days Reliability in Patients with Rheumatoid Arthritis and Systemic Lupus Erythematosus
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Manual 3D Control of an Assistive Robotic Manipulator Using Alpha Rhythms and an Auditory Menu: A Proof-of-Concept
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The effect of transcutaneous auricular vagus nerve stimulation and deep breathing exercises on heart rate variability in healthy participants and patients with rheumatoid arthritis and systemic lupus erythematosus
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Liboriussen, C. H., Andersen, S. S., Jensen, M. K., Andersen, S. S., Jochumsen, M. R. & Kristensen, S., maj 2022, I: Annals of the Rheumatic Diseases. 81, Suppl. 1, s. 1262-1263

Scalable tensor factorization for recovering multiday missing intramuscular electromyography data
Akmal, M., Zubair, S., Jochumsen, M. R., Rehman, M. Z. U., Kamavuako, E. N., Irfan Abid, M. & Niazi, I. K., 25 apr. 2022, I: Journal of Intelligent and Fuzzy Systems. 43, 1, s. 1177-1187 11 s.

Feature- and classification analysis for detection and classification of tongue movements from single-trial pre-movement EEG
Kæseler, R. L., Johansson, T. W., Struijk, L. N. S. A. & Jochumsen, M. R., 15 mar. 2022, I: I E E E Transactions on Neural Systems and Rehabilitation Engineering. 30, s. 678-687 10 s.

Single-Trial Classification of Error-Related Potentials in People with Motor Disabilities: A Study in Cerebral Palsy, Stroke, and Amputees
Usama, N., Niazi, I. K., Dremstrup, K. & Jochumsen, M., 21 feb. 2022, I: Sensors. 22, 4, 1676.

Detection of Attempted Stroke Hand Motions from Surface EMG
Jochumsen, M. R., Waris, A. & Niazi, I. K., 2022, *Converging Clinical and Engineering Research on Neurorehabilitation IV: Proceedings of the 5th International Conference on Neurorehabilitation (ICNR2020), October 13–16, 2020.* Springer, s. 47-52 6 s. (Biosystems and Biorobotics, Bind 28).

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Kjeldsen, T. K. K., Nielsen, T. B., Ziadeh, H., Lehmann , S., Nielsen, L. D., Gulyás, D., Hougaard, B. I., Knoche, H. & Jochumsen, M. R., 15 dec. 2021, *2021 IEEE 21st International Conference on Bioinformatics and Bioengineering (BIBE).* IEEE (Institute of Electrical and Electronics Engineers), s. 1-5 5 s. 9635586. (International Conference on Bioinformatics

and Bioengineering).

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Kæseler, R. L., Struijk, L. N. S. A. & Jochumsen, M. R., dec. 2021, *IEEE 21st International Conference on Bioinformatics and Bioengineering (BIBE).* IEEE (Institute of Electrical and Electronics Engineers), 9635303. (International Conference on Bioinformatics and Bioengineering).

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Deep Breathing Increases Heart Rate Variability in Patients With Rheumatoid Arthritis and Systemic Lupus Erythematosus

Rovsing, C., Rovsing, H., Liboriussen, C. H., Jensen, M. K., Andersen, S. S., Andersen, S. S., Kristensen, S. & Jochumsen, M., okt. 2021, I: Clinical Rheumatology. 27, 7, s. 261-266 6 s.

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Detection of error-related potentials in stroke patients from EEG using an artificial neural network

Usama, N., Niazi, I. K., Dremstrup, K. & Jochumsen, M., sep. 2021, I: Sensors. 21, 18, 6274.

Who willed it? Decreasing Frustration by Manipulating Perceived Control through Fabricated Input for Stroke Rehabilitation BCI Games

Hougaard, B. I., Rossau, I. G., Czapla, J. J., Miko, M. A., Bugge Skammelsen , R., Knoche, H. & Jochumsen, M., sep. 2021, I: Proceedings of the ACM on Human-Computer Interaction. 5, s. 1-19 19 s.

The Danish Future Patient Telerehabilitation Program for Patients with Atrial Fibrillation: Design and Pilot Study in Collaboration with Patients and Their Spouses

Dinesen, B., Gade, J. D., Schacksen, C. S., Spindler, H., Albertsen, A. E., Dittmann, L., Jochumsen, M. R. & Svenstrup, D., 19 jul. 2021, I: JMIR Cardio. 5, 2, 16 s., e27321.

Decoding of Ankle Joint Movements in Stroke Patients Using Surface Electromyography

Noor, A., Waris, A., Gilani, S. O., Kashif, A. S., Jochumsen, M., Iqbal, J. & Niazi, I. K., 24 feb. 2021, I: Sensors (Basel, Switzerland). 21, 5, s. 1-15 15 s., 1575.

