US008886954B1

(12) **United States Patent**
**Giobbi**

(10) **Patent No.: US 8,886,954 B1**
(45) **Date of Patent: *Nov. 11, 2014**

(54) **BIOMETRIC PERSONAL DATA KEY (PDK) AUTHENTICATION**

(71) Applicant: **Proxense, LLC**, Bend, OR (US)

(72) Inventor: **John J. Giobbi**, Bend, OR (US)

(73) Assignee: **Proxense, LLC**, Bend, OR (US)

( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/710,109**

(22) Filed: **Dec. 10, 2012**

**Related U.S. Application Data**

(63) Continuation of application No. 11/314,199, filed on Dec. 20, 2005, now Pat. No. 8,352,730.

(60) Provisional application No. 60/652,765, filed on Feb. 14, 2005, provisional application No. 60/637,538, filed on Dec. 20, 2004.

(51) **Int. Cl.**
***H04L 29/06*** (2006.01)
***G05B 1/00*** (2006.01)

(52) **U.S. Cl.**
CPC ..... ***G05B 1/00*** (2013.01)
USPC ..... **713/186**; 713/153

(58) **Field of Classification Search**
CPC combination set(s) only.
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,759,060 A 7/1988 Hayashi et al.
4,993,068 A 2/1991 Piosenka et al.
5,187,352 A 2/1993 Blair et al.
5,296,641 A 3/1994 Stelzel
5,392,433 A 2/1995 Hammersley et al.
5,416,780 A 5/1995 Patel

(Continued)

FOREIGN PATENT DOCUMENTS

WO WO 00/62505 10/2000
WO WO 01/22724 3/2001

(Continued)

OTHER PUBLICATIONS

"Alliance Activities: Publications: Identity—Smart Card Alliance," Smart Card Alliance, 1997-2007, Retrieved on Jan. 7, 2007 from <URL:http://www.smartcardalliance.org/pages/publications-identity>, 3 pgs.

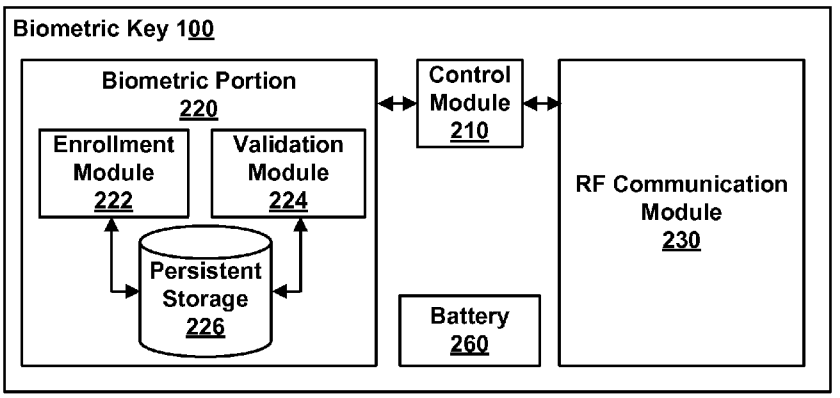
(Continued)

*Primary Examiner* — Eleni Shiferaw
*Assistant Examiner* — Phy Ahn Vu
(74) *Attorney, Agent, or Firm* — Patent Law Works LLP

(57) **ABSTRACT**

Systems and methods verifying a user during authentication of an integrated device. In one embodiment, the system includes an integrated device and an authentication unit. The integrated device stores biometric data of a user and a plurality of codes and other data values comprising a device ID code uniquely identifying the integrated device and a secret decryption value in a tamper proof format, and when scan data is verified by comparing the scan data to the biometric data, wirelessly sends one or more codes and other data values including the device ID code. The authentication unit receives and sends the one or more codes and the other data values to an agent for authentication, and receives an access message from the agent indicating that the agent successfully authenticated the one or more codes and other data values and allows the user to access an application.

