# 2021 27th IEEE International Symposium on Asynchronous Circuits and Systems (ASYNC 2021)

Virtual Conference 7-10 September 2021



**IEEE Catalog Number: CFP21012-POD** 

ISBN: 978-1-7281-4133-6

## Copyright © 2021 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

 IEEE Catalog Number:
 CFP21012-POD

 ISBN (Print-On-Demand):
 978-1-7281-4133-6

 ISBN (Online):
 978-1-7281-4132-9

ISSN: 2643-1394

#### Additional Copies of This Publication Are Available From:

Curran Associates, Inc 57 Morehouse Lane Red Hook, NY 12571 USA

Phone: (845) 758-0400 Fax: (845) 758-2633

E-mail: curran@proceedings.com Web: www.proceedings.com



#### 27th IEEE International Symposium on Asynchronous Circuits and Systems

## **ASYNC 2021**

#### **Table of Contents**

Welcome Message from the Chairs	
Committees	
Keynotes	
Sponsors x	IV
Paper Session 1: Circuits and Methodology	
Fluid: An Asynchronous High-level Synthesis Tool for Complex Program Structures Rui Li (Yale University, USA), Lincoln Berkley (Yale University, USA), Yihang Yang (Yale University, USA), and Rajit Manohar (Yale University, USA)	. 1
Hierarchical Token Rings for Address-Event Encoding Prafull Purohit (Yale University) and Rajit Manohar (Yale University)	9
Towards Hazard-Free Multiplexer Based Implementation of Self-Timed Circuits	17
Fowards Explaining the Fault Sensitivity of Different QDI Pipeline Styles	25
Paper Session 2: Applications	
A 28nm Configurable Asynchronous SNN Accelerator with Energy-Efficient Learning	34
Self-timed Reinforcement Learning using Tsetlin Machine	<b>1</b> C

Reconfigurable ASIC Implementation of Asynchronous Recurrent Neural Networks .48
Spencer Nelson (University of Arkansas, USA), SangYun Kim (University
of Arkansas, USA), Jia Di (University of Arkansas, USA), Zhe Zhou
(Peking University, China), Zhihang Yuan (Peking University, China),
and Guangyu Sun (Peking University, China)
An Asynchronous Hybrid Pixel Image Sensor .55.
Mohamed Akrarai (University of Grenoble Alpes, France), Nils Margotat
(University of Grenoble Alpes, France), Gilles Sicard (CEA, France),
and Laurent Fesquet (University of Grenoble Alpes, France)
Industrial & Fresh Ideas Paper Session
Asynchronous Serial Infrastructure Using FPIO .62.
Andrew Lines (Intel Labs)
Audion To Joseff