Investigating the Intervention Parameters of Endogenous Paired Associative Stimulation (ePAS)

Alder, G., Signal, N., Vandal, A. C., Olsen, S., Jochumsen, M., Niazi, I. K. & Taylor, D., 12 feb. 2021, I: Brain Sciences. 11 , 2, s. 1-22 22 s., 224.

Evaluation of windowing techniques for intramuscular EMG-based diagnostic, rehabilitative and assistive devices

Ashraf, H., Waris, A., Gilani, S. O., Kashif, A. S., Jamil, M., Jochumsen, M. R. & Niazi, I. K., feb. 2021, I: Journal of Neural Engineering. 18, 1, 016017.

Induction of Neural Plasticity Using a Low-Cost Open Source Brain-Computer Interface and a 3D-Printed Wrist Exoskeleton

Jochumsen, M. R., Janjua, T., Arceo Luzanilla, J. C., Lauber, J., Simoneau-Buessinger, E. & Kæseler, R. L., 15 jan. 2021, I: Sensors. 21, 2, s. 1-14 14 s., 572.

Decoding kinetic features of hand motor preparation from single-trial EEG using convolutional neural networks

Gatti, R., Atum, Y., Schiaffino, L., Jochumsen, M. & Biurrun Manresa, J., jan. 2021, I: European Journal of Neuroscience. 53, 2, s. 556-570 15 s.

Development of Future Patient - Telerehabilitation of Patients with Atrial Fibrillation
Svenstrup Møller, D., Gade, J. D., Schacksen, C. S., Spindler, H., Albertsen, A. E., Dittmann, L., Jochumsen, M. R., Mogensen, H. M. & Dinesen, B., 2021, *Abstract Book: Rehabilitation International World Congress 2021, 7–9 September 2021, Aarhus, Denmark* . s. 373 587

"Mine works better" - Examining the influence of embodiment in virtual reality on the sense of agency during a binary motor imagery task with a brain-computer interface
Ziadeh, H., Gulyás, D., Nielsen, L. D., Lehmann , S., Nielsen, T. B., Kjeldsen, T. K. K., Hougaard, B. I., Jochumsen, M. R. & Knoche, H., 2021, I: Frontiers in Psychology. 12, 11 s., 806424.

Detection and classification of tongue movements from single-trial EEG
Kæseler, R. L., Struijk, L. N. S. A. & Jochumsen, M., dec. 2020, *The 20th IEEE International Conference on BioInformatics And BioEngineering.* IEEE (Institute of Electrical and Electronics Engineers), s. 376-379 4 s. 9288026. (International Conference on Bioinformatics and Bioengineering).

Investigating the feasibility of combining EEG and EMG for controlling a hybrid human computer interface in patients with spinal cord injury
Leerskov, K., Rehman, M. Z. U., Niazi, I. K., Cremoux, S. & Jochumsen, M. R., dec. 2020, *20th IEEE Conference on Bioinformatics and Bioengineering (BIBE-2020).* IEEE Press, 8 s. 9288158. (International Conference on Bioinformatics and Bioengineering).

Decoding Attempted Hand Movements in Stroke Patients Using Surface Electromyography
Jochumsen, M., Niazi, I. K., Zia ur Rehman, M., Amjad, I., Shafique, M., Gilani, S. O. & Waris, A., 26 nov. 2020, I: Sensors. 20, 23, s. 1-14 14 s., 6763.

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Usama, N., Leerskov, K., Niazi, I. K., Dremstrup, K. & Jochumsen, M., 1 nov. 2020, I: Medical & Biological Engineering & Computing. 58, 11, s. 2699-2710 12 s.

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Waris, A., Zia Ur Rehman, M., Niazi, I. K., Jochumsen, M., Englehart, K., Jensen, W., Haavik, H. & Kamavuako, E. N., 15 jun. 2020, I: Sensors (Basel, Switzerland). 20, 12, s. 1-13 13 s., 3385.

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Jochumsen, M., Navid, M. S., Rashid, U., Haavik, H. & Niazi, I. K., 1 sep. 2019, I: IEEE Transactions on Neural Systems and Rehabilitation Engineering. 27, 9, s. 1901-1908 8 s.