**29 Claims, 6 Drawing Sheets**






GOOGLE EXHIBIT 1026
GOOGLE v. PROXENSE
IPR2024-00232

(56) **References Cited**

U.S. PATENT DOCUMENTS

| | | | | |
|---|---|---|---|---|
| 5,422,632 | A | | 6/1995 | Bucholtz et al. |
| 5,450,489 | A | | 9/1995 | Ostrover et al. |
| 5,619,251 | A | | 4/1997 | Kuroiwa et al. |
| 5,629,980 | A | | 5/1997 | Stefik et al. |
| 5,644,354 | A | | 7/1997 | Thompson et al. |
| 5,666,412 | A | | 9/1997 | Handelman et al. |
| 5,784,464 | A | | 7/1998 | Akiyama et al. |
| 5,825,876 | A | | 10/1998 | Peterson, Jr. |
| 5,857,020 | A | | 1/1999 | Peterson, Jr. |
| 5,892,825 | A | | 4/1999 | Mages et al. |
| 5,894,551 | A | | 4/1999 | Huggins et al. |
| 5,898,880 | A | | 4/1999 | Ryu |
| 5,917,913 | A | | 6/1999 | Wang |
| 5,928,327 | A | | 7/1999 | Wang et al. |
| 5,991,399 | A | | 11/1999 | Graunke et al. |
| 5,991,749 | A | | 11/1999 | Morrill, Jr. |
| 6,016,476 | A | | 1/2000 | Maes et al. |
| 6,018,739 | A | | 1/2000 | McCoy et al. |
| 6,035,038 | A | | 3/2000 | Campinos et al. |
| 6,035,329 | A | | 3/2000 | Mages et al. |
| 6,038,334 | A | | 3/2000 | Hamid |
| 6,041,410 | A | * | 3/2000 | Hsu et al. ..... 713/186 |
| 6,042,006 | A | | 3/2000 | Van Tilburg et al. |
| 6,055,314 | A | | 4/2000 | Spies et al. |
| 6,070,796 | A | | 6/2000 | Sirbu |
| 6,088,730 | A | | 7/2000 | Kato et al. |
| 6,104,334 | A | | 8/2000 | Allport |
| 6,121,544 | A | | 9/2000 | Petsinger |
| 6,148,142 | A | | 11/2000 | Anderson |
| 6,161,179 | A | | 12/2000 | Seidel |
| 6,185,316 | B1 | | 2/2001 | Buffam |
| 6,209,089 | B1 | | 3/2001 | Selitrennikoff et al. |
| 6,219,109 | B1 | | 4/2001 | Raynesford et al. |
| 6,219,439 | B1 | | 4/2001 | Burger |
| 6,247,130 | B1 | | 6/2001 | Fritsch |
| 6,256,737 | B1 | | 7/2001 | Bianco et al. |
| 6,266,415 | B1 | | 7/2001 | Campinos et al. |
| 6,295,057 | B1 | | 9/2001 | Rosin et al. |
| 6,336,121 | B1 | | 1/2002 | Lyson et al. |
| 6,336,142 | B1 | | 1/2002 | Kato et al. |
| 6,363,485 | B1 | | 3/2002 | Adams et al. |
| 6,367,019 | B1 | | 4/2002 | Ansell et al. |
| 6,381,747 | B1 | | 4/2002 | Wonfor et al. |
| 6,385,596 | B1 | | 5/2002 | Wiser et al. |
| 6,392,664 | B1 | | 5/2002 | White et al. |
| 6,397,387 | B1 | | 5/2002 | Rosin et al. |
| 6,401,059 | B1 | | 6/2002 | Shen et al. |
| 6,411,307 | B1 | | 6/2002 | Rosin et al. |
| 6,424,715 | B1 | | 7/2002 | Saito |
| 6,425,084 | B1 | | 7/2002 | Rallis et al. |
| 6,434,535 | B1 | | 8/2002 | Kupka et al. |
| 6,446,130 | B1 | | 9/2002 | Grapes |
| 6,463,534 | B1 | | 10/2002 | Geiger et al. |
| 6,480,188 | B1 | | 11/2002 | Horsley |
| 6,490,443 | B1 | | 12/2002 | Freeny, Jr. |
| 6,510,350 | B1 | | 1/2003 | Steen, III et al. |
| 6,523,113 | B1 | | 2/2003 | Wehrenberg |
| 6,529,949 | B1 | | 3/2003 | Getsin et al. |
| 6,546,418 | B2 | | 4/2003 | Schena et al. |
| 6,550,011 | B1 | | 4/2003 | Sims, III |
| 6,563,805 | B1 | | 5/2003 | Ma et al. |
| 6,564,380 | B1 | | 5/2003 | Murphy |
| 6,628,302 | B2 | | 9/2003 | White et al. |
| 6,632,992 | B2 | | 10/2003 | Hasegawa |
| 6,647,417 | B1 | | 11/2003 | Hunter et al. |
| 6,667,684 | B1 | | 12/2003 | Waggamon et al. |
| 6,683,954 | B1 | | 1/2004 | Searle |
| 6,697,944 | B1 | | 2/2004 | Jones et al. |
| 6,709,333 | B1 | | 3/2004 | Bradford et al. |
| 6,711,464 | B1 | | 3/2004 | Yap et al. |
| 6,775,655 | B1 | | 8/2004 | Peinado et al. |
| 6,804,825 | B1 | | 10/2004 | White et al. |
| 6,806,887 | B2 | | 10/2004 | Chernock et al. |
| 6,850,147 | B2 | | 2/2005 | Prokoski et al. |
| 6,873,975 | B1 | | 3/2005 | Hatakeyama et al. |
| 6,950,941 | B1 | | 9/2005 | Lee et al. |
| 6,963,971 | B1 | * | 11/2005 | Bush et al. ..... 713/153 |
| 6,973,576 | B2 | | 12/2005 | Giobbi |
| 6,975,202 | B1 | | 12/2005 | Rodriguez et al. |
| 6,983,882 | B2 | | 1/2006 | Cassone |
| 7,012,503 | B2 | | 3/2006 | Nielsen |
| 7,090,126 | B2 | | 8/2006 | Kelly et al. |
| 7,112,138 | B2 | | 9/2006 | Hedrick et al. |
| 7,137,012 | B1 | | 11/2006 | Kamibayashi et al. |
| 7,191,466 | B1 | | 3/2007 | Hamid et al. |
| 7,218,944 | B2 | | 5/2007 | Cromer et al. |
| 7,249,177 | B1 | | 7/2007 | Miller |
| 7,305,560 | B2 | | 12/2007 | Giobbi |
| 7,529,944 | B2 | | 5/2009 | Hamid |
| 7,574,734 | B2 | | 8/2009 | Fedronic et al. |
| 7,587,611 | B2 | | 9/2009 | Johnson et al. |
| 7,617,523 | B2 | * | 11/2009 | Das et al. ..... 726/5 |
| 7,644,443 | B2 | | 1/2010 | Matsuyama et al. |
| 7,715,593 | B1 | | 5/2010 | Adams et al. |
| 7,883,417 | B2 | | 2/2011 | Bruzzese et al. |
| 7,904,718 | B2 | | 3/2011 | Giobbi et al. |
| 2001/0044337 | A1 | | 11/2001 | Rowe et al. |
| 2002/0007456 | A1 | | 1/2002 | Peinado et al. |
| 2002/0013772 | A1 | | 1/2002 | Peinado |
| 2002/0014954 | A1 | | 2/2002 | Fitzgibbon et al. |
| 2002/0015494 | A1 | | 2/2002 | Nagai et al. |
| 2002/0023032 | A1 | | 2/2002 | Pearson et al. |
| 2002/0026424 | A1 | | 2/2002 | Akashi |
| 2002/0071559 | A1 | | 6/2002 | Christensen et al. |
| 2002/0073042 | A1 | | 6/2002 | Maritzen et al. |
| 2002/0098888 | A1 | | 7/2002 | Rowe et al. |
| 2002/0103027 | A1 | | 8/2002 | Rowe et al. |
| 2002/0104006 | A1 | | 8/2002 | Boate et al. |
| 2002/0108049 | A1 | | 8/2002 | Xu et al. |
| 2002/0109580 | A1 | | 8/2002 | Shreve et al. |
| 2002/0129262 | A1 | * | 9/2002 | Kutaragi et al. ..... 713/193 |
| 2002/0138767 | A1 | | 9/2002 | Hamid et al. |
| 2002/0140542 | A1 | | 10/2002 | Prokoski et al. |
| 2002/0144117 | A1 | | 10/2002 | Faigle |
| 2002/0150282 | A1 | | 10/2002 | Kinsella |
| 2002/0152391 | A1 | | 10/2002 | Willins et al. |
| 2002/0158750 | A1 | | 10/2002 | Almalik |
| 2002/0174348 | A1 | * | 11/2002 | Ting ..... 713/186 |
| 2002/0178063 | A1 | | 11/2002 | Gravelle et al. |
| 2002/0191816 | A1 | | 12/2002 | Maritzen et al. |
| 2003/0036425 | A1 | | 2/2003 | Kaminkow et al. |
| 2003/0046552 | A1 | | 3/2003 | Hamid |
| 2003/0054868 | A1 | | 3/2003 | Paulsen et al. |
| 2003/0054881 | A1 | | 3/2003 | Hedrick et al. |
| 2003/0055689 | A1 | | 3/2003 | Block et al. |
| 2003/0079133 | A1 | | 4/2003 | Breiter et al. |
| 2003/0115474 | A1 | * | 6/2003 | Khan et al. ..... 713/186 |
| 2003/0127511 | A1 | | 7/2003 | Kelly et al. |
| 2003/0139190 | A1 | | 7/2003 | Steelberg et al. |
| 2003/0149744 | A1 | * | 8/2003 | Bierre et al. ..... 709/217 |
| 2003/0172037 | A1 | | 9/2003 | Jung et al. |
| 2003/0176218 | A1 | | 9/2003 | LeMay et al. |
| 2003/0186739 | A1 | | 10/2003 | Paulsen et al. |
| 2004/0127277 | A1 | | 7/2004 | Walker et al. |
| 2004/0128162 | A1 | * | 7/2004 | Schlotterbeck et al. ..... 705/2 |
| 2004/0129787 | A1 | * | 7/2004 | Saito et al. ..... 235/492 |
| 2004/0209690 | A1 | | 10/2004 | Bruzzese et al. |
| 2004/0209692 | A1 | | 10/2004 | Schober et al. |
| 2004/0215615 | A1 | | 10/2004 | Larsson et al. |
| 2004/0230488 | A1 | | 11/2004 | Beenau et al. |
| 2005/0074126 | A1 | * | 4/2005 | Stanko ..... 380/279 |
| 2005/0081040 | A1 | | 4/2005 | Johnson et al. |
| 2005/0109836 | A1 | * | 5/2005 | Ben-Aissa ..... 235/380 |
| 2005/0229007 | A1 | | 10/2005 | Bolle et al. |
| 2005/0251688 | A1 | | 11/2005 | Nanavati et al. |
| 2005/0253683 | A1 | | 11/2005 | Lowe |
| 2006/0022046 | A1 | | 2/2006 | Iwamura |
| 2006/0113381 | A1 | | 6/2006 | Hochstein et al. |
| 2006/0156027 | A1 | | 7/2006 | Blake |
| 2007/0220272 | A1 | | 9/2007 | Campisi et al. |
| 2008/0019578 | A1 | | 1/2008 | Saito et al. |
| 2008/0188308 | A1 | | 8/2008 | Shepherd et al. |

(56) **References Cited**

U.S. PATENT DOCUMENTS

| | | | |
|---|---|---|---|
| 2009/0328182 | A1 | 12/2009 | Malakapalli et al. |
| 2010/0117794 | A1 | 5/2010 | Adams et al. |
| 2011/0126188 | A1 | 5/2011 | Bernstein et al. |

FOREIGN PATENT DOCUMENTS

| | | |
|---|---|---|
| WO | WO 01/75876 | 10/2001 |
| WO | WO 01/77790 | 10/2001 |
| WO | WO 2005/050450 | 6/2005 |
| WO | WO 2005/086802 | 9/2005 |

OTHER PUBLICATIONS

"Applying Biometrics to Door Access," Security Magazine, Sep. 26, 2002, Retrieved on Jan. 7, 2007, from <URL:http://www.securitymagazine.com/CDA/Articles/technologies/3ae610eaa34d8010VgnVCM100000f932a8c0_>, 5 pgs.

Van Winkle, William, "Bluetooth, the King of Connectivity," Laptop Buyer's Guide and Handbook, Jan. 2000, pp. 148-153.

Yoshida, Junko, "Content Protection Plan Targets Wireless Home Networks," www.eetinnes.com, Jan. 11, 2002, 2 pgs.

Debow, Yvette, "Credit/Debit Debuts in Midwest Smart Card Test," Computers in Banking, v6, n11, Nov. 1989, 4 pgs.

Dennis, Sylvia, "Digital Passports Need Not Infringe Civil Liberties," Newsbytes, Dec. 2, 1999, 2 pgs.

Blum, Jonathan, "Digital Rights Management May Solver the Napster "Problem"," Technology Investor Industrysector, Oct. 2000, pp. 24-27.

Lake, Matt, "Downloading for Dollars," Sound & Vision, Nov. 2000, pp. 137-138.

Sapsford, Jathon, "E-Business: Sound Waves Could Help Ease Web-Fraud Woes," Wall Street Journal, Aug. 14, 2000, 2 pgs.

"Firecrest Shows How Truly Commercially-Minded Companies Will Exploit the Internet," Computergram International, Jan. 18, 1996, 2 pgs.

"Frequently Asked Questions (FAQs) About BioPay," BioPay, LLC, 2007, Retrieved on Jan. 7, 2007, from <URL: http://www.biopay.com/faqs-lowes.asp>, 5 pgs.

McIver, R. et al., "Identification and Verification Working Together," Bioscrypt, Aug. 27, 2004, Retrieved on Jan. 7, 2007, from <URL:http://www.ibia.org/membersadmin/whitepapers/pdf/15/Identification%20and%20%20Verification%20Working%20-Together.pdf>, 5 pgs.

Weber, Thomas E., "In the Age of Napster, Protecting Copyright is a Digital Arms Race," Wall Street Journal, Jul. 24, 2000, 3 pgs.

PCT International Search Report, PCT/US04/38124, Apr. 7, 2005, 10 pgs.

PCT International Search Report, PCT/US05/43447, Feb. 22, 2007, 7 pgs.

