

Deneysel Fizikten Giyilebilir Elektronigue Fikir Aktarımı

Bir kaç örnek

Şu pseudo-algoritmayı anlatacağım:

- Deneysel fizikten **bir fikir** alınır: **resistive charge division / position-sensitive detection**
- Seksi bir alan olan **giyilebilir elektronigue** uygulanır
- Malzeme, organik ve polimer kimyası, tekstil, biyoloji, enzimoloji alanlarından **multi-disipliner** arkadaşlar edinilir
- **Sensör yapılarının** sentezi ve elektro-mekanik-spectroskopik karakterizasyonu gerçekleştirilir
- Read-out **elektronikleri** tasarılanır, yapılır, prototipler üretilir
- Son **kullanıcı ürünlerini** düşünülür ve tasarlanır, imal edilir
- İstekli **kullanıcılar** (early adopters) bulunur ve kullanılır
- Kullanıcı **tecrübeleri toplanır** ve iterasyon
- **Patent'leyerek** korunur
- **Yayınlar ile** duyurulur
- Konferanslarda sunulur (**Şu anda buradasınız!**)

*Detectors and the Design of Full-Custom Front-End & Data Transmission ASICs**

Table of Contents

The Big (but Brief) Picture

- Briefly front-end – FE ASICs
- Briefly read-out – RO systems
- Briefly serializer - SER
- Briefly phase-lock loop - PLL



Detectors and Ideas Behind

- Particle **tracker** detectors
- Photodetectors **vs** photon counters
- **Position-sensitive** detectors
 - Resistive charge division
 - Discrete array of elements
- **Time-resolved** detection
- **DAQ** system overview

Feed-Back Concept

- A **qualitative** introduction
- **Natural frequency** concept - ω_n
- Real-world examples:
 - **Binary** read-out
 - **Time-over threshold**
- Adjusting/optimizing loop behavior
 - Damping ratio - ξ

Detector Front-End ASICs

- **Pre-Amplifier**: basic idea – V_{out} / V_{in}
- **Transconductance** of a transistor - g_m
- Evolving a **single-stage amplifier** into a real-world application

Processing Technology

- **Transistor** switch – A masterpiece
 - **Lithography**
 - Formation of an **nMOS** transistor
- VLSI design flow
 - Parasitic **extraction**
- Real-world ASIC examples

Radiation Tolerance Issues

- Definitions:
 - **Single event upset, analog**
 - **single event transient, latch-up**
- **Simulating** radiation effects on analog circuits

Potential CMOS Replacements(?)

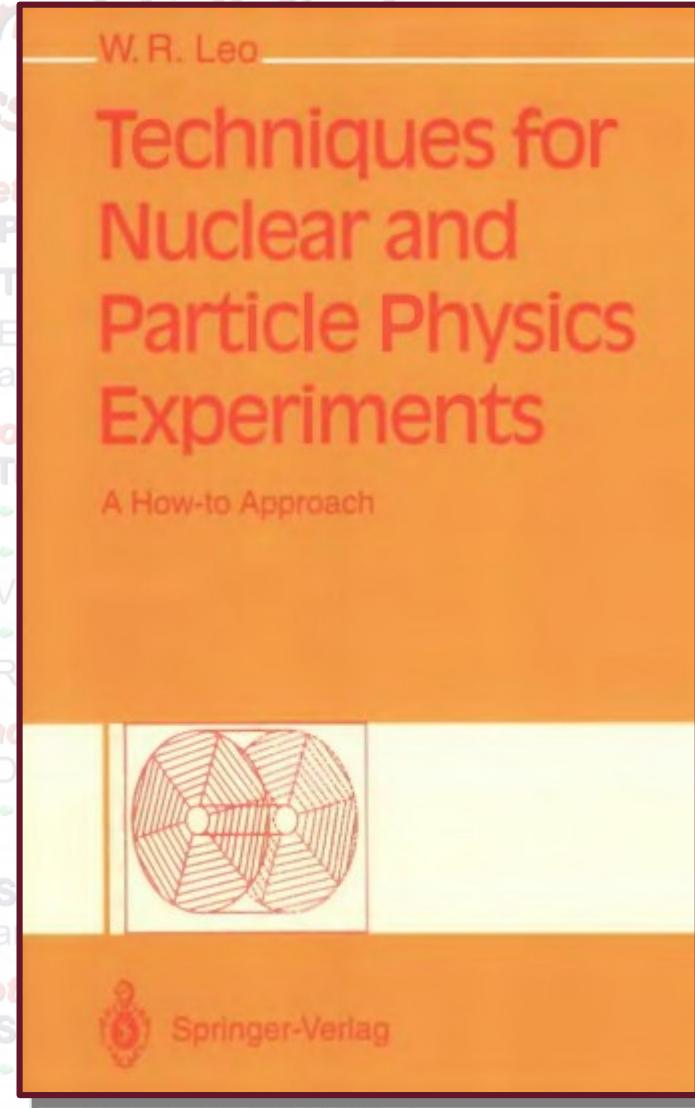
- **Single-layer thick** transistors
 - **Graphen'ics** (benzen lattice)
 - **Molybdenite'ics** (MoS_2)

Detectors and the Design of High-Performance Electronics

Front-End & Data Transmission

Table of Contents

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 - ↳ Discrete array of elements
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 - ↳ **DAQ** system overview
- **Feed-Back Concept**
 - ↳ A qualitative introduction
 - ↳ **Natural frequency** concept - ω_n
 - ↳ Real-world examples:
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 - ↳ Damping ratio - ξ



Position Sensitive Architecture

First interaction with the photons (and/or particles)

- Detect particles with the sensitivity of **where** they land; two main **paradigms**:

- **Resistive charge division** on a single detection element:

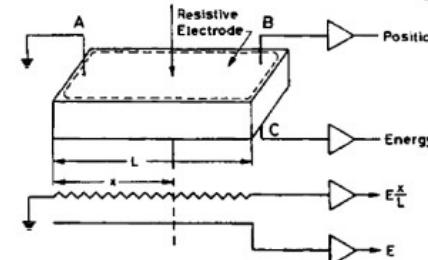
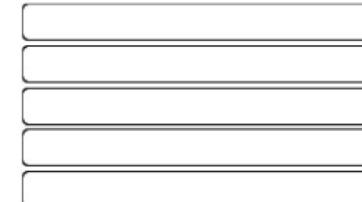


Fig. 10.14. Layout of a one-dimensional continuous position-sensitive detector using resistive charge division. A simplified equivalent circuit is shown below

* From Leo, p. 227

$$\text{Position} = \frac{B}{C}$$



A hybrid: Discrete array of resistive charge division

- **Discrete array** of individual detection elements:

