IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

DALE PROGRESS LTD., **Plaintiff,** **v.** **VOLKSWAGEN GROUP OF AMERICA, INC. D/B/A AUDI OF AMERICA, INC.,** **Defendant.**	**CIVIL ACTION NO. 2:18-cv-476** **JURY TRIAL DEMANDED**

PLAINTIFF'S SIXTH AMENDED COMPLAINT

Plaintiff Dale Progress Ltd. ("Plaintiff"), by and through its undersigned counsel, files this Sixth Amended Complaint against Defendant Volkswagen Group of America, Inc. d/b/a Audi of America, Inc. ("Defendant") as follows:

NATURE OF THE ACTION

1. This is a patent infringement action to stop Defendant's infringement of United States Patent No. 9,686,504 ("the '504 patent") entitled "Remote Resource Access Interface Apparatus" and the United States Patent No. 8,320,461 ("the '461 patent") entitled "Remote Resource Access Interface Apparatus". A true and correct copy of the '504 patent is attached hereto as Exhibit A. A true and correct copy of the '461 patent is attached hereto as Exhibit B. Plaintiff is the owner by assignment of the '504 and '461 patents. Plaintiff seeks monetary damages and injunctive relief.

PARTIES

2. Plaintiff is a limited liability company having a principal place of business located at #204(#-81), 83, Gasan digital 1-ro, Gasan-Dong Geumcheon-gu, Seoul, 08589, Republic of Korea.

3. Upon information and belief, Defendant is a corporation organized and existing under the laws of the State of New Jersey with a principal place of business located at 2200 Ferdinand Porsche Dr., Herndon, VA 20171. Defendant can be served with process by serving Corporation Service Company D/B/A CSC-Lawyers INCO, 211 E. 7th Street Suite 620 Austin, Texas 78701.

4. Upon information and belief, Defendant Audi of America, Inc. is a d/b/a of Defendant Volkswagen Group of America, Inc., organized and existing under the laws of the State of New Jersey with a principal place of business located at 2200 Ferdinand Porsche Dr, Herndon, VA 20171.

JURISDICTION AND VENUE

5. This action arises under the Patent Laws of the United States, 35 U.S.C. § 1 *et seq.*, including 35 U.S.C. §§ 271, 281, 283, 284, and 285.

6. This Court has subject matter jurisdiction over this case for patent infringement under 28 U.S.C. §§ 1331 and 1338(a).

7. The Court has personal jurisdiction over Defendant because: Defendant is present within or has minimum contacts within the State of Texas and the Eastern District of Texas; Defendant has purposefully availed itself of the privileges of conducting business in the State of Texas and in the Eastern District of Texas; Defendant has sought protection and benefit from the laws of the State of Texas; Defendant regularly conducts business within the State of Texas and within the Eastern District of Texas; and Plaintiff's cause of action arises directly from Defendant's business contacts and other activities in the State of Texas and in the Eastern District of Texas.

8. More specifically, Defendant, directly and/or through intermediaries, ships, distributes, uses, offers for sale, sells, and/or advertises products and services in the United States, the State of Texas, and the Eastern District of Texas including but not limited to the Accused Instrumentalities as detailed below. Upon information and belief, Defendant has committed patent infringement in the State of Texas and in the Eastern District of Texas. Defendant solicits and has solicited customers in the State of Texas and in the Eastern District of Texas. Defendant has paying customers who are residents of the State of Texas and the Eastern District of Texas and who each use and have used the Defendant's products and services in the State of Texas and in the Eastern District of Texas.

9. Venue is proper in the Eastern District of Texas pursuant to 28 U.S.C. §§ 1400(b). On information and belief, Defendant in incorporated in this district, or has a regular and established business presence in this district with a brick and mortar location at 5010 TX-121, Frisco, TX 75034 and has transacted business in this district, and has directly and/or indirectly committed acts of patent infringement in this district.

COUNT I – PATENT INFRINGEMENT

10. Plaintiff refers to and incorporates herein the allegations of Paragraphs 1-8 above.

11. The '504 patent was duly and legally issued by the United States Patent and Trademark Office on June 20, 2017 after full and fair examination. Plaintiff is the owner by assignment of the '504 patent and possesses all rights of recovery under the '504 patent, including the exclusive right to sue for infringement and recover past damages and obtain injunctive relief.

12. Defendant owns, uses, operates, advertises, controls, sells, and otherwise provides apparatus, systems and methods that infringe the '504 patent. Claim 2 of the '504 patent provides, among other things, "a remote resource access interface apparatus comprising: a touch input

detection unit configured to detect touch input on a display screen and to generate touch position information on a display screen; a communication unit configured to receive supportable key information from a compatible portable device, the communication unit further configured to transmit input key information to the portable device and to receive video information from the portable device; a video output unit configured to display adjusted video information in the form of a visual image, the video output unit having a display screen having a screen specification different from a screen specification of the portable device, wherein the screen specification includes screen resolution information regarding the screen resolutions supported by the portable device; and a key advisor unit configured to output the supportable key information to the video output unit wherein the key advisor unit is configured to receive the touch position information through the touch input detection unit, and wherein the adjusted video information is video data adjusted to screen resolution supported by the video output unit on the basis of the screen resolution information supported by the portable device, and the touch position information is mapped to one of key values indicated by the supportable key information of the portable device such that the touch position information matches key values of the portable device."

13. Defendant has been and is now infringing the '504 Patent in the State of Texas, in this judicial district, and elsewhere in the United States, by, among other things, directly or through intermediaries, making, using, importing, testing, providing, supplying, distributing, selling, and/or offering for sale apparatus and systems (including, without limitation, the Defendant's products including Android Auto functionality of the Volkswagen Atlas, Beetle, Beetle Cabriolet, CC, Golf, Golf Cabriolet, Jetta, Passat, Scirocco, Tiguan, and Touareg, and Audi 2017 - 2018 A3, 2017 - 2018 A4, 2017 - 2018 A5, 2017 - 2018 A6, 2017 - 2018 A7, 2017 - 2018 Q2, 2017 - 2018 Q7, 2017 - 2018 R8, 2017 - 2018 TT, 2018 Q5, 2019 Q8, 2019 Q3 identified herein as the

"Accused Instrumentalities") that provide a remote resource access interface device, covered by at least claims 1, 2, 3, 4, 5, 6, 7, 8, and 9 of the '504 Patent to the injury of Dale Progress Ltd. Defendant is directly infringing, literally infringing, and/or infringing the '504 Patent under the doