

REALTIME:  
MAKING DIGITAL  
CHINA

实时

REALTIME IS AN INVESTIGATION  
ABOUT CHINA'S DIGITAL AND URBAN  
INFRASTRUCTURE, PRACTICES AND  
IMAGINARY SPACES.

REALTIME ATTEMPTS TO CAPTURE  
THE PACE, SCALE AND DEPTH OF  
CHINA'S COMPLEX AND CHANGING  
REALITY.

REALTIME IS A COLLECTION OF  
ORIGINAL ACCOUNTS, ANALYSES,  
STORIES, ARTICLES, ARTWORKS,  
PICTURES, MAPS, ILLUSTRATIONS,  
AND MATERIALS COLLECTED BY  
RESEARCHERS AND PRACTITIONERS  
FROM VARIOUS FIELDS OF DESIGN,  
GEOGRAPHY, ARCHITECTURE,  
ANTHROPOLOGY, ECONOMICS,  
AND ART.

ISBN 978-2-86915-345-9



9 782889 153459 >

EPFL PRESS





# REALTIME: MAKING DIGITAL CHINA

实时

# COPYRIGHT

---

Cover illustration, graphic design and layout: Maria Roszkowska, DISNOVATION.ORG

---

## EPFL PRESS

---

is an imprint owned by the Presses polytechniques et universitaires romandes, a Swiss academic publishing company whose main purpose is to publish the teaching and research works of the Ecole polytechnique fédérale de Lausanne (EPFL).

Presses polytechniques et universitaires romandes  
EPFL - Rolex Learning Center  
Post office box 119  
CH-1015 Lausanne, Switzerland  
E-mail: [ppur@epfl.ch](mailto:ppur@epfl.ch)

[www.epflpress.org](http://www.epflpress.org)

First edition  
© EPFL Press, 2020  
ISBN 978-2-88915-345-9

All rights reserved, including those of translation into other languages.  
No part of this book may be reproduced in any form - by photoprint, microfilm, or any other means - nor transmitted or translated into a machine language without written permission from the publisher.

Printed in Italy

---



**INTRODUCTION (RENAUD, GRAEZER BIDEAU &**

---

**01 THE ASCENT OF DIGITAL TECHNOLOGY IN**

---

**02 PLANNING: FROM MODEL TO MODULES**

---

**03 PRODUCING STANDARDIZATION: CHINESE**

---

**04 AN ARCHEOLOGY OF SHANZHAI PHONES**

---

**05 THE GHOSTS OF SHENZHEN**

---

**06 LEARNING ABOUT MAKERS IN CHINA**

---

**07 CHINA.AI**

---

**08 THE ARMATURES OF A NEW AUTONOMOUS**

---

**09 SPEED POLITICS OF DANMU**

---

**10 FUTURE RECIPES**

---

**CONCLUSION (RENAUD, GRAEZER BIDEAU &**

---

---

**E****N****T****S**

---

---

**LAPERROUZA)** 006

---

**CHINA (RENAUD)** 014

---

**(GRAEZER BIDEAU)** 038

---

**BLOCKS IN NETWORKS (LAPERROUZA)** 060

---

**(RENAUD & DISNOVATION.ORG)** 086

---

**(DE BEL)** 110

---

**(BOLLI, RENAUD, BLOCH & PROTTI)** 126

---

**(DE SETA)** 154

---

**URBANISM (HILGEFORT & LI)** 170

---

**(GE ZHANG)** 182

---

**(WANG)** 200

---

**LAPERROUZA)** 218







# REALTIME: MAKING DIGITAL CHINA

In the digital world, speed is set by a clock. Operations from the circuitry—the processor, memory, buffers, etc., are synchronized by the signal sent by a clock chip at regular frequencies—for instance one million cycles, or vibrations per second (1 MHz). With the clock setting the pace of execution, computer systems are said to be *real time* when the result returned by an instruction are not only logically correct, but arrive within a defined deadline. In other words, the concept of real time for computers does not relate as much to speed as to *predictability*.

## LOST IN TIME SCALES

The construction of highly predictable systems is concomitant with the rise of great uncertainties on a planetary scale. Human societies and natural ecosystems are subject to major transformations of climate, exponential demography, new modes of mass control or robotic presence. While computers have long surpassed a pace we can comprehend,<sup>1</sup> the biggest challenge humanity now seems to face is coping with the velocity of these changes.