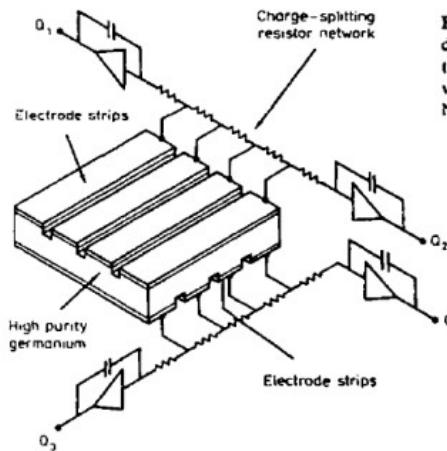
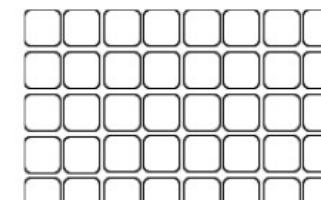
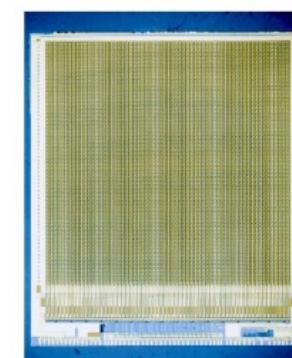


Fig. 10.15. Layout of a two-dimensional matrix detector. To reduce the readout electronics, the electrodes may be connected to an external resistive divider [from Gerber et al.: IEEE Trans. Nucl. Sci. NS-24, No. 1, 182 (1977)]

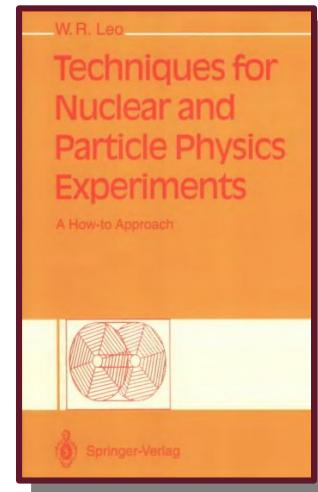
* From Leo, p. 229



Pixel detector



MEDIPIX



Bir Uygulama (1/3) Position Sensitive Architecture

First interaction with the photons (and/or particles)

- Detect particles with the sensitivity of **where** they land; two main **paradigms**:

- ❖ **Resistive charge division** on a single detection element:

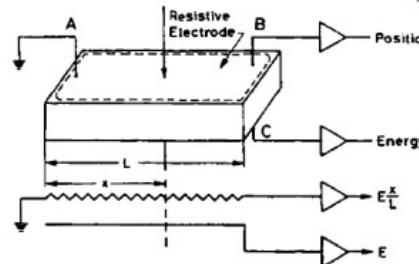
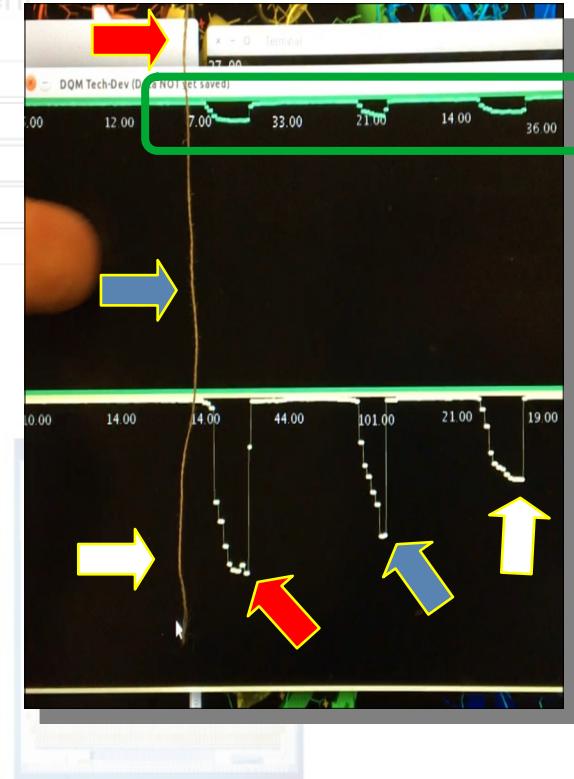
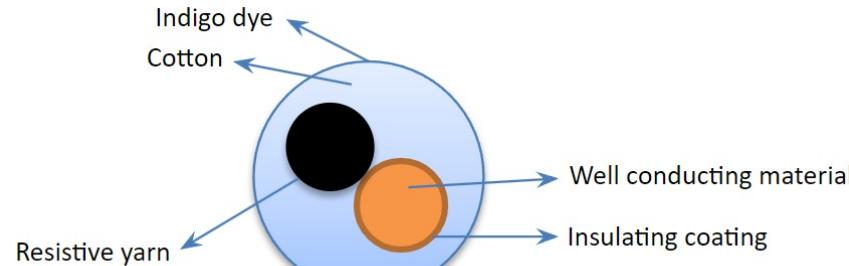


Fig. 10.14. Layout of a one-dimensional continuous position-sensitive detector using resistive charge division. A simplified equivalent circuit is shown below