PCT International Search Report, PCT/US05/46843, Mar. 1, 2007, 10 pgs.

PCT International Search Report, PCT/US07/11102, Oct. 3, 2008, 11 pgs.

PCT International Search Report, PCT/US07/11103, Apr. 23, 2008, 9 pgs.

PCT International Search Report, PCT/US07/11104, Jun. 26, 2008, 9 pgs.

PCT International Search Report, PCT/US07/11105, Oct. 20, 2008, 10 pgs.

Nilsson, J. et al., "Match-On-Card for Java Cards," Precise Biometrics, White Paper, Apr. 2004, Retrieved on Jan. 7, 2007, from <URL:http://www.ibia.org/membersadmin/whitepapers/pdf/17/Precise%20Match-on-Card%20for%20Java%20Cards.pdf>, 5 pgs.

Nordin, B., "Match-On-Card Technology," Precise Biometrics, White Paper, Apr. 2004, Retrieved on Jan. 7, 2007, from <URL:http://www.ibia.org/membersadmin/whitepapers/pdf/17/Precis%20Match-on-Card%20technology.pdf>, 7 pgs.

"Micronas and Thomson Multimedia Showcase a New Copy Protection System that Will Drive the Future of Digital Television," www.micronas.com, Jan. 8, 2002, 3 pgs.

Pope, "Oasis Digital Signature Services: Digital Signing without the Headaches," Internet Computing—IEEE, vol. 10, Oct. 2006, pp. 81-84.

"SAFModuleTM: A Look Into Strong Authentication," saflink Corporation, Retrieved on Jan. 7, 2007, from <URL: http://www.ibia.org/membersadmin/whitepapers/pdf/6/SAFmod_WP.pdf>, 8 pgs.

"Say Hello to Bluetooth," Bluetooth Web site, Jun. 2000, 4 pgs.

"Smart Cards and Biometrics White Paper," Smart Card Alliance, May 2002, Retrieved on Jan. 7, 2007, from <URL: http://www.securitymanagementcom.library/smartcard_faqtech0802.pdf>, 7 pgs.

Lewis, Peter H., "Sony and Visa in On-Line Entertainment Venture," New York Times, v145, Nov. 16, 1995, 1 pg.

Fasca, Chad, "The Circuit," Electronic News, vol. 45 Iss. 45, Nov. 8, 1999, 2 pgs.

Wallace, Bob, "The Internet Unplugged," InformationWeek.com, Dec. 13, 1999, pp. 22-24.

Paget, Paul, "The Security Behind Secure Extranets," Enterprise Systems Journal, Dec. 1999, 4 pgs.

Kontzer, Tony, "Thomson Bets on Smart Cards for Video Encryption," www.informationweek.com, Jun. 7, 2001, p. 1.

Press Release, "Thomson Multimedia Unveils Copy Protection Proposal Designed to Provide Additional Layer of Digital Content Security," www.thompson-multimedia.com, May 30, 2001, 2 pgs.

Wade, Will, "Using Fingerprints to Make Payments at POS Slowly Gaining Popularity," Credit Union Journal, International Biometric Group, Apr. 21, 2003, Retrieved on Jan. 7, 2007, from <URL:http://www.biometricgroup.com/in_the_news/04.21.03.html>, 3 pgs.

Antonoff, Michael, "Visiting Video Valley," Sound & Vision, Nov. 2001, pp. 116, 118-119.

"What is a File?," Apr. 30, 1998, URL: http://unixhelp.ed.ac.uk/editors/whatisafile.html, accessed Mar. 11, 2010 via http://waybackmachine.org/1998061500000* /http://unixhelp.ed.ac.uk/editors/whatisafile.html, 1 pg.

Farouk, "Authentication Mechanisms in Grid Computing Environment; Comparative Study", 2012, IEEE, p. 1-6.

* cited by examiner

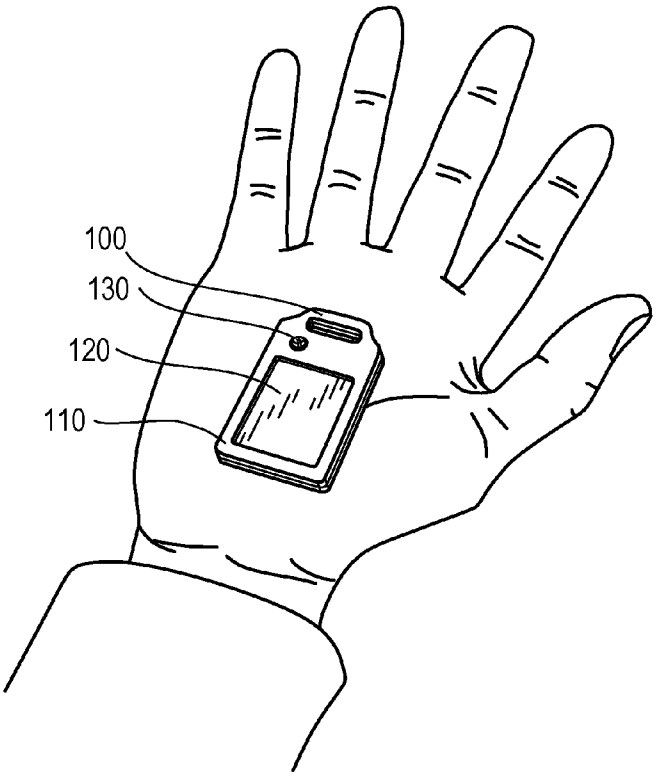

100
130
120
110

FIG. 1

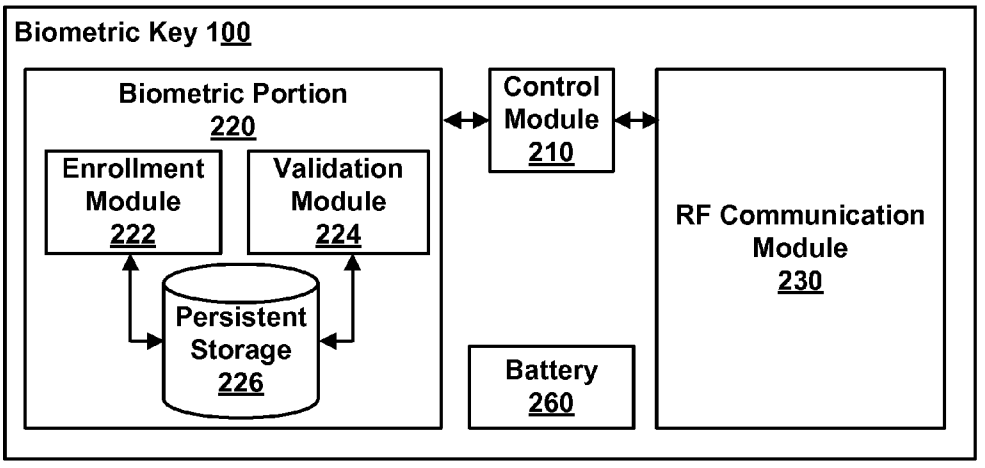

Biometric Key 100
Biometric Portion 220
Enrollment Module 222
Validation Module 224
Persistent Storage 226
Control Module 210
Battery 260
RF Communication Module 230

FIG. 2

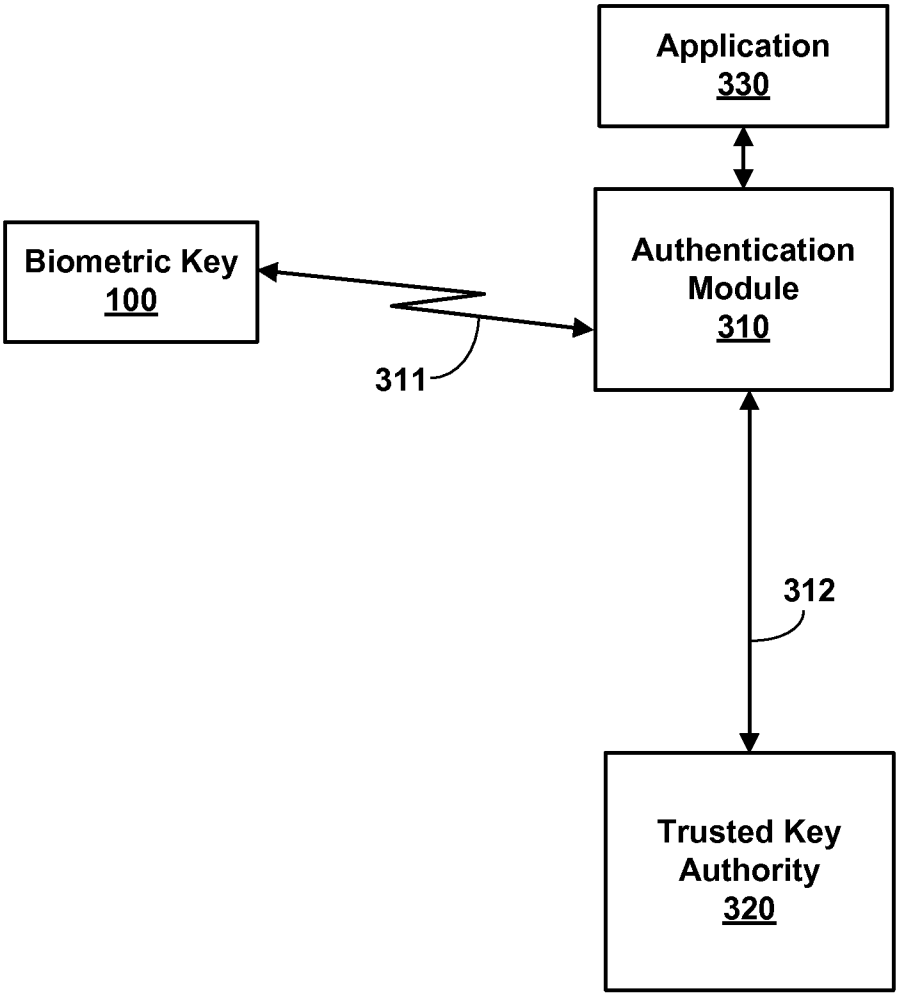

Application
330
Authentication
Module
310
Biometric Key
100
311
312
Trusted Key
Authority
320