In an uncertain world, grand narratives of the future often fall short. Computers are used to formulate and calculate timetables,<sup>2</sup> requiring us to form plans and ways to execute them. The predictable outcome of computer simulations contrasts with the growing uncertainty we observe. We often feel lost in planning and time scales, searching for a set of instructions that could finally provide a predictable outcome.

## CHINA SPEED

Arguably, the country on Earth that has undergone the most drastic transformation over the last half century is China. Its urban population went from slightly over 100 million to more than 600 million people between 1978 and 2018.<sup>3</sup> The manufacturing and export of billions of *Made in China* goods shaped entirely new ways of producing and consuming all across the world. Once a relatively isolated nation, the country now occupies a central role in international affairs.

1 The “flash crash” of May 6, 2010, has become a canonical example of how systems can surpass the understanding of mankind. At 2:32 pm EDT, the most important stock indexes in the United States collapsed for approximately 36 minutes, causing a loss of almost one trillion dollars before rebounding and recovering most of the original amount. To this day, the exact reasons for this remain unknown.

2 The Intergovernmental Panel on Climate Change (IPCC) relies on statistical models and advanced computation to define the timeframe of global warming.

3 Statistics from the World Bank, 2018.

All this happened with incredible speed. Anyone who has witnessed firsthand the development of Chinese cities over the past three decades can attest to its velocity. Nationwide infrastructure projects were developed and deployed in a matter of years, including more than 100,000 km of railway tracks and 4,000 km of subway lines. These developments evolved from intense planning through successive five-year and ten-year plans, but also from a surprising sense of urgency and immediacy that has spread over the country.

All across the nation, thousands of people were arriving each day at train stations, bags in hand, ready to start a new urban life. Planners had to develop entire cities to host these newcomers, who were often present illegally. In many cases, urban plans were used to explain and contain what was already happening. Among the population, the dedication to executing tasks at a faster rate was also palpable. Manufacturers would hear a client request, rush back to the factory and work day and night until a prototype was ready to ship. “*On my way to meet a Korean client, I was blowing on the phone to dry the paint!*” remembers a Shenzhen electronics maker with a large smile.

Beyond the anecdotes, China’s experiments conciliate predictable plans with revolutionary events. In many ways, the Chinese economic reforms directly evolved from the experience of the guerrilla. Yuan Geng (1917–2016), author of the famous slogan “*Time is Money, Efficiency is Life,*” was at the same time a war hero, a policy-maker and a Shenzhen business magnate. For his generation, speed was a necessary means in achieving victory. Today, this legacy, while gradually fading, remains foundational.

#### THE CITY-ON-A-CHIP

Since the 1990s, communication devices and the Internet have played an important role in the transformation of our world. By 2018, half the planet’s population had access to a network of computers.<sup>4</sup> Beyond humanity itself, billions of machines are now exchanging information daily. Direct communications continue to raise new questions about the ways habitants, cities and nations comprehend time and space.

Indeed, why should urban composition be based on the spatial order of places and roads when we can find our own way using a text search? Why should we wait to interact physically when an interface able to react in under a tenth of a second feels instant? One of the most outwardly visible actions of computers is to reorganize space. Cities, like computers, evolved from the same necessity of humans to organize things and thoughts into functions and zones.

In this regard, the technocratic dream that predates the “*smart city*” is a very old one. The city is classically represented as a machine, with vertical dynamics of institutions and horizontal ranges of possibilities. With computers networks

4 55% according to Internet World Stats, 2019.

and robotics, these structures are redefined, with new forms of control shaping existing and potential spaces. Even in the places we inhabit daily, power and dreams are projected through many different channels.

In most Chinese cities, digital technologies are omnipresent. With both the largest urban areas and the largest electronics manufacturing industry in the world, the country has created entirely new models of production, use and regulation of information technology. As with urban development, the emergence of these technologies has followed both chaotic paths and well-thought-out plans. Digital devices have been deeply integrated into urban spaces, from LED screens and phones, to cyber-cafes, surveillance cameras, drones and robots.

#### ABOUT THE BOOK

This book intends to provide an account from the digital and urban worlds of China. For decades, scholars, think tanks and agencies, both local and global, have been observing and predicting the rise of China's technological power. Research about technology in China has mostly attempted to understand and describe its local specificities, often in order to make recommendations and adjust for competitive advantages. This book asks a different question: how can China inform our relationship with technology?

We envisage China as an important proving ground to learn about ourselves as humans. Instead of attempting to formulate a single and structured analysis, our intention is to incite questions by making unfamiliar links and offering a glance at multiple aspects of digital technology in urban China. This book proposes a fragmented vision made of observations, original documents, scientific research, art projects and fictional content. The title REALTIME expresses a common feeling present in these contributions, one that usually occurs when everything around seems very fast, loud and real.