* From Leo, p. 227

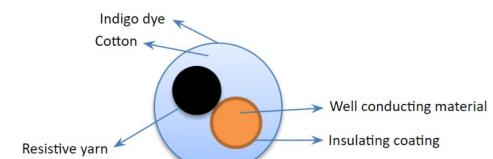
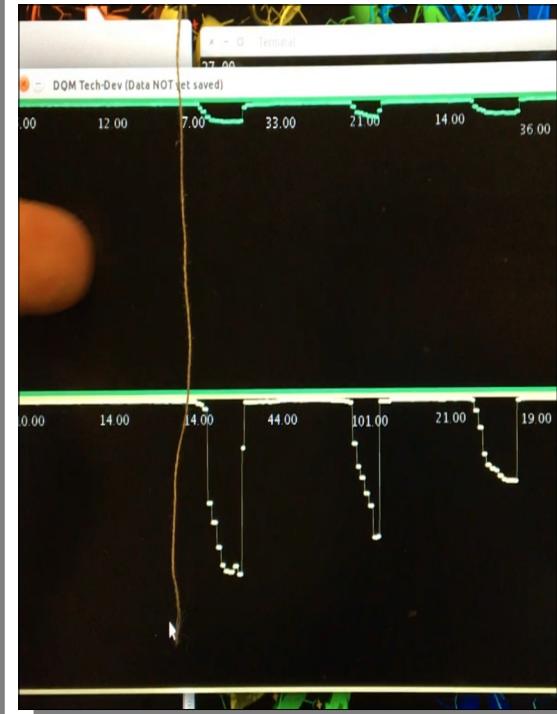
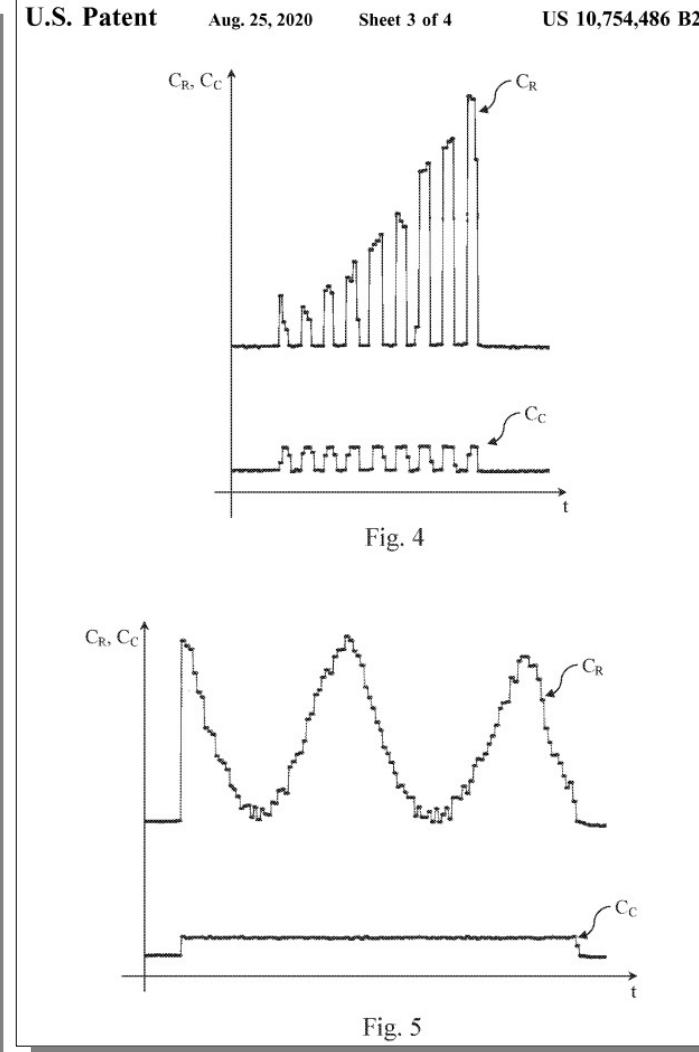
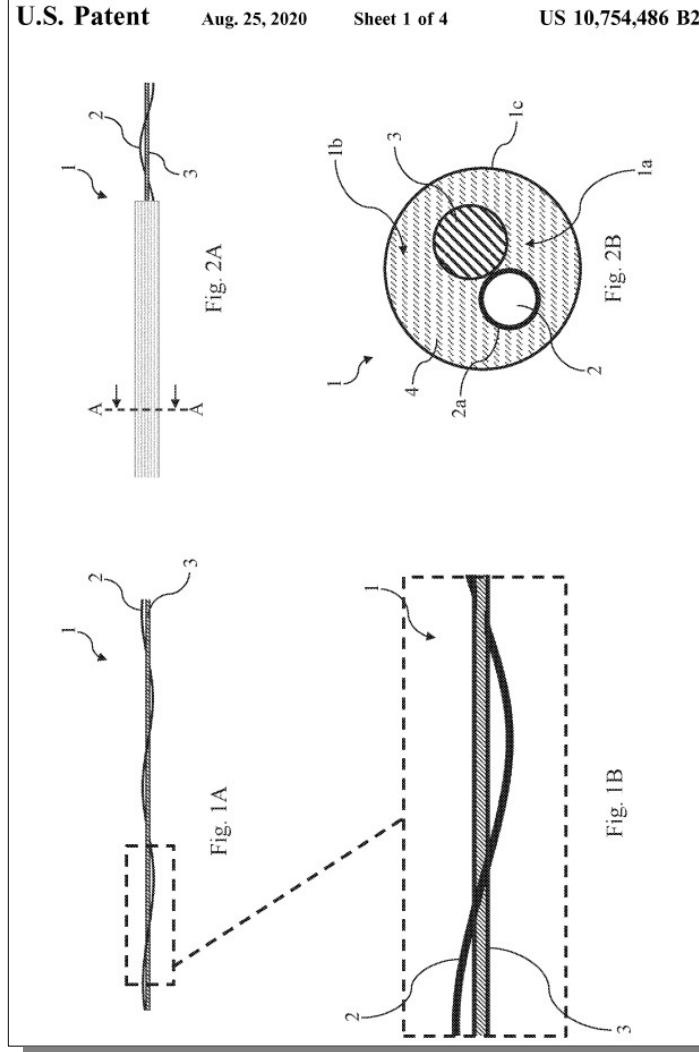
$$\text{Position} = \frac{B}{C}$$

- ❖ **Discrete array** of individual detection elements:



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Bu kimsenin aklına gelmemiş mi?



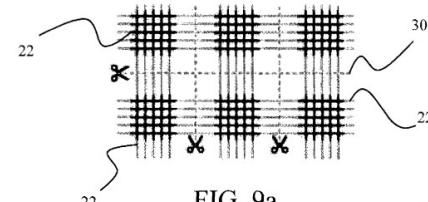
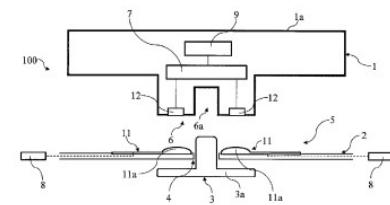
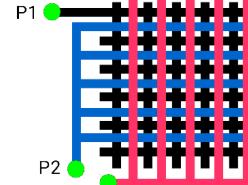
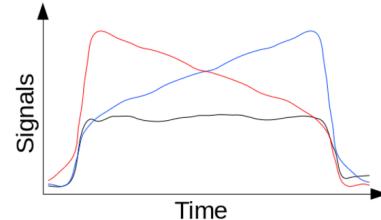
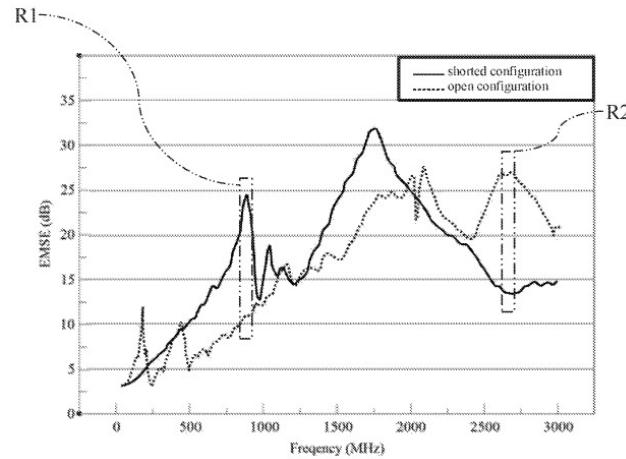
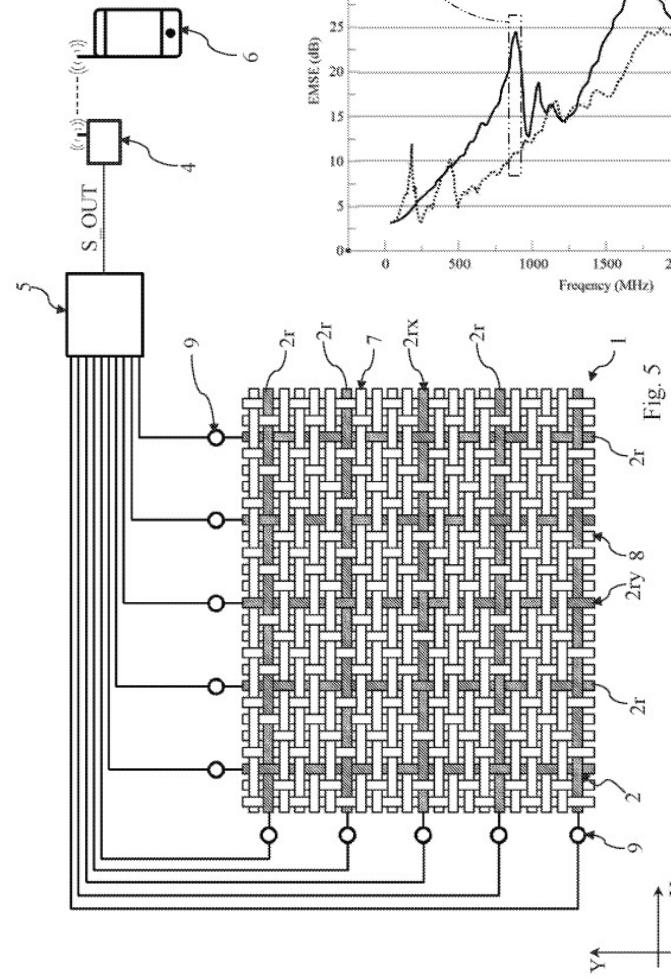


