

[IEEE.org](#) [IEEE Xplore](#) [IEEE SA](#) [IEEE Spectrum](#) [More Sites](#)[Subscribe](#)[Subscribe](#)[Cart](#)[Create Account](#)[Per](#)
[Sig](#)[Browse](#) [My Settings](#) [Help](#)[Institutional Sign In](#)[Institutional Sign In](#)

All



ADVANCED SEARCH

[Journals & Magazines](#) > [IEEE Sensors Journal](#) > [Volume: 12 Issue: 5](#)

A CMOS Micromachined Capacitive Sensor Array for Fingerprint Detection

Publisher: [IEEE](#)[Cite This](#)[PDF](#)Jiun-Chieh Liu ; Yung-Shih Hsiung ; Michael S.-C. Lu [All Authors](#)25
Paper
Citations7
Patent
Citations1631
Full
Text Views

Abstract

Abstract:Biometric techniques, such as fingerprint detection, have been widely applied to identify a specific user for security and safety reasons. This work presents an integrate... [View more](#)

Document Sections

- I. Introduction
- II. Methods
- III. Experiment
- IV. Discussion and Conclusion

[Authors](#)[Figures](#)[References](#)[Citations](#)[Keywords](#)[Metrics](#)[More Like This](#)

► Metadata

Abstract:

Biometric techniques, such as fingerprint detection, have been widely applied to identify a specific user for security and safety reasons. This work presents an integrated capacitive sensor array for fingerprint detection based on the difference of pressures induced by the ridges and valleys of a finger tip. The 8×32 sensing membranes are released by wet etch of the complementary metal oxide semiconductor (CMOS) metal layers and no additional thin-film deposition is required to form the capacitive electrodes. Each membrane contains the CMOS dielectric and metal layers with a total thickness of $3.375 \mu\text{m}$. The size of each sensing pixel is $65 \times 65 \mu\text{m}^2$, equivalent to an imaging resolution of 390 dpi. The sensing capacitance and capacitive sensitivity are 12 fF and 1.41 fF/MPa, respectively. The measured spring constant of the membrane is close to the simulated value of 1400 N/m. Part of the fingerprint image is successfully produced by the CMOS sensor array.

Published in: IEEE Sensors Journal (Volume: 12 , Issue: 5, May 2012)

Referenced in:IEEE Biometrics Compendium, IEEE RFIC Virtual Journal, IEEE RFID Virtual Journal

Page(s): 1004 - 1010

INSPEC Accession Number: 12650283

Date of Publication: 15 September 2011

DOI: 10.1109/JSEN.2011.2167748

► ISSN Information:

Publisher: IEEE

Contents

I. Introduction

The use of biometric techniques, such as recognition of human speech, iris patterns, and

[Sign in to Continue Reading](#)

fingerprints, has become popular for identifying a specific user due to security and safety reasons. Conventional fingerprint detection is based on optical measurement [1] where the finger surface is illuminated by visible light and photographed, and the image is then stored for subsequent identification. Optical sensors are costly and bulky due to mechanical assembly of the prism, lens, and camera. Detected image may be affected by stained fingers, and an optical sensor may not be sufficiently sensitive to the differences between a printed image of a fingerprint and a true fingerprint. Thermal [2], [3], piezoresistive [4], and capacitive [5]–[12] fingerprint sensors have been studied in accordance with the advances in microfabrication and integrated-circuit technologies. Han et al. [2] reported an array of micro heaters as the sensing elements to detect the temperature differences related to touching ridges and nontouching valleys of a finger tip. The chip developed by ATMEL [3] utilized a pyroelectric material for detection. The piezoresistive cantilever array demonstrated by Charlot et al. [4] was monolithically integrated in a triple metal CMOS process.

Authors	▼
Figures	▼
References	▼
Citations	▼
Keywords	▼
Metrics	▼

More Like This

128 × 96 Pixel parallel three dimensional integrated CMOS image sensors with 16 bit A/D converters: By direct bonding with embedded Au electrodes
2015 IEEE SOI 3D Subthreshold Microelectronics Technology Unified Conference (S3S)
Published: 2015

Modeling and Analysis of Charged Particle CMOS Image Sensor Arrays
IEEE Transactions on Nuclear Science
Published: 2009

[Show More](#)

IEEE Personal Account

CHANGE
USERNAME/PASSWORD

Purchase Details

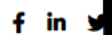
PAYMENT OPTIONS
VIEW PURCHASED
DOCUMENTS

Profile Information

COMMUNICATIONS
PREFERENCES
PROFESSION AND
EDUCATION
TECHNICAL INTERESTS

Need Help?

US & CANADA: +1 800 678
4333
WORLDWIDE: +1 732 981
0060
CONTACT & SUPPORT

Follow

About IEEE *Xplore* | Contact Us | Help | Accessibility | Terms of Use | Nondiscrimination Policy | IEEE Ethics Reporting  | Sitemap |
IEEE Privacy Policy

A not-for-profit organization, IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.

© Copyright 2023 IEEE - All rights reserved.

IEEE Account

- » Change Username/Password
- » Update Address

Purchase Details

- » Payment Options
- » Order History
- » View Purchased Documents

Profile Information

- » Communications Preferences
- » Profession and Education
- » Technical Interests

Need Help?

- » **US & Canada:** +1 800 678 4333
- » **Worldwide:** +1 732 981 0060
- » Contact & Support

About IEEE *Xplore* | Contact Us | Help | Accessibility | Terms of Use | Nondiscrimination Policy | Sitemap | Privacy & Opting Out of Cookies

A not-for-profit organization, IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.

© Copyright 2023 IEEE - All rights reserved. Use of this web site signifies your agreement to the terms and conditions.