This volume is composed of two sides—graphical on the left, textual on the right—so as to offer the reader an experience that is both analytical and sensory. It contains perspectives from researchers and practitioners across various fields including geography, anthropology, economics, design, architecture and art.

The opening three chapters provide the larger context, with a historical overview of the ascent of digital technologies in China (chap. 1), a spatial perspective on the planning of cities (chap. 2) and a geopolitical look at the evolution of China's role in defining global technological standards (chap. 3). The bulk of the volume is dedicated to observations collected from the field, including a unique collection of *shanzhai* phones (chap. 4) and an exploration of Shenzhen's night markets in search of second-hand electronics (chap. 5). Chapter 6 narrates a methodological experiment for studying makerspaces in China. The following three chapters present accounts of home-grown Internet phenomena, namely the media propaganda surrounding artificial intelligence (chap. 7), the evolution of rural e-commerce villages (chap. 8) and the popular activity of live

commenting directly over online videos (chap. 9). The final chapter is a work of fiction that attempts to articulate a potential future of China's technology through food and recipes (chap. 10).

Together these contributions constitute a small but significant sample from the vast spectrum of technology in China. They remind us that technology, before being from any specific nation, is deeply human.

Clément Renaud

Florence Graezer Bideau

Marc Laperrouza



THE ASCENT OF DIGITAL TECHNOLOGY IN CHINA 数码科技在中国的延伸



(Message # 50: 1532 bytes, KEEP, Forwarded)  
Received: from unika1 by irau11.germany.csnet id aa21216; 20 Sep 87 17:36 MET  
Received: from Peking by unika1; Sun, 20 Sep 87 16:55 (MET dst)  
Date: Mon, 14 Sep 87 21:07 China Time  
From: Mail Administration for China <MAIL@ze1>  
To: Zorn@germany, Rotert@germany, Wacker@germany, Finken@unika1  
CC: lhl@parmesan.wisc.edu, farber@udel.edu,  
jennings%irlean.bitnet@germany, cic%relay.cs.net@germany, Wang@ze1,  
RZLI@ze1  
Subject: First Electronic Mail from China to Germany

"Ueber die Grosse Mauer erreichen wie alle Ecken der Welt"

"Across the Great Wall we can reach every corner in the world"

Dies ist die erste ELECTRONIC MAIL, die von China aus ueber Rechnerkopplung in die internationalen Wissenschaftsnetze geschickt wird.

This is the first ELECTRONIC MAIL supposed to be sent from China into the international scientific networks via computer interconnection between Beijing and Karlsruhe, West Germany (using CSNET/PMDF BS2000 Version).

University of Karlsruhe	Institute for Computer Application of
-Informatik Rechnerabteilung-	State Commission of Machine Industry
(IRA)	(ICA)

Prof. Werner Zorn  
Michael Finken  
Stefan Paulisch  
Michael Rotert  
Gerhard Wacker  
Hans Lackner

Prof. Wang Yuen Fung  
Dr. Li Cheng Chiung  
Qiu Lei Nan  
Ruan Ren Cheng  
Wei Bao Xian  
Zhu Jiang  
Zhao Li Hua

#### CHINA'S FIRST EMAIL.

On September 14, 1987, scientists from China and Germany together, sent China's first email entitled "Across the Great Wall, we can reach every corner in the world." The email was received in Germany six days later, on September 20.

# THE ASCENT OF DIGITAL TECHNOLOGY IN CHINA

---

数码科技在中国的延伸 | Clément Renaud

---

Over the last few decades, the harsh international competition between nations for technological domination has shifted towards digital technology. This global rivalry has largely contributed to framing technology in China as a direct continuity of the Chinese state. Discourse around the Internet in China—the so-called “*Chinese Internet*”—has been fueled by techno-nationalisms both in and outside of China, enhancing the need for nation-states to reassert their power in the face of increasingly complex production and communication networks.

Historical references and analogy (such as the Great Wall) have been present since the early days of the Internet in China, and provided a historical anchor for national claims over computer networks. Digital technology has often been renamed after Deng’s socialism epithet, the famous “*with Chinese characteristics*.” This self-reinforcing narrative of digital China’s otherness pleased both the Chinese and non-Chinese sides, as it offered a comfortable frame of reference for national or regional issues.