FIG. 9a

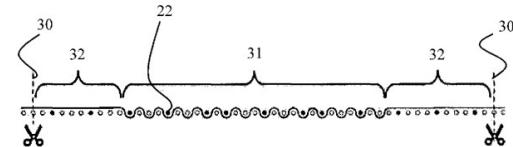


FIG. 9b

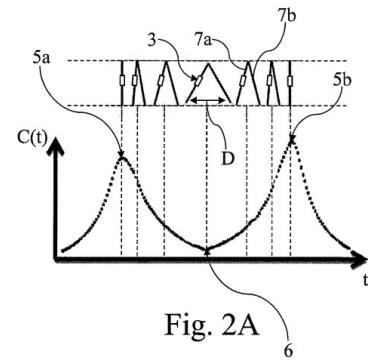
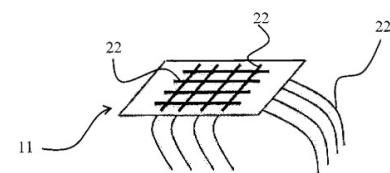
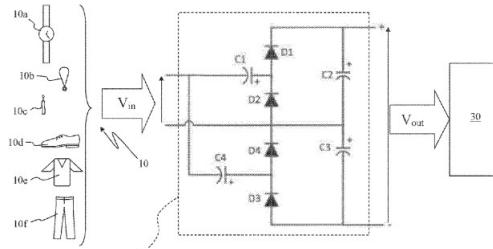
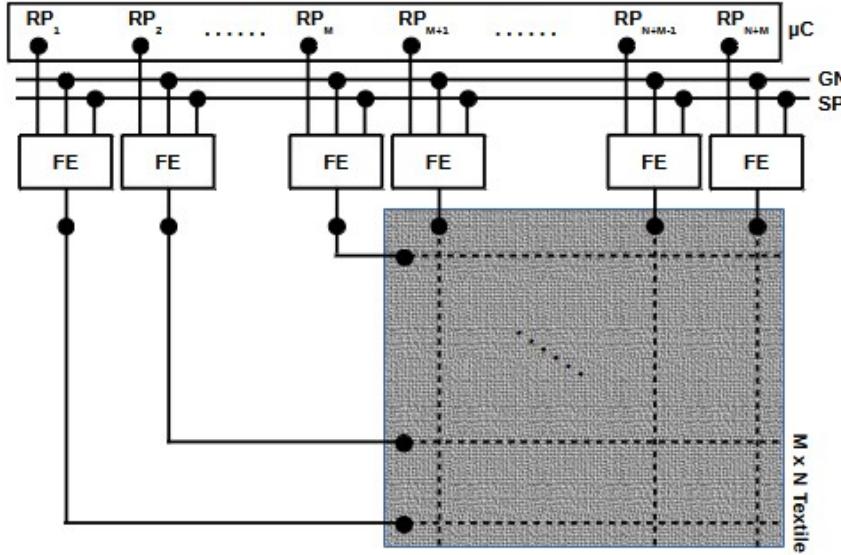


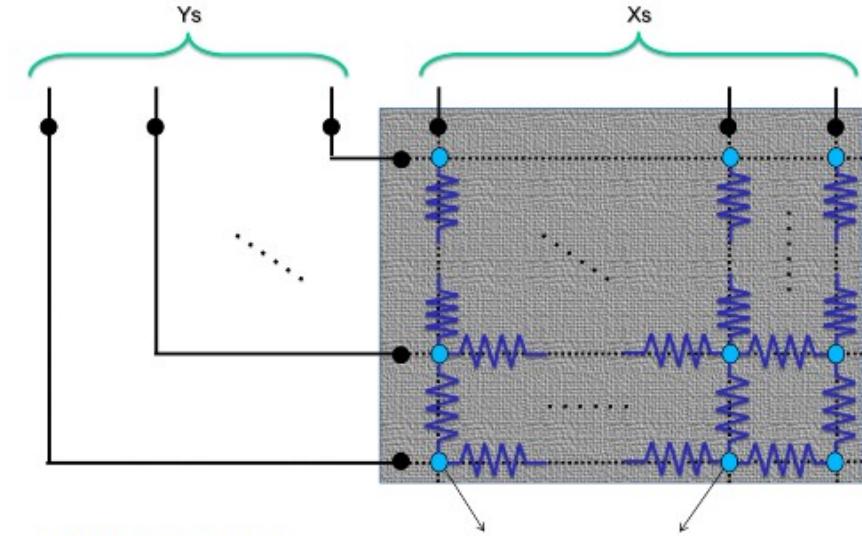
Fig. 2A



Bir Başka Uygulama (2/3)

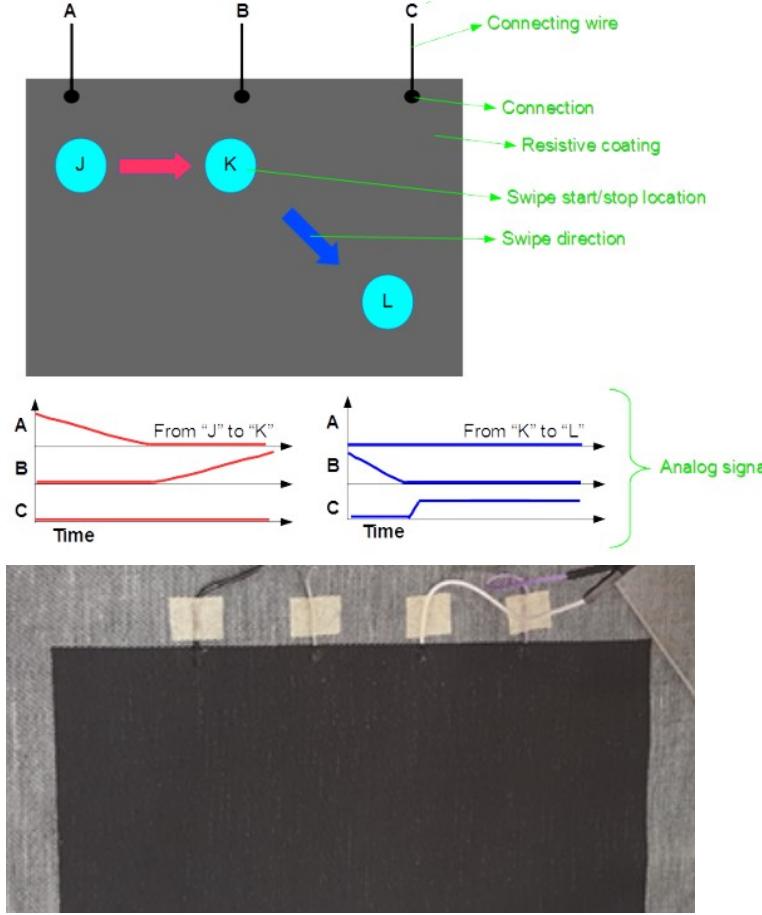


SoA: Conducting yarns forming an isolated grid



Disclosed: Network of unit resistors

Parasitic capacitance or ohmic contact point which couples a vertical sensing element to a horizontal sensing element



(12) United States Patent
Cobanoglu et al.