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Aktiviteter

The Elsass Foundation Research Day
Jochumsen, M. R. (Deltager), Hougaard, B. I. (Deltager) & Dalgaard, K. S. (Deltager)
29 okt. 2024

Frontiers in Neuroscience (Tidsskrift)
Struijk, L. N. S. A. (Redaktør), Jochumsen, M. R. (Redaktør), Hansen, J. P. (Redaktør) & Kamavuako, E. N. (Redaktør)
14 jan. 2021 → apr. 2021

Faculté des Sciences et Métiers du Sport, University of Valenciennes
Jochumsen, M. R. (Gæsteforsker)
2017 → 2018

Auckland University of Technology
Jochumsen, M. R. (Gæsteforsker)
2015

64th Lindau Nobel Laureate Meeting on Physiology or Medicine.
Jochumsen, M. R. (Deltager)
2014

New Zealand College of Chiropractic
Jochumsen, M. R. (Gæsteforsker)
2014 → 2015

Presse/medie

Aktuelle navne: Rejsestipendier til unge forskere
Skov, I. R., Birkbak, A. & Jochumsen, M.
14/02/2014
1 element af Mediedækning

Banebrydende studie: Lam mand går ved hjælp af trådløs forbindelse
Jochumsen, M. R.
24/05/2023 → 26/05/2023
3 elementer af Mediedækning

Chips i hjernen
Jochumsen, M. R.
23/06/2024
2 elementer af Mediedækning

Computere, der vil lære at læse vores tanker
Jochumsen, M. R.

14/06/2024 → 17/06/2024
2 elementer af Mediedækning

Computere kan læse dine tanker
Jochumsen, M.
25/02/2018
1 element af Mediedækning

Computer i hjernen forvandler lam kvindes tanker til tale i realtid
Jochumsen, M. R.
02/04/2025 → 06/04/2025
3 elementer af Mediedækning

Det Frie Forskningsråd sender to unge forskere til årets nobeltræf i Tyskland
Jochumsen, M.
25/06/2014
1 element af Mediedækning

De vandt foredragskonkurrencen
Jochumsen, M.
28/11/2017
1 element af Mediedækning

De vandt foredrags- og poster-konkurrencerne
Jochumsen, M.
02/11/2015
1 element af Mediedækning

Elektroder gav lam mand bevægelse
Jochumsen, M.
29/11/2015
1 element af Mediedækning

Elektroder i hjernen giver lam mand bevægelsen igen
Jochumsen, M.
20/11/2015
2 elementer af Mediedækning

Elon Musk vil være tankelæser og forbinde din hjerne til en computer, men inden da vil han få lamme til at gå igen
Jochumsen, M. R.
17/04/2021
2 elementer af Mediedækning

"Hjerne-streaming": Implantat forvandler lam kvindes tanker til tale
Jochumsen, M. R.
23/04/2025
1 element af Mediedækning

Hjernestyrede exoskeletter kan give lammede bevægelsen tilbage
Jochumsen, M. R.
15/12/2023
1 element af Mediedækning

Kan vi ændre i kriminelles hjerner og forhindre mord?
Jochumsen, M. R.
08/12/2023

1 element af Mediedækning

Lam mand går igen
Stevenson, A. J. T. & Jochumsen, M.
24/09/2018
9 elementer af Mediedækning

Med en chip i hjernen kan man få ting til at ske med tankens kraft
Jochumsen, M. R.
25/05/2024
1 element af Mediedækning

Navne i noter
Jochumsen, M.
23/03/2014
1 element af Mediedækning

Niveauet var højt i årets konkurrence
Jochumsen, M. R.
05/12/2023
1 element af Mediedækning

Når tanke bliver til handling
Jochumsen, M.
14/01/2017
3 elementer af Mediedækning

Priser til forskere
Jochumsen, M.
06/02/2014
1 element af Mediedækning

Professoren giver håb for demente
Jochumsen, M.
06/02/2014
3 elementer af Mediedækning

På bølgelængde med hjernen
Stevenson, A. J. T., Jochumsen, M. R. & Gervasio, S.
08/02/2024 → 08/02/2024
2 elementer af Mediedækning

Robotarm læser lam mands tanker
Jochumsen, M.
22/05/2015
2 elementer af Mediedækning

Siemens Fonden gives DKK 289,800 to a series of projects with perspective within technology and science
Bak, B. L. V., Jochumsen, M. R. & Sinkjær, T.
31/05/2024
1 element af Mediedækning

Store stipendier til tre AAU-forskere
Jochumsen, M., Skov, I. R. & Birkbak, A.
06/02/2014
7 elementer af Mediedækning

Tankelæser kan få lamme aber til at gå igen
Jochumsen, M.
09/11/2016
7 elementer af Mediedækning

Tankelæser lader lam mand gribe gaffel og made sig selv
Jochumsen, M.
29/03/2017
3 elementer af Mediedækning