To consider the world of technology as competing sides fails to address the most important underlying issues and questions we are facing. We need to understand how digital technology operates and contributes to our world’s current changes—both within China and elsewhere. The prevalence of a national frame of reference helps support scientific and business claims but prevents us from exploring more precisely the political and societal negotiations expressed in successive technical decisions that created digital technology in China, and their relevance to our world as a whole.

In this chapter, I will present an overview of some important moments in the history of digital technology in China. The construction of China’s digital edifice has involved a complex set of local, national and international actors, fueled by various ambitions. The present text aims at observing these dynamics and exposing their diversity within and outside of the country.

Oct. 14, 1952

L. YUTANG

2,613,795

CHINESE TYPEWRITER

Filed April 17, 1946

17 Sheets-Sheet 1

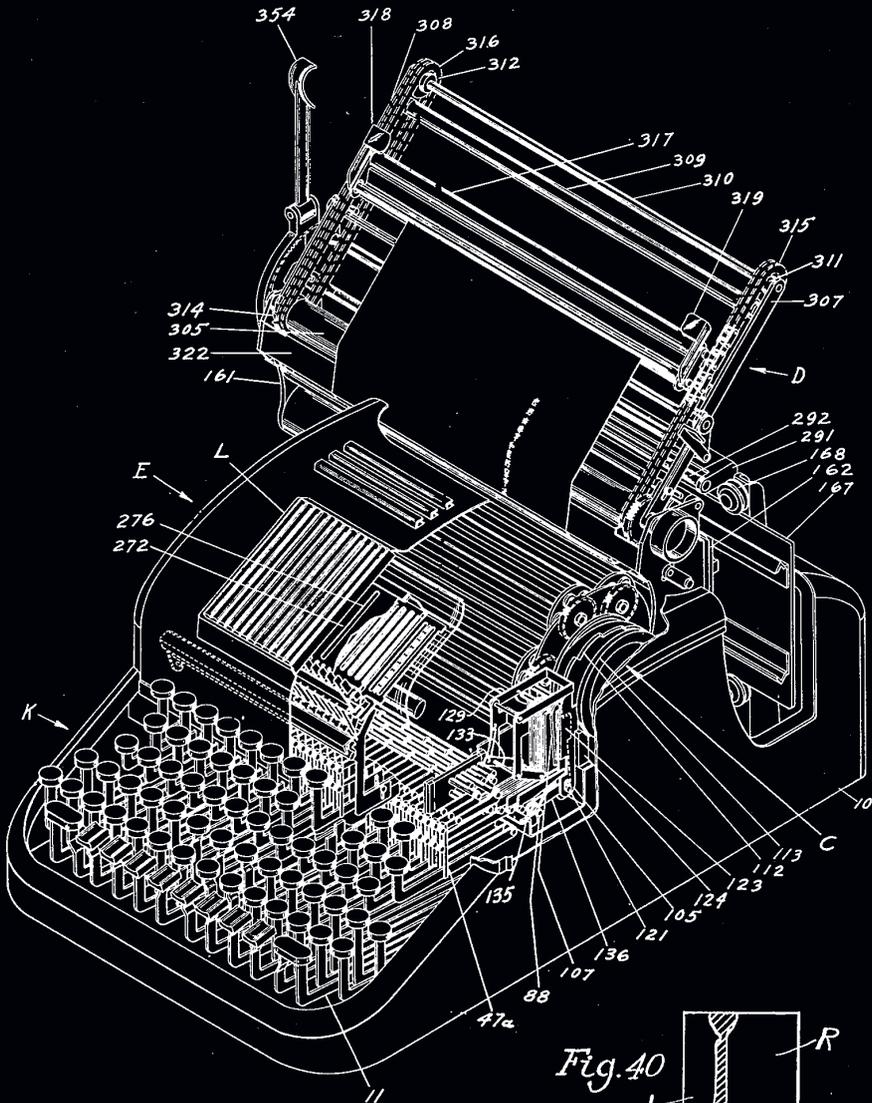


Fig. 1.

Fig. 40



Inventor

LIN YUTANG

MING KWAI CHINESE TYPEWRITER.

Throughout the 19th and 20th centuries, the Chinese language was considered cumbersome and unfit for the expression of modern ideas by many reformers both in China and abroad. The global expansion of the Remington ignited fervent discussion on the necessity to romanize it. Patented in 1952, the Ming Kwai (明快, *mingkuai*, literally "clear and fast") was the first typewriter that allowed the retrieval of 8352 Chinese characters from the input of a compact keyboard (Mullaney 2017).