(10) Patent No.: US 11,460,959 B2
(45) Date of Patent: Oct. 4, 2022

(54) LARGE AREA TOUCH FABRIC

(71) Applicant: Sanko Tekstil Isletmeleri San. Ve Tic. A.S., Inegol-Bursa (TR)

(72) Inventors: Ozgur Cobanoglu, Inegol-Bursa (TR); Deniz Iyidogan, Inegol-Bursa (TR); Leyla Zengi, Inegol-Bursa (TR); Adil Berk Karakaya, Inegol-Bursa (TR)

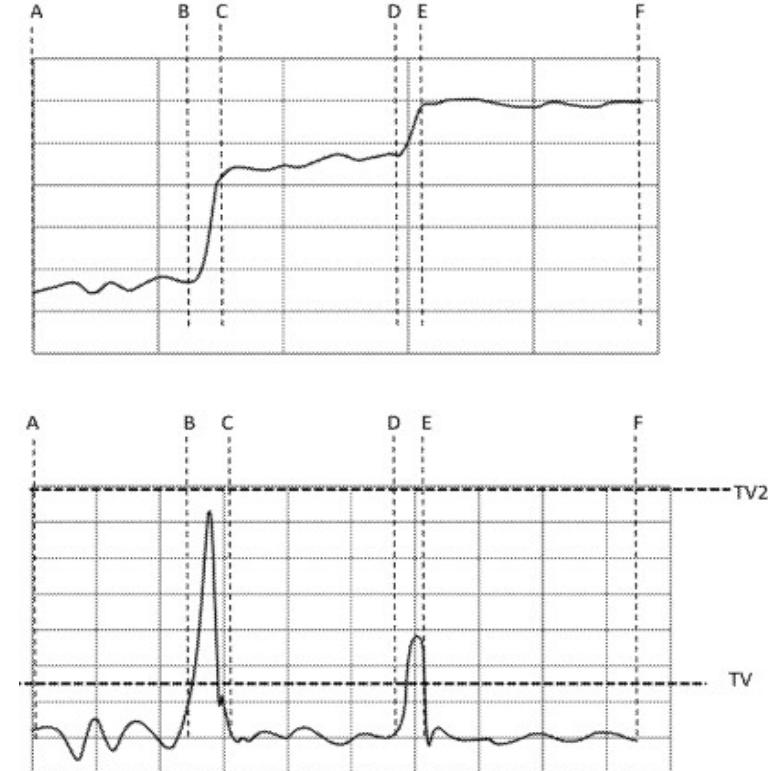
(58) Field of Classification Search

CPC D0G/N 3/0006; D0G/N 3/0088
See application file for complete search history.

(56) References Cited

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| 2008/0314626 A1* | 12/2008 Moore | G06F 3/0445 |
| 2009/0160800 A1* | 6/2009 Liu | 174/255 |
| | | G06F 21/83 |



(12) United States Patent
Cobanoglu et al.

(10) Patent No.: US 10,613,047 B2
(45) Date of Patent: Apr. 7, 2020

(54) FABRIC WITH DEGRADABLE SENSOR

(71) Applicant: Sanko Tekstil Isletmeleri San. Ve Tic. A.S., Inegol-Bursa (TR)

(72) Inventors: Ozgur Cobanoglu, Inegol-Bursa (TR); Jitka Eryilmaz, Inegol-Bursa (TR); Ozgur Akdemir, Inegol-Bursa (TR); Deniz Iyidogan, Inegol-Bursa (TR); Onur Yukseken, Inegol-Bursa (TR)

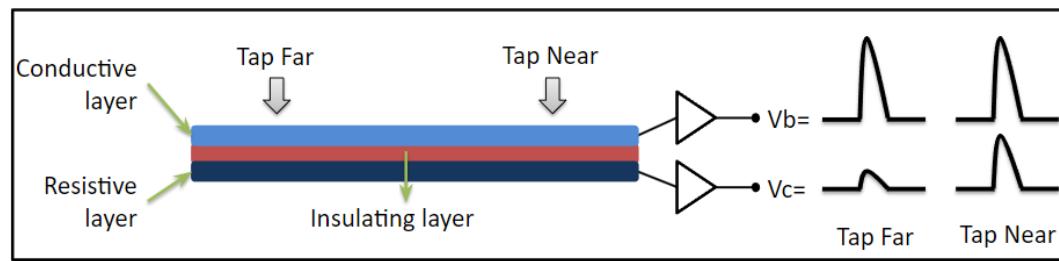
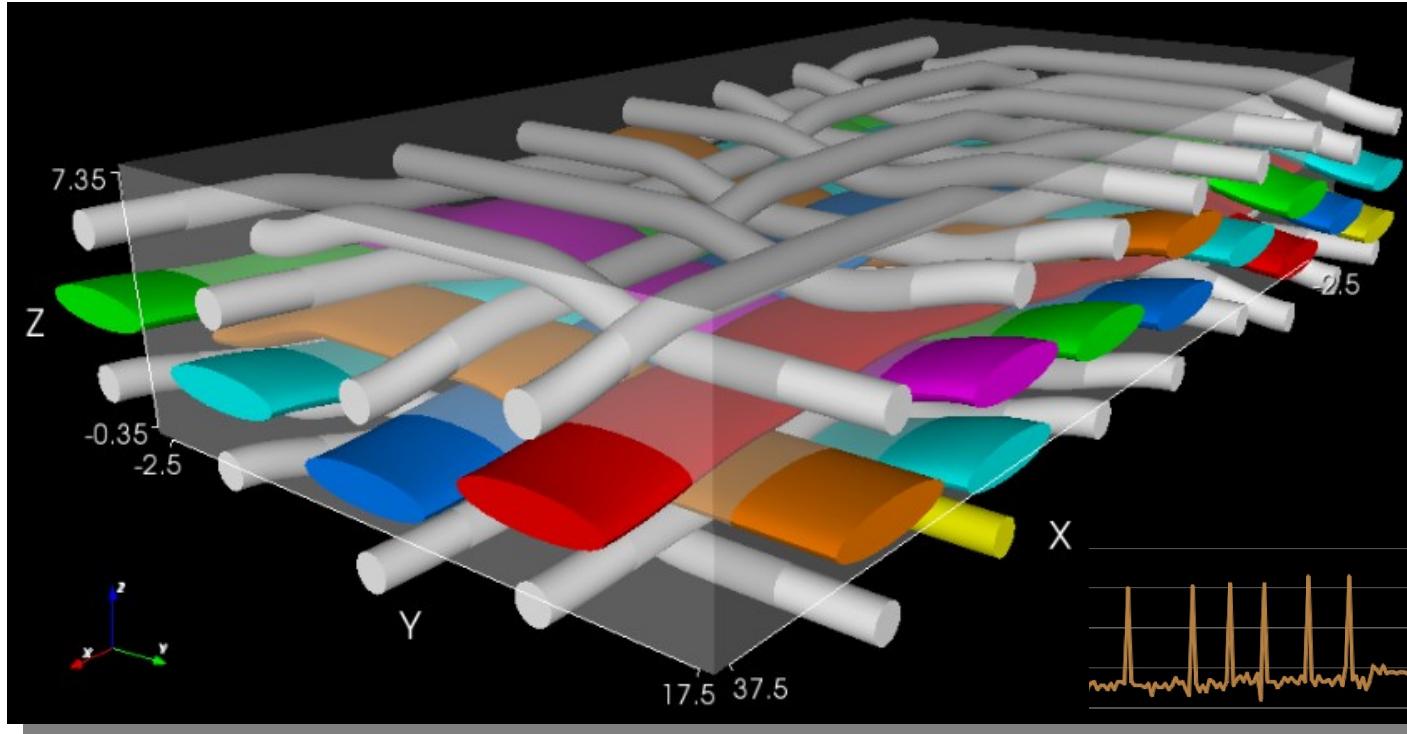
(2013.01); A41D 2500/20 (2013.01); D10B 2401/18 (2013.01); G06K 19/0717 (2013.01)