FIG. 3

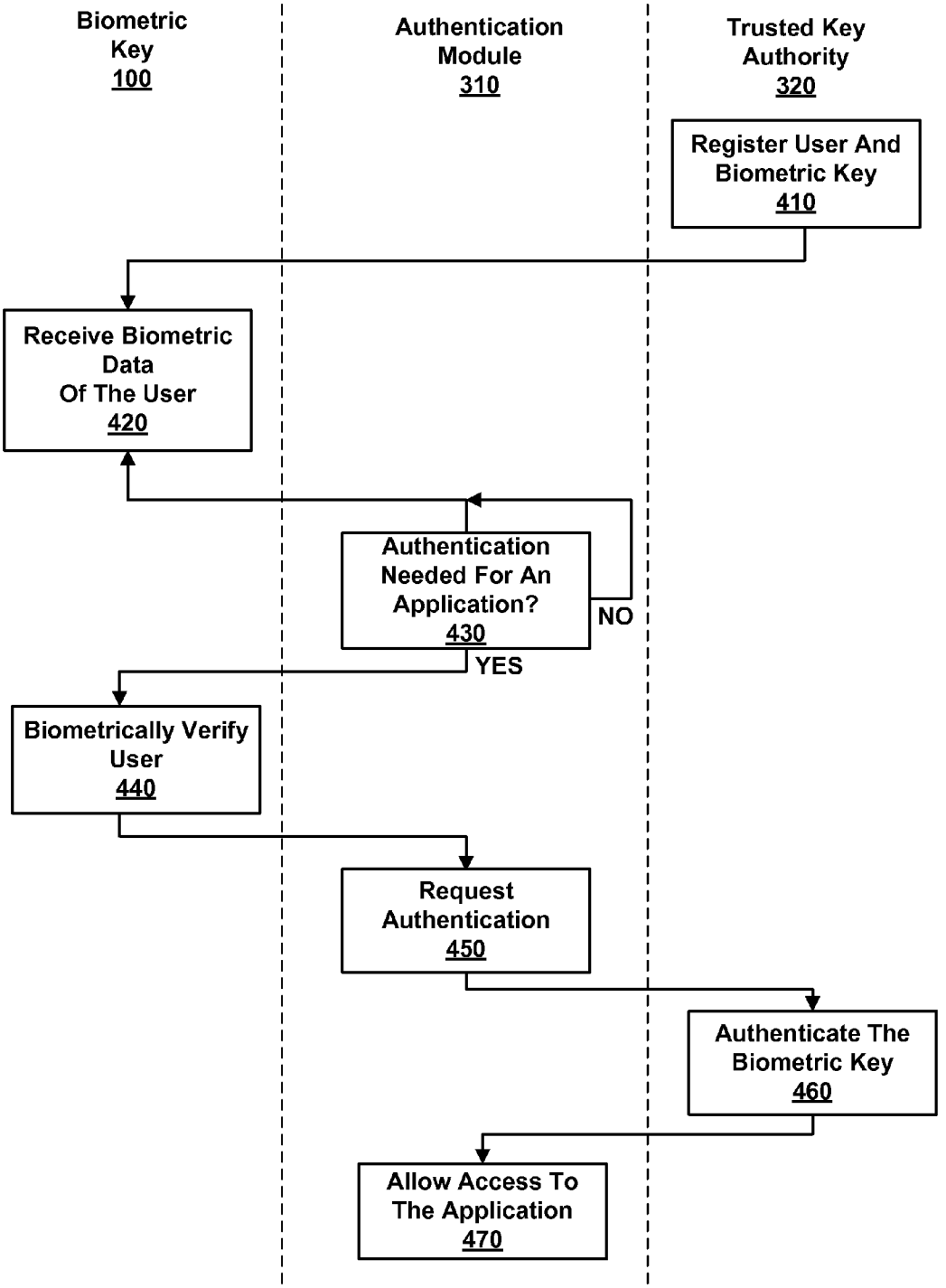

Biometric Key 100
Authentication Module 310
Trusted Key Authority 320
Register User And Biometric Key 410
Receive Biometric Data Of The User 420
Authentication Needed For An Application? 430
NO
YES
Biometrically Verify User 440
Request Authentication 450
Authenticate The Biometric Key 460
Allow Access To The Application 470

FIG. 4

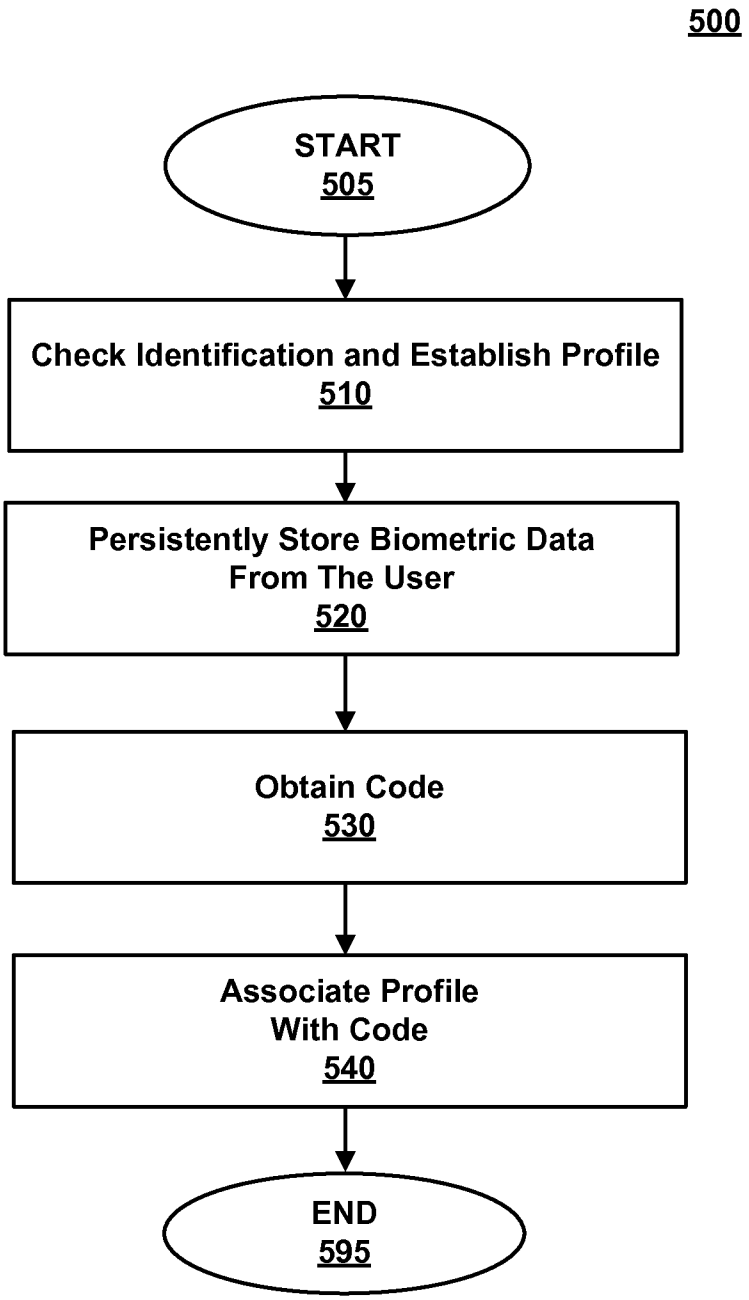

500
START
505
Check Identification and Establish Profile
510
Persistently Store Biometric Data From The User
520
Obtain Code
530
Associate Profile With Code
540
END
595