To projekter vil forske i ny teknologi til genoptræning
Jochumsen, M.
03/07/2018
1 element af Mediedækning

To projekter vil forske i ny teknologi til genoptræning
Jochumsen, M.
03/07/2018
1 element af Mediedækning

Vidste du det?
Jochumsen, M.
30/12/2015
1 element af Mediedækning

Projekter

Brain-controlled exoskeletons for stroke rehabilitation: Technology transfer from prototype to home use
Jochumsen, M. R. (PI (principal investigator)), Dinesen, B. (Projektdeltager), Hougaard, B. I. (Projektdeltager), Kjær, T. W. (Projektdeltager), Knoche, H. (Projektdeltager), Kidmose, P. (Projektdeltager) & Kristensen, M. S. (Projektdeltager)
Velux Fonden
01/09/2018 → 31/03/2022

Gamified brain-controlled electrical stimulation for improving hand function in individuals with Cerebral Palsy
Jochumsen, M. R. (PI (principal investigator)), Knoche, H. (Projektdeltager), Hougaard, B. I. (Projektdeltager), Dalgaard, K. S. (Projektdeltager) & Sulkjær, C. (Projektdeltager)
The Elsass Foundation
01/04/2023 → 31/03/2025

CRERoB: Grant form Louis-Hansen fonden: Center for Rehabilitation Robotics - phase II
Struijk, L. N. S. A. (PI (principal investigator)), Moeslund, T. B. (Projektdeltager), Rasmussen, J. (Projektdeltager), Jochumsen, M. R. (Projektdeltager), Jochum, E. (Projektdeltager), Glintborg, C. (Projektdeltager), Gaihede, M. (Projektdeltager), Blicher, J. U. (Projektdeltager), Obál, I. (Projektdeltager), Mohammadi, M. (Projektdeltager), Kæseler, R. L. (Projektdeltager), Bengtson, S. H. (Projektdeltager), Cardoso, A. S. S. (Projektdeltager), Khan, J. S. (Projektdeltager), Leerskov, K. (Projektdeltager), Kirtas, O. (Projektdeltager) & Bentsen, B. (Projektdeltager)
01/08/2024 → 01/10/2027

MultiRob: Independent Research Fund Denmark (grant): Multimodal control of assistive robotic arms for severely disabled individuals
Struijk, L. N. S. A. (Bevillingshaver), Johansen, D. (Projektdeltager), Pálsdóttir, Á. A. (Projektdeltager), Kæseler, R. L. (Projektdeltager), Jochumsen, M. R. (Projektdeltager), Dremstrup, K. (Projektdeltager), Dosen, S. (Projektdeltager), Cipriani, C. (Projektdeltager) & Farina, D. (Projektdeltager)
Danmarks Frie Forskningsfond | Teknologi og Produktion
01/10/2018 → 31/12/2022

Louis-Hansen fonden (grant): Center for Rehabiliteringsrobotik
Struijk, L. N. S. A. (PI (principal investigator)), Dremstrup, K. (Projektdeltager), Jochumsen, M. R. (Projektdeltager), Moeslund, T. B. (Projektdeltager), Rasmussen, J. (Projektdeltager), Gaihede, M. (Projektdeltager), Obál, I. (Projektdeltager), Bai, S. (Projektdeltager), Bak, T. (Projektdeltager), Kanstrup, A. M. (Projektdeltager), Vinge, L. (Projektdeltager), Mohammadi, M. (Projektdeltager), Bengtson, S. H. (Projektdeltager), Kobbelgaard, F. V. (Projektdeltager), Kæseler, R. L. (Projektdeltager), Thøgersen, M. (Projektdeltager), Leerskov, K. (Projektdeltager), Bentsen, B. (Projektdeltager), Johansen, D. (Projektdeltager), Pálsdóttir, Á. A. (Projektdeltager) & Kirtas, O. (Projektdeltager)
24/03/2021 → …

Louis-Hansen fonden (grant): Intelligent Hybrid Light Weight Tendon Based Exoskeleton for Severely Disabled Individuals
Struijk, L. N. S. A. (PI (principal investigator)), Dremstrup, K. (Projektdeltager), Mohammadi, M. (Projektdeltager), Jochumsen, M. R. (Projektdeltager), Moeslund, T. B. (Projektdeltager), Rasmussen, J. (Projektdeltager), Gaihede, M. (Projektdeltager), Kanstrup, A. M. (Projektdeltager), Bak, T. (Projektdeltager), Bai, S. (Projektdeltager), Obál, I. (Projektdeltager) & Vinge, L. (Projektdeltager)
24/03/2021 → …