(58) Field of Classification Search
CPC G01N 27/02; G01N 33/367; G01N 3/56;
G01N 33/36; G01N 33/365; A41D 1/06;

A41D 1/002; A41D 2500/20; A41D 2500/10; D03D 1/0088; D10B 2401/18;

G06K 19/0717 (2013.01); 324/654
USPC See application file for complete search history.

Bir Başka Uygulama 3/3



Piezoelektrik Sensör

U.S. Patent May 18, 2021 Sheet 2 of 4 US 11,008,679 B2

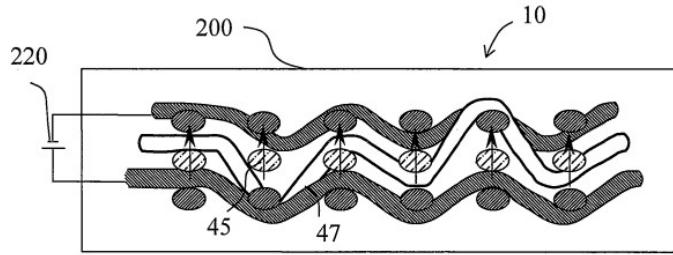


FIG.3

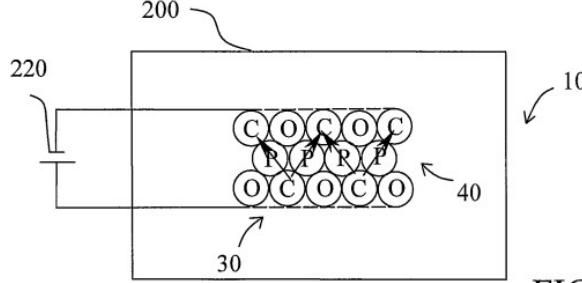


FIG.4

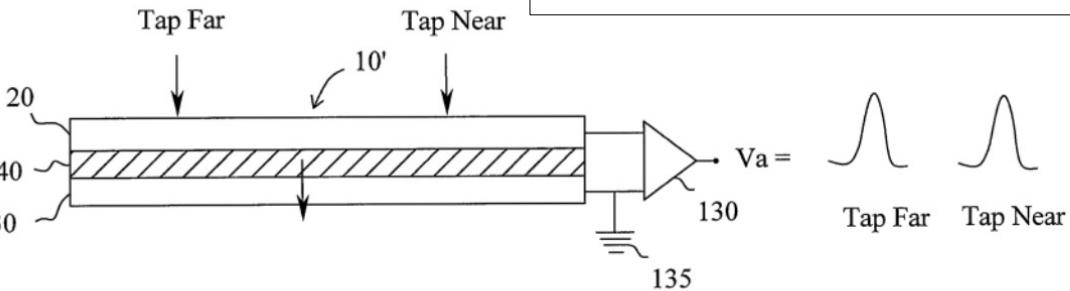
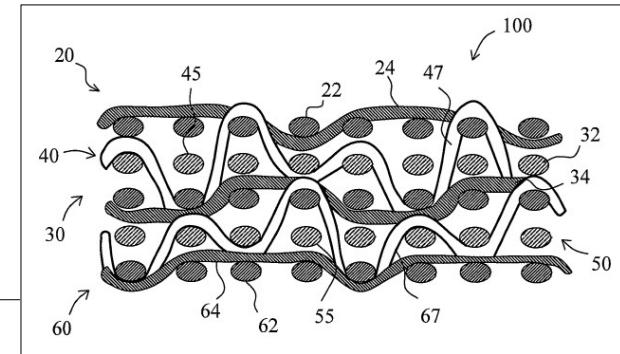