FIG. 5

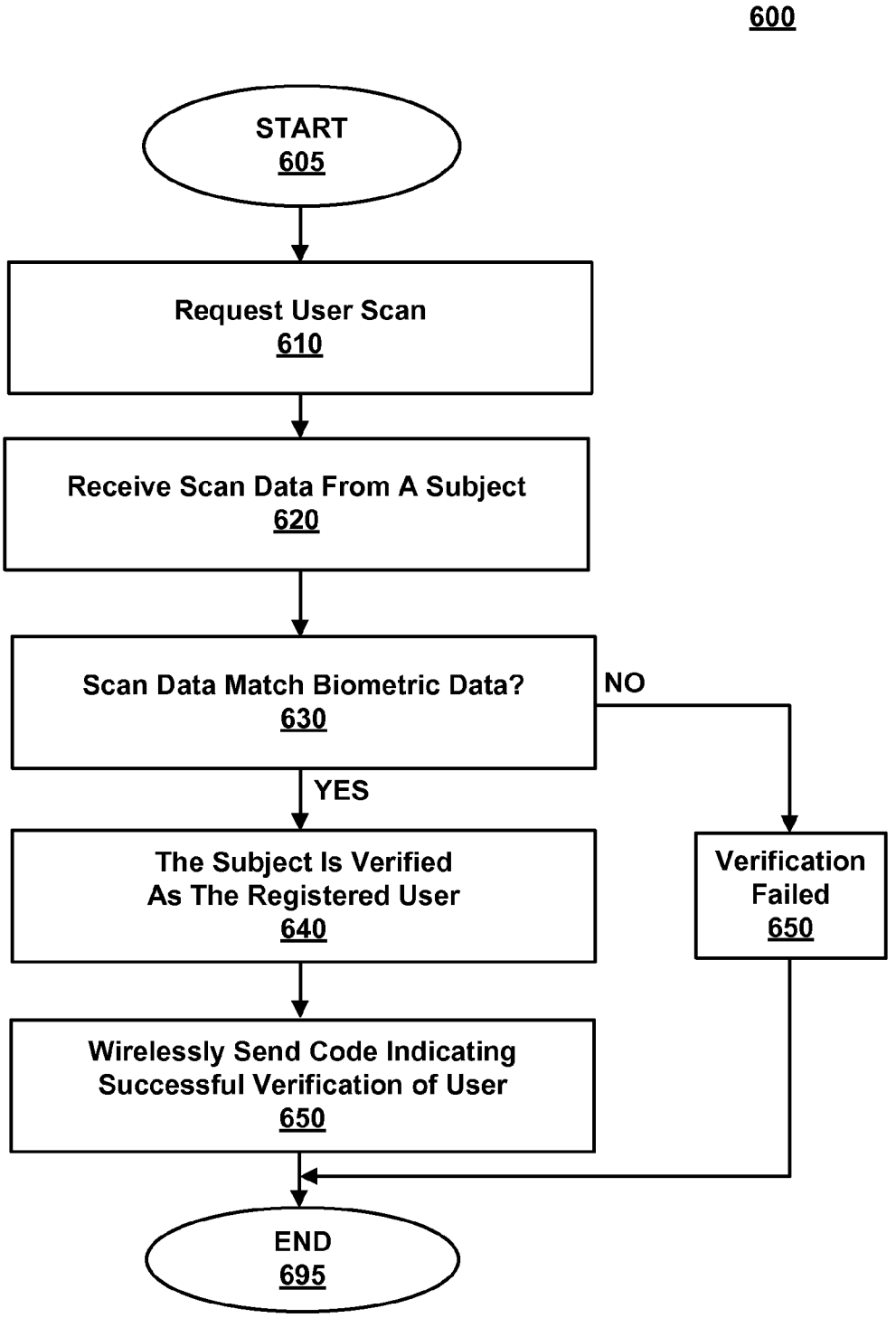

600
START
605
Request User Scan
610
Receive Scan Data From A Subject
620
Scan Data Match Biometric Data?
630
NO
YES
The Subject Is Verified
As The Registered User
640
Verification
Failed
650
Wirelessly Send Code Indicating
Successful Verification of User
650
END
695

FIG. 6

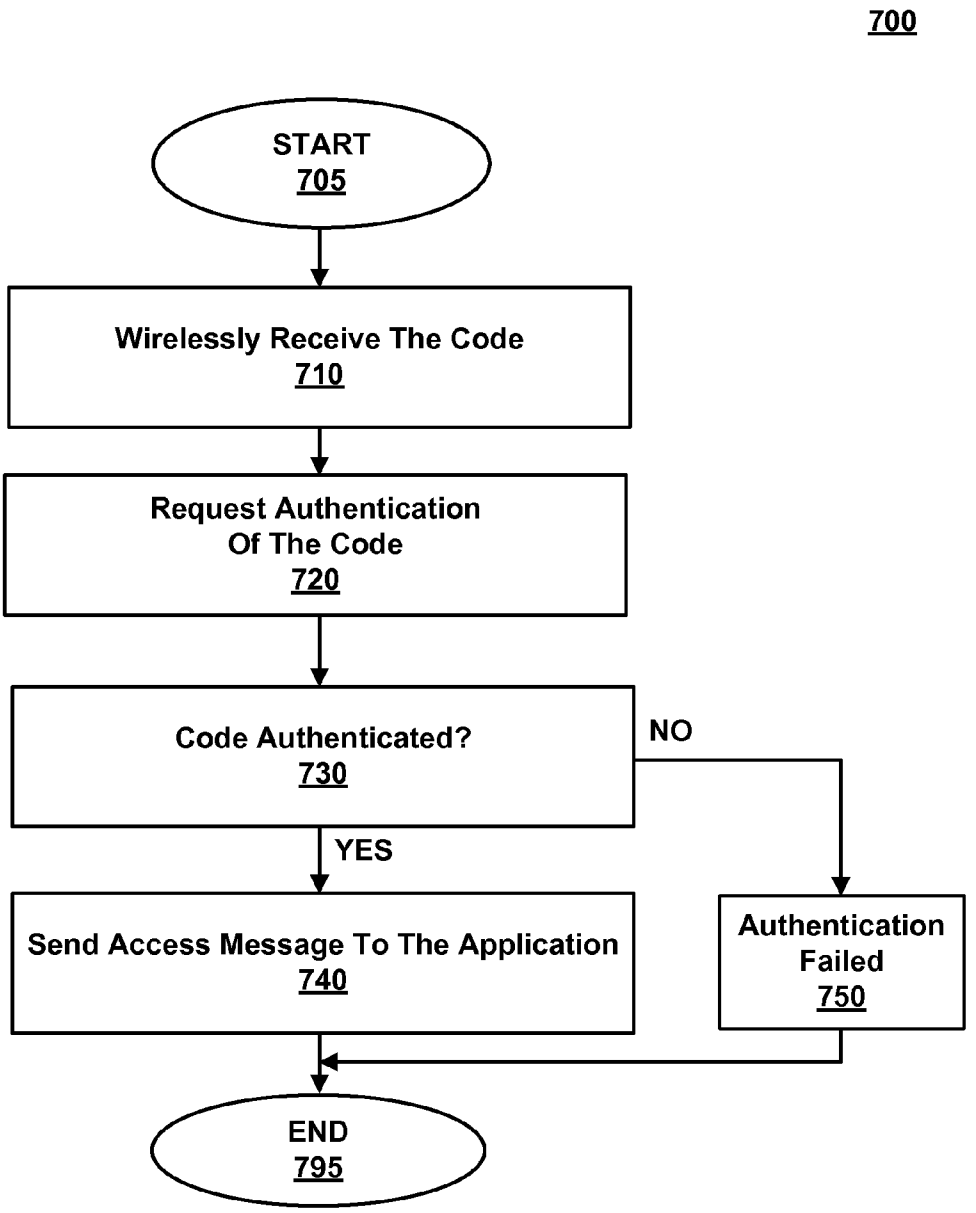

700
START
705
Wirelessly Receive The Code
710
Request Authentication
Of The Code
720
Code Authenticated?
730
NO
YES
Send Access Message To The Application
740
Authentication
Failed
750
END
795

FIG. 7

# BIOMETRIC PERSONAL DATA KEY (PDK) AUTHENTICATION

## CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims priority, under 35 U.S.C. §120, to U.S. patent application Ser. No. 11/314,199, filed Dec. 20, 2005 and entitled "Biometric Personal Data Key (PDK) Authentication," which claims the benefit of U.S. Provisional Application No. 60/637,538, filed on Dec. 20, 2004, and of U.S. Provisional Application No. 60/652,765, filed on Feb. 14, 2005, the entire contents of which are hereby incorporated by reference.

## FIELD OF THE INVENTION

The present invention relates generally to computerized authentication, and more specifically, to an authentication responsive to biometric verification of a user being authenticated.

## BACKGROUND

Conventional user authentication techniques are designed to prevent access by unauthorized users. One technique is to require a user being authenticated to provide secret credentials, such as a password, before allowing access. Similarly, a PIN number can be required by an ATM machine before allowing a person to perform automated bank transactions. A difficulty with this technique is that it requires the user to memorize or otherwise keep track of the credentials. A uses often has multiple sets of credentials (e.g., passwords and PINs) and it can be quite difficult to keep track of them all.

Another technique that does not require the user to memorize credentials is to provide the user with an access object such as a key (e.g., an electronic key) that the user can present to obtain access. For example, a user can be provided with a small electronic key fob that allows access to a building or other secured location. A difficulty with using access objects is that authentication merely proves that the access object itself is valid; it does not verify that the legitimate user is using the access object. That is, illegitimate user can use a stolen access object to enter a secured location because the user's identity is never checked.

Some hybrid authentication techniques require the user to provide both an access object and credentials. The user is authenticated only upon providing both items. Of course, this solution does not resolve the problem of making the user memorize credentials.