FIG.5

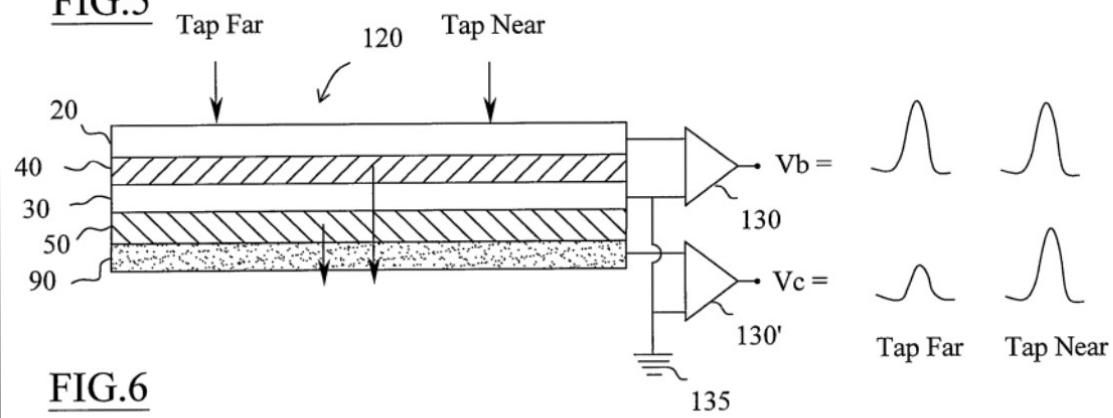
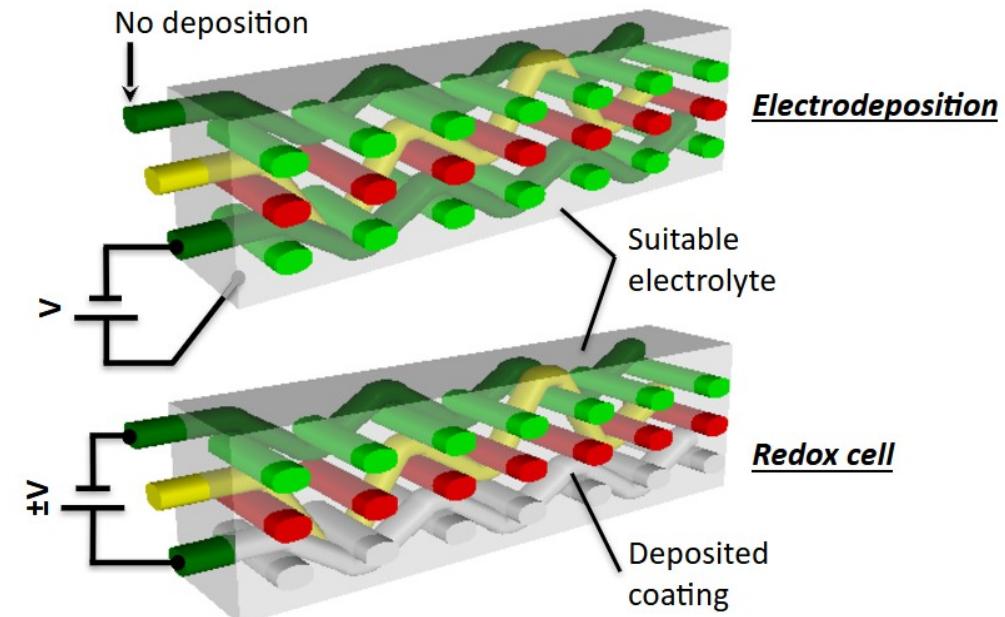
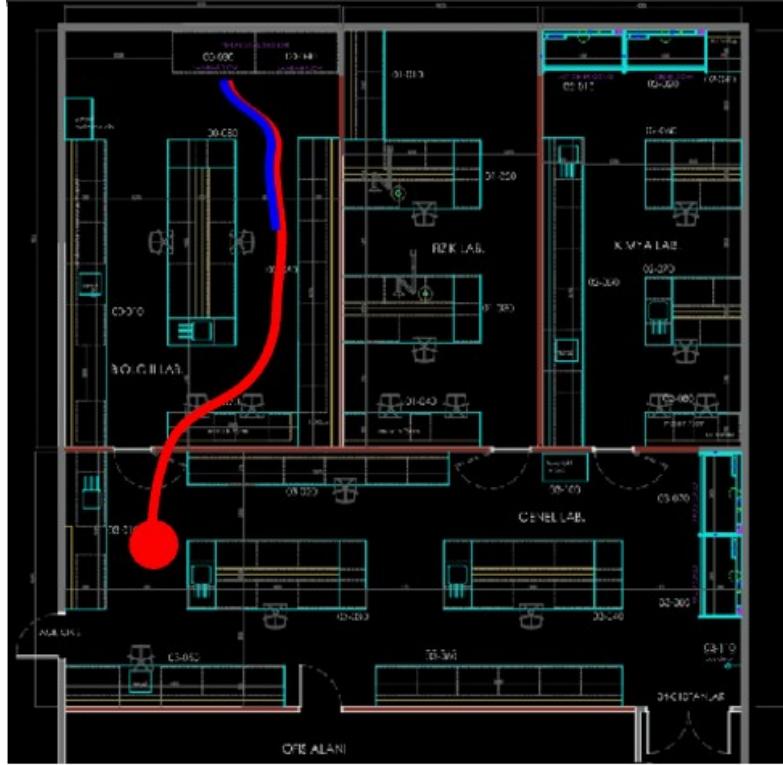


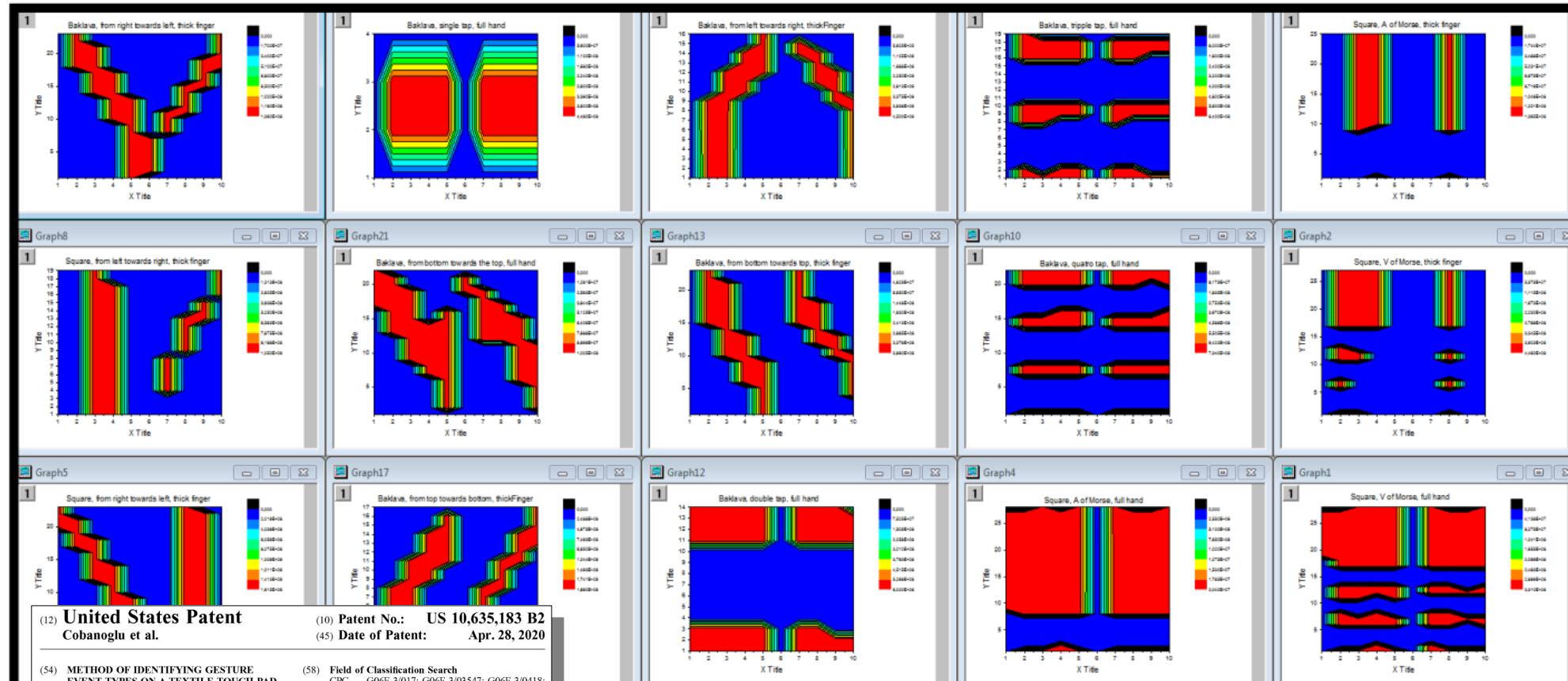
FIG.6

U.S. Patent May 18, 2021 Sheet 3 of 4

US 11,008,679 B2



Farklı El Hareketlerinin Hatalarına Rağmen Ayrılmaları



(12) United States Patent
Cobanoglu et al.

(10) Patent No.: US 10,635,183 B2
(45) Date of Patent: Apr. 28, 2020

(54) METHOD OF IDENTIFYING GESTURE EVENT TYPES ON A TEXTILE TOUCH PAD SENSOR

(71) Applicant: Sanko Tekstil İstehmeleri San. Ve Tic.
A.S., İnegöl-Bursa (TR)

(72) Inventors: Ozgur Cobanoglu, İnegöl-Bursa (TR);
Fehim Caglar, İnegöl-Bursa (TR);
Semih Kazanci, İnegöl-Bursa (TR);
Jitka Eryilmaz, İnegöl-Bursa (TR);
Serkan Mert, İnegöl-Bursa (TR);
Ertug Erkus, İnegöl-Bursa (TR); Lian
Kohener, İnegöl-Bursa (TR)

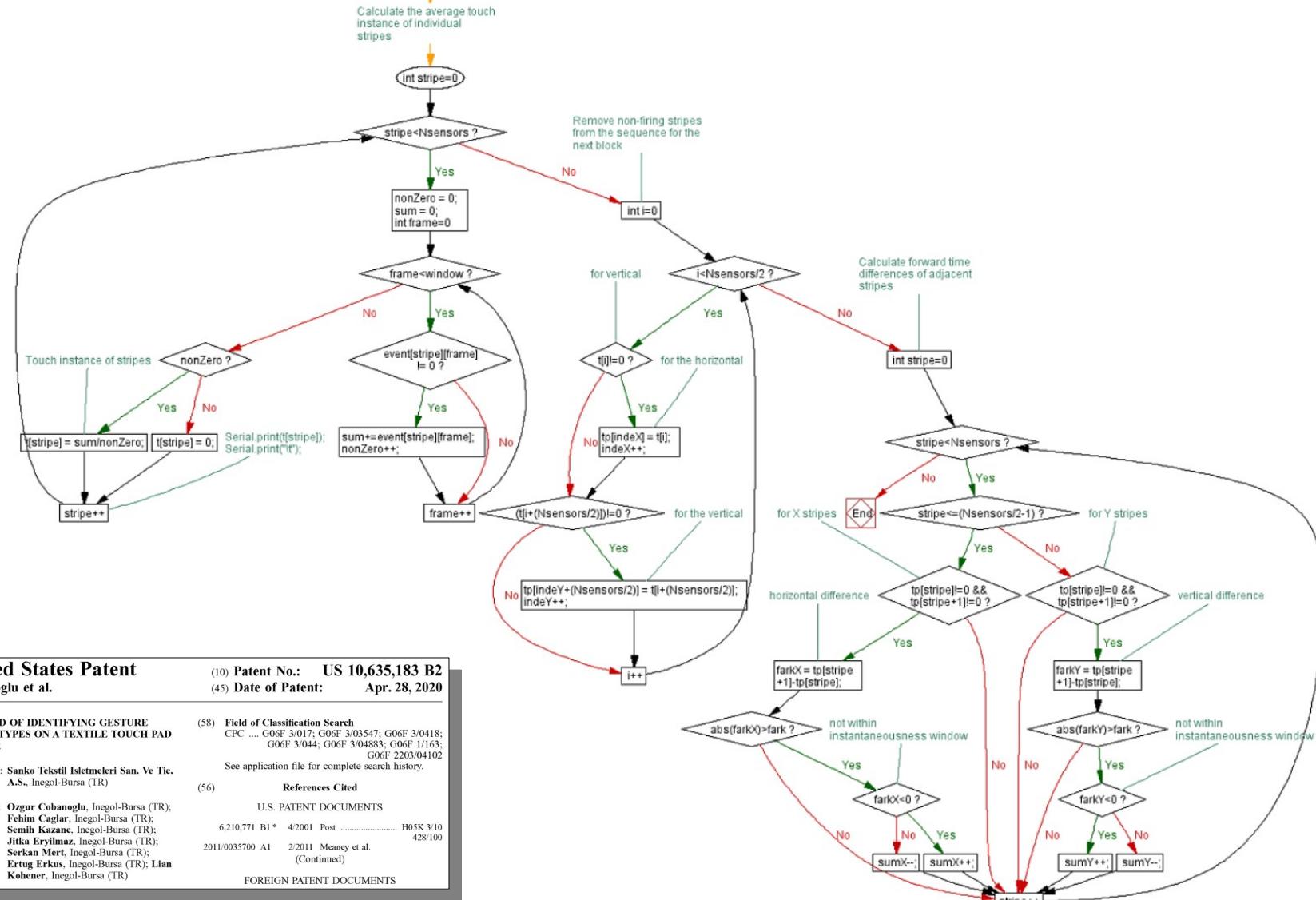
(58) Field of Classification Search
CPC G06F 3/017; G06F 3/03547; G06F 3/0418;
G06F 3/044; G06F 3/04883; G06F 1/163;
G06F 2203.04102

See application file for complete search history.

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428/100
2011/0035700 A1 2/2011 Meany et al.
(Continued)

FOREIGN PATENT DOCUMENTS



Yolculuk

United States Patent

(10) Patent No.: US 11,561,351 B2

(45) Date of Patent: Jan. 31, 2023

(Continued)

(54) TEXTILE FABRIC IMPLEMENTING A CAPACITIVE GRID

(56) CPC: D02B 27/00; D02D 1/00; D02D 11/00

(73) Inventor: Oğuz Çobanlıoğlu, İnegöl, Denizli, Turkey

(75) U.S. Inventor: Özgür Çobanlıoğlu, İnegöl, Denizli, Turkey

(77) Assignee: Santa Tekstil İkmalat San. Ve Tic. A.Ş., İnegöl - Denizli, Turkey

(19) Attorney: İsmail Arslan, İnegöl, Denizli, Turkey

(21) Filed: Apr. 16, 2018

(22) Prior Art: 1677518

(23) PCT Filed: Nov. 2, 2018

(24) PCT Int'l Appl'n No.: PCT/EP2018/074975

(25) PCT Int'l Publ'c No.: WO2019/090984

(26) PCT Int'l Date: May 2, 2019

(27) U.S. Non-Entry Date: Nov. 15, 2019

(28) Foreign Application Priority Data

US 2018/027029 A1, filed Oct. 15, 2018

(Continued)

(30) Int'l C.: G06E 3/00 (2006.01)

(31) Int'l Cl.: D02B 27/00

(32) U.S. Cl.: G06E 3/00; A41D 13/00; A41D 13/02

(34) (Continued)

(35) Field of Classification Search

CN — 60073048.5; A41D 13/00; A41D 13/02

(36) (Continued)

(37) (Continued)

(38) (Continued)

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