Therefore, there is a need for systems and methods for verifying a user that is being authenticated that does not suffer from the limitations described above. Moreover, the solution should ease authentications by wirelessly providing an identification of the user.

## SUMMARY

The present invention addresses the above needs by providing systems and methods for authentication responsive to biometric verification of a user being authenticated. In one embodiment, an integrated device includes a persistent storage to persistently stores a code such as a device identifier (ID) and biometric data for a user in a tamper-resistant format, and a verification module, in communication with the persistent storage, to receive scan data from a biometric scan for comparison against the biometric data, and if the scan data matches the biometric data, wirelessly sending a code for authentication.

In one embodiment, a method for verifying a user during authentication of an integrated device, includes persistently storing biometric data for the user in a tamper-resistant format; responsive to receiving a request for biometric verification of the user, receiving scan data from a biometric scan; comparing the scan data to the biometric data to determine whether the data match; and responsive to a determination that the scan data matches the biometric data, wirelessly sending a code for authentication.

Other embodiments include corresponding systems, apparatus, and computer programming products, configured to perform the actions of the methods, encoded on computer storage devices. These and other embodiments may each optionally include one or more of the following features. For instance the operations further include registering an age verification for the user in association with the code. For instance the operations further include establishing a secure communication channel prior to sending the code for authentication. For instance the operations further include receiving a request for the code without a request for biometric verification, and responsive to receiving the request for the code without a request for biometric verification, sending the code without requesting the scan data. For instance, the features include: the code is registered with a trusted authority, and the code can be authenticated to a third party by the trusted authority; the code uniquely identifies the integrated device; the code indicates that the biometric verification was successful; persistently storing biometric data includes permanently storing biometric data; the biometric data and the scan data are both based on a fingerprint scan by the user, an LED to be activated for requesting the biometric scan.

In one embodiment, a method for authenticating a verified user, includes receiving a code associated with a biometrically verified user; requesting authentication of the code; receiving an authentication result; and in response to the authentication result being positive, providing access to an application.

In one embodiment, a system includes an integrated device (e.g. a biometric key) to store biometric data for a user in a tamper resistant format, and if scan data can be verified as being from the user by comparing the scan data to the biometric data, wirelessly sending a code; and an authentication module to receive the code and send the code to a trusted authority for authentication, and responsive to the code being authenticated, allowing the user to access an application.

Other embodiments include corresponding systems, apparatus, and computer programming products, configured to perform the actions of the methods, encoded on computer storage devices. These and other embodiments may each optionally include one or more of the following features. For instance, the operations further include registering the code with a trusted authority, wherein requesting authentication of the code includes providing the code to the trusted authority and wherein receiving an authentication result comprises receiving the authentication result from the trusted authority. For instance the operations further include registering a date of birth or age with the trusted authority. For instance the operations further include establishing a secure communications channel with an integrated device, wherein the code associated with the biometrically verified user is received from the integrated device. For instance the features include: the integrated device receives an authentication request from the authentication module, and in response, requests a biometric scan from the user to generate the scan data; when the

integrated device cannot verify the scan data as being from the user, it does not send the code.

Advantageously, user authentication is bolstered with highly reliable biometric verification of the user in an integrated device. Furthermore, a keyless environment relieves authorized users from having to memorize credentials, and of having to physically enter credentials or keys. In addition, the integrated device can be authenticated for an application that is open to the public (i.e., in an open loop system).

The features and advantages described in the specification are not all inclusive and, in particular, many additional features and advantages will be apparent to one of ordinary skill in the art in view of the drawings, specifications, and claims. Moreover, it should be noted that the language used in the specification has been principally selected for readability and instructional purposes and may not have been selected to delineate or circumscribe the inventive matter.

## BRIEF DESCRIPTION OF THE DRAWINGS

The teachings of the present invention can be readily understood by considering the following detailed description in conjunction with the accompanying drawings.

FIG. **1** is a schematic diagram illustrating a biometric key for providing authentication information for a biometrically verified user according to one embodiment of the present invention.

FIG. **2** is a block diagram illustrating functional modules within the biometric key according to one embodiment of the present invention.

FIG. **3** is a block diagram illustrating a system for providing authentication information for a biometrically verified user.

FIG. **4** is a flow chart illustrating a method for providing authentication information for a biometrically verified user.

FIG. **5** is a flow chart illustrating a method for enrolling biometric data of the user with the biometric key.

FIG. **6** is a flow chart illustrating a method for verifying a subject presenting the biometric key according to one embodiment of the present invention.

FIG. **7** is a flow chart illustrating a method for authenticating a verified user of the biometric key according to one embodiment of the present invention.

## DETAILED DESCRIPTION

Systems and methods for authentication responsive to biometric verification of a user being authenticated are described. Generally, biometric verification uses biometric data to ensure that the user of, for example, a biometric key, is the person registered as an owner. Biometric data is a digital or analog representation of characteristics unique to the user's body. For example, a fingerprint of a subject can be compared against previously-recorded biometric data for verification that the subject is the registered owner of the biometric key. Then, the biometric key itself can be authenticated.

Although the embodiments below are described using the example of biometric verification using a fingerprint, other embodiments within the spirit of the present invention can perform biometric verification using other types of biometric data. For example, the biometric data can include a palm print, a retinal scan, an iris scan, hand geometry recognition, facial recognition, signature recognition, or voice recognition.

FIG. **1** is a schematic diagram illustrating an example of a biometric key **100** for providing authentication information for a biometrically verified user according to one embodiment of the present invention. In one embodiment, the biometric key **100** comprises a frame **110**, a scan pad **120**, and an LED **130**. In one embodiment, biometric key **100** has a small form factor (e.g., the size of an automobile remote control) such that it can be unobtrusively carried by a user. In one embodiment, the biometric key **100** is integrated into another object or device. A device having an integrated biometric key **100** is occasionally referred to herein as an "integrated device." For example, in one embodiment, the biometric key **100** is integrated into a mobile phone (e.g. a cellular phone or smartphone), tablet, laptop, mp3 player, mobile gaming device, watch, key fob or other mobile device, thereby making the biometric key **100** unobtrusive to carry.

Frame **110** can be formed by plastic, metal or another suitable material. Frame **110** is shaped to secure scan pad **120**, and includes a perforation for attachment to, for example a key chain or clip. In one embodiment, frame **110** is formed from a unitary molding to protect biometric data. Accordingly, frame **110** cannot be opened to expose the underlying components unless it is broken.

Scan pad **120** can be, for example, an optical scanner using a charge coupled device, or a capacitive scanner. Scan pad **120** can be sized to fit a thumb or other finger. Biometric key **100** of the present embodiment includes LED **130** that lights up to request a fingerprint scan from a user. In one embodiment, LED **130** can also confirm that user verification and/or authentication has completed.

Biometric key **100** can authenticate a user for various purposes. For example, biometric key **100** can allow keyless entry into homes and autos. In another example, biometric key **100** can log a user onto a computer system or point of sale register without typing in credentials. In still another example, biometric key **100** can verify that an enrolled user is above a certain age (e.g., before allowing access to a slot machine in a casino). In some embodiments, biometric key **100** operates without biometric verification, and request a fingerprint scan from a user only when biometric verification is needed for the particular use.

FIG. **2** is a block diagram illustrating biometric key **100** according to one embodiment of the present invention. Biometric key **100** comprises control module **210**, biometric portion **220**, RF communication module **230**, persistent storage **240**, and battery **250**. Biometric key **100** can be formed from a combination of hardware and software components as described above. In one embodiment, biometric key **100** comprises a modified key fob.

Control module **210** coordinates between several functions of biometric key **100**. In one embodiment, control module **210** provides a verification code upon successful verification of the user. More specifically, once biometric portion **220** indicates that a fingerprint scan matches biometric data that was collected during enrollment, control module **210** can trigger RF communication module **230** for sending a code indicating that the user was verified. In another embodiment, control module **210** can work in the opposite direction by detecting a request for verification from RF communication module **230**, and then requesting verification of the user from biometric portion **210**. Note that control module **210** of FIG. **2** is merely a grouping of control functions in a central architecture, and in other embodiments, the control functions can be distributed between several modules around biometric key **100**.

Biometric portion **220** comprises enrollment module **222**, validation module **224**, and biometric data base **226**. In one embodiment, enrollment module **222** registers a user with biometric key **100** by persistently storing biometric data asso-

ciated with the user. Further, enrollment module **222** registers biometric key **100** with a trusted authority by providing the code (e.g., device ID) to the trusted authority. Or conversely, the trusted authority can provide the code to biometric key **100** to be stored therein.

Validation module **224** can comprise scan pad **120** (FIG. **1**) to capture scan data from a user's fingerprint (e.g., a digital or analog representation of the fingerprint). Using the scan data, validation module **214** determines whether the user's fingerprint matches the stored biometric data from enrollment. Conventional techniques for comparing fingerprints can be used. For example, the unique pattern of ridges and valleys of the fingerprints can be compared. A statistical model can be used to determine comparison results. Validation module **224** can send comparison results to control module **210**.

In other embodiments, validation module **224** can be configured to capture biometric data for other human characteristics. For example, a digital image of a retina, iris, and/or handwriting sample can be captured. In another example, a microphone can capture a voice sample.

Persistent storage **226** persistently stores biometric data from one or more users which can be provided according to specific implementations. In one embodiment, at least some of persistent storage **226** is a memory element that can be written to once but cannot subsequently be altered. Persistent storage **226** can include, for example, a ROM element, a flash memory element, or any other type of non-volatile storage element. Persistent storage **226** is itself, and stores data in, a tamper-proof format to prevent any changes to the stored data. Tamperproofing increases reliability of authentication because it does not allow any changes to biometric data (i.e., allows reads of stored data, but not writes to store new data or modify existing data). Furthermore, data can be stored in an encrypted form.

In one embodiment, persistent storage **226** also stores the code that is provided by the key **100** responsive to successful verification of the user. As described above, in one embodiment the code is a device ID or other value that uniquely identifies biometric key **100**. In one embodiment, the code is providing during the manufacturing process and the biometric data are provided during an enrollment of the user. In other embodiments, the code is provided during enrollment and/or the biometric data are provided during manufacturing. Further, in some embodiments persistent storage **226** stores other data utilized during the operation of biometric key **100**. For example, persistent storage **226** can store encryption/decryption keys utilized to establish secure communications links.

Radio frequency (RF) communication module **230** is, for example, a transceiver or other mechanism for wireless communication. RF communication module **230** can send and receive data (e.g., the code) as modulated electromagnetic signals. In one embodiment, RF communication **220** can be optimized for low-power usage by, for example, using short-range transceivers. RF communication module **230** can actively send out connection requests, or passively detect connection requests.

Battery **260** can be a conventional power source suitable for the components of biometric key **100**. Battery **260** can be either replaceable or rechargeable. Alternatively, battery **260** can be embedded within key **100** such that the key must be discarded or recycled upon expiration of the battery.

FIG. **3** is a block diagram illustrating a system **300** for providing authentication information for a biometrically verified user. System **300** comprises an authentication module **310** in communication with biometric key **100**, a trusted key authority **320**, and an application **330**.

Authentication module **310** is coupled in communication with biometric key via line **311** (i.e., a wireless medium such as EM signals), and with trusted key authority **320** via line **312** (e.g., a secure data network such as the Internet, or a cell network). Authentication module **310** can include one or more of, for example, a computerized device, software executing on a computerized device, and/or a reader/decoder circuit. In one embodiment, authentication module **310** servers as a gatekeeper to application **330** by requiring the code indicating successful biometric verification of the user prior to allowing access to the application. Further, in one embodiment, authentication module **310** provides the code to trusted key authority **320** in order to verify that it belongs to a legitimate key (e.g., when application **330** is security-critical). Authentication module **310** can send a message to application **330**, or otherwise allow access to the application, responsive to a successful authentication by trusted key authority **320**.

Application **330** is a resource that can be accessed by a verified and authenticated user. Application **330** can be, for example, a casino machine, a keyless lock, a garage door opener, an ATM machine, a hard drive, computer software, a web site, a file, a financial account (e.g. a savings account, checking account, brokerage account, credit card account, credit line, etc.) and the like. In one embodiment, a file includes medical information such as a medical record, insurance information or other healthcare information. Application **330** can execute on the same system as authentication module **310** or on another system in communication with the system of the authentication module. In one embodiment, application module **330** allows access by a user after receiving a message from authentication module **310**. At that point, application **330** can allow direct use by the user, or require that communications continue to pass through authentication module **310** for continued authentication.

Trusted key authority **320** is a third-party authority that is present in some embodiments in order to provide enhanced security. In one embodiment, trusted key authority **320** verifies that a code from a biometric key is legitimate. To do so, the trusted key authority **320** stores a list of codes for legitimate biometric keys. The list can be batched or updated each time a new user/key is enrolled. In one embodiment, trusted key authority **320** can also store a profile associated with a biometric key. The profile describes the user associated with the key, the key itself, the trusted key authority, and/or other relevant information. In one embodiment, the functionality of trusted key authority **320** is provided by a server or other computerized device.

In an open system, where unknown users can attempt authentication (e.g., in a public grocery store), trusted key authority **320** provides verification that a key presenting a certain code is legitimate. By contrast, in a closed system, only known users are legitimate (e.g., owners of a home), the trusted key authority **320** can be maintained locally and serves to verify that the key belongs to one of the limited number of users that can use the system.

FIG. **4** is a flow chart illustrating a method **400** for authenticating a biometrically verified user using a trusted key authority (e.g., authority **320**). A biometric key (e.g., biometric key **100**) is registered **410** with the trusted key authority. The code (e.g., device ID) of the key is stored by the trusted key authority. Additionally, a user is enrolled **420** with the biometric key as described below with reference to FIG. **5**.

In various situations, authentication of the key is needed **430** (e.g., by authentication module **310**). In one embodiment, authentication can be required prior to allowing access to an application (e.g., application **330**). For example, a user can be standing proximate to a slot machine in a casino which

requires that a user be over the age of 21. The slot machine can detect the biometric key in the user's pocket, and, in response, spawn a conspicuous pop-up window on the slot machine requesting age verification. Alternatively, the biometric key can blink an LED. In other embodiments, biometric verification is not necessary and only the key itself is authenticated.

The biometric key establishes communication with the authentication module using various techniques. In one embodiment, the key and authentication module engage in preliminary data exchanges to determine who and/or what they are (e.g., to ascertain that they belong to the same system). These data exchanges can include challenge-response dialogs, hashing algorithms, and the like in order to ensure that the biometric key and authentication module are themselves legitimate. Further, in one embodiment the key and authentication module establish a secure communications channel. The key performs the biometric verification of the user **440** as described below with reference to FIG. **6**. If the biometric verification of the user is successful, the key provides its code over the secure communications channel.

The code is utilized to authenticate the biometric key itself **450**, **460** as described below with reference to FIG. **7** and profile information is received. Responsive to successful authentication of the key, access is allowed 470 to the application. In the slot machine example, a new pop-up window can be spawned to indicate a successful age verification.

FIG. **5** is a flow chart illustrating a method **500** for enrolling biometric data of the user with the biometric key according to one embodiment of the present invention. An agent checks **510** an identification of the user and establishes a profile. The agent can be, for example, a government official, a notary, and/or an employee of a third party which operates the trusted key authority, or another form of witness. The agent can follow standardized procedures such as requiring identification based on a state issued driver license, or a federally issued passport in order to establish a true identity of the user.

The profile describes the user and can include, for example, the user's name, date of birth, age, passwords, account numbers, preferences etc. In some embodiments, the profile stores no or only limited information about the user. For example, the agent might store the date of birth of the user in the profile, but not store any other information about the user. In addition, the profile describes the biometric key and/or key authority. For the biometric key, the profile can store a value indicating the status of the key, such as whether the key is in-service, out-of-service, abandoned, lost, stolen etc. For the key authority, the profile can store a value identifying the key authority.

The agent also collects and persistently stores **520** biometric data from the user. To do so, a fingerprint or eye retina can be scanned and converted to data which is then persistently stored in the biometric key. In one embodiment, the agent does not retain the biometric data. Since this step occurs under control of the agent, the agent can be certain that the biometric data stored within the key matches the user who presented the identification. The agent also obtains the code (e.g., device ID) from the biometric key in which the biometric data was stored. The agent associates the code and the profile using a table and/or other data structure.

FIG. **6** is a flow chart illustrating a method **600** for verifying a subject presenting the biometric key according to one embodiment of the present invention. In response to an authentication request, a user scan is requested **610** (e.g., by a blinking LED). Once the subject provides a fingerprint, scan data is received **620**. Scan data is compared for a match **630** to previously-stored biometric data. If there is no match, then verification fails **650**.

If there is a match, the subject is verified **640** as the user. The code indicating a successful verification is wirelessly sent **650** from the biometric key (e.g., by RF communication module **230**).

FIG. **7** is a flow chart illustrating a method **700** for authenticating a biometric key according to one embodiment of the present invention. The code is wirelessly received **710**. A request for authentication of the code is sent to the trusted key authority **720**. The trusted key authority determines whether the code is authentic **730** (i.e., it was created through an established enrollment process) and has a valid status (e.g., has not expired). If authentication is successful, the trusted key authority sends an access message to the application to allow user access and/or provide additional information from the profile **740** (such as the user's age). If authentication is not successful, authentication fails **750** and the message to the application indicates that the user should be denied access.

In some embodiments, the biometric key provides multiple codes and/or other data values. For example, the key can provide a device ID code that the authentication module can provide to the trusted key authority in order to authenticate the key, and the key can provide a secret decryption value that can be used to communicate with the biometric key. As used herein, the term "code" is intended to include one or more of these values, depending upon the specific embodiment.

The order in which the steps of the methods of the present invention are performed is purely illustrative in nature. The steps can be performed in any order or in parallel, unless otherwise indicated by the present disclosure. The methods of the present invention may be performed in hardware, firmware, software, or any combination thereof operating on a single computer or multiple computers of any type. Software embodying the present invention may comprise computer instructions in any form (e.g., source code, object code, interpreted code, etc.) stored in any computer-readable storage medium (e.g., a ROM, a RAM, a magnetic media, a compact disc, a DVD, etc.). Such software may also be in the form of an electrical data signal embodied in a carrier wave propagating on a conductive medium or in the form of light pulses that propagate through an optical fiber.

While particular embodiments of the present invention have been shown and described, it will be apparent to those skilled in the art that changes and modifications may be made without departing from this invention in its broader aspect and, therefore, the appended claims are to encompass within their scope all such changes and modifications, as fall within the true spirit of this invention.

In the above description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the invention. It will be apparent, however, to one skilled in the art that the invention can be practiced without these specific details. In other instances, structures and devices are shown in block diagram form in order to avoid obscuring the invention.

Reference in the specification to "one embodiment" or "an embodiment" means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the invention. The appearances of the phrase "in one embodiment" in various places in the specification are not necessarily all referring to the same embodiment.

Some portions of the detailed description are presented in terms of algorithms and symbolic representations of operations on data bits within a computer memory. These algorithmic descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art.

An algorithm is here, and generally, conceived to be a self-consistent sequence of steps leading to a desired result. The steps are those requiring physical manipulations of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated. It has proven convenient at times, principally for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like.

It should be borne in mind, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely convenient labels applied to these quantities. Unless specifically stated otherwise as apparent from the discussion, it is appreciated that throughout the description, discussions utilizing terms such as "processing" or "computing" or "calculating" or "determining" or "displaying" or the like, refer to the action and processes of a computer system, or similar electronic computing device, that manipulates and transforms data represented as physical (electronic) quantities within the computer system's registers and memories into other data similarly represented as physical quantities within the computer system memories or registers or other such information storage, transmission or display devices.

The present invention also relates to an apparatus for performing the operations herein. This apparatus can be specially constructed for the required purposes, or it can comprise a general-purpose computer selectively activated or reconfigured by a computer program stored in the computer. Such a computer program can be stored in a computer readable storage medium, such as, but is not limited to, any type of disk including floppy disks, optical disks, CD-ROMs, and magnetic-optical disks, read-only memories (ROMs), random access memories (RAMs), EPROMs, EEPROMs, magnetic or optical cards, or any type of media suitable for storing electronic instructions, and each coupled to a computer system bus.

The algorithms and modules presented herein are not inherently related to any particular computer or other apparatus. Various general-purpose systems can be used with programs in accordance with the teachings herein, or it may prove convenient to construct more specialized apparatuses to perform the method steps. The required structure for a variety of these systems will appear from the description below. In addition, the present invention is not described with reference to any particular programming language. It will be appreciated that a variety of programming languages can be used to implement the teachings of the invention as described herein. Furthermore, as will be apparent to one of ordinary skill in the relevant art, the modules, features, attributes, methodologies, and other aspects of the invention can be implemented as software, hardware, firmware or any combination of the three. Of course, wherever a component of the present invention is implemented as software, the component can be implemented as a standalone program, as part of a larger program, as a plurality of separate programs, as a statically or dynamically linked library, as a kernel loadable module, as a device driver, and/or in every and any other way known now or in the future to those of skill in the art of computer programming. Additionally, the present invention is in no way limited to implementation in any specific operating system or environment.

It will be understood by those skilled in the relevant art that the above-described implementations are merely exemplary, and many changes can be made without departing from the true spirit and scope of the present invention. Therefore, it is intended by the appended claims to cover all such changes and modifications that come within the true spirit and scope of this invention.

What is claimed is:

**1**. A method comprising:

persistently storing biometric data of a user and a plurality of codes and other data values comprising a device ID code uniquely identifying an integrated device and a secret decryption value in a tamper proof format written to a storage element on the integrated device that is not capable of being subsequently altered;

responsive to receiving a request for a biometric verification of the user, receiving scan data from a biometric scan;

comparing the scan data to the biometric data to determine whether the scan data matches the biometric data;

responsive to a determination that the scan data matches the biometric data, wirelessly sending one or more codes and other values from the plurality of codes and other data values for authentication to a third party that operates a trusted authority, wherein the one or more codes and other data values includes the device ID code; and

receiving, at an application, an access message from the trusted authority indicating that the trusted authority successfully authenticated the one or more codes and other data values sent to the third party and allowing the user access to the application.

**2**. The method of claim **1**, wherein the one or more codes and other data values are transmitted to the trusted authority over a network.

**3**. The method of claim **1**, further comprising:

registering an age verification for the user in association with the device ID code.

**4**. The method of claim **1**, wherein the one or more codes and other data values indicate that the biometric verification was successful.

**5**. The method of claim **1**, wherein the biometric data includes one or more of a fingerprint, palm print, a retinal scan, an iris scan, a hand geometry, a facial recognition, a signature recognition and a voice recognition.

**6**. The method of claim **1**, wherein the integrated device comprises one or more of a mobile phone, tablet, laptop, mp3 player, mobile gaming device, watch and a key fob.

**7**. The method of claim **1**, wherein the application includes one or more of a casino machine, a keyless lock, a garage door opener, an ATM machine, a hard drive, computer software, a web site, a file and a financial account.

**8**. The method of claim **1**, wherein the application includes a file including medical information.

**9**. The method of claim **1**, wherein the application includes a financial account.

**10**. The method of claim **1**, further comprising:

establishing a secure communication channel prior to sending the one or more codes and other data values for authentication.

**11**. The method of claim **1**, further comprising:

receiving a request for the one or more codes and other data values without a request for biometric verification; and

responsive to receiving the request for the one or more codes and other data values without a request for biometric verification, sending the one or more codes and other data values without requesting the scan data.

**12**. An integrated device comprising:

a persistent storage media that stores biometric data of a user and a plurality of codes and other data values comprising a device ID code uniquely identifying the integrated device and a secret decryption value in a tamper

proof format written to the persistent storage media and not capable of being subsequently altered;

a validation module, coupled to communicate with the persistent storage media, that receives scan data from a biometric scan for comparison against the biometric data, and that sends one or more codes and other data values from the plurality of codes and other data values for authentication by a third party that operates a trusted authority, wherein the one or more codes and other data values includes the device ID code; and

a radio frequency communication module that receives an access message from the trusted authority indicating that the trusted authority successfully authenticated the one or more codes and other data values to the third party and allowing the user access to an application.

**13**. The integrated device of claim **12**, wherein the one or more codes and other data values are transmitted to the trusted authority over a network.

**14**. The integrated device of claim **12**, wherein an age verification is registered in association with the device ID code.

**15**. The integrated device of claim **12** comprising:

an LED to be activated for requesting the biometric scan.

**16**. A method for authenticating a verified user using a computer processor configured to execute method steps, comprising:

wirelessly receiving one or more codes and other data values from a plurality of codes and other data values including a device ID code, wherein the plurality of codes and other data values comprises the device ID code uniquely identifying an integrated device associated with a biometrically verified user, the device ID code being registered with a trusted authority for authentication, the trusted authority operated by a third party;

requesting authentication of the integrated device using the one or more codes and other data values by the trusted authority;

receiving, at an application, an access message from the trusted authority indicating that the trusted authority successfully authenticated the one or more codes and other data values to the third party; and

in response to receiving the access message, allowing the biometrically verified user access to the application.

**17**. The method of claim **16**, further comprising:

registering a date of birth or age with the trusted authority.

**18**. The method of claim **16**, further comprising:

establishing a secure communications channel with the integrated device, wherein the one or more codes and other data values associated with the biometrically verified user is received from the integrated device.

**19**. The method of claim **16**, wherein the application includes one or more of a casino machine, a keyless lock, a garage door opener, an ATM machine, a hard drive, computer software, a web site, a file and a financial account.

**20**. The method of claim **16**, wherein the application includes a file including medical information.

**21**. The method of claim **16**, wherein the application includes a financial account.

**22**. A system, comprising:

an integrated hardware device that stores biometric data of a user and a plurality of codes and other data values comprising a device ID code uniquely identifying the integrated hardware device and a secret decryption value in a tamper proof format written to a storage element in the integrated hardware device that is not capable of being subsequently altered, and that wirelessly sends one or more codes and other data values from the plurality of codes and other data values, wherein the one or more codes and other data values include the device ID code; and

an authentication circuit that receives the one or more codes and other data values and sends the one or more codes and other data values to a third party that operates a trusted authority for authentication, and that receives an access message from the trusted authority indicating that the trusted authority successfully authenticated the one or more codes and other data values to the third party and allows the user to access an application.

**23**. The system of claim **22**, wherein the integrated hardware device receives an authentication request from the authentication circuit, and in response, requests a biometric scan from the user to generate scan data.

**24**. The system of claim **22**, wherein when the integrated hardware device cannot verify scan data as being from the user, the integrated hardware device does not send the one or more codes and other data values.

**25**. The system of claim **22**, wherein the integrated hardware device comprises one or more of a mobile phone, tablet, laptop, mp3 player, mobile gaming device, watch and a key fob.

**26**. The system of claim **22**, wherein the biometric data includes one or more of a fingerprint, palm print, a retinal scan, an iris scan, a hand geometry, a facial recognition, a signature recognition and a voice recognition.

**27**. The system of claim **22**, wherein the application includes one or more of a casino machine, a keyless lock, a garage door opener, an ATM machine, a hard drive, computer software, a web site, a file and a financial account.

**28**. The system of claim **22**, wherein the application includes a file including medical information.

**29**. The system of claim **22**, wherein the application includes a financial account.

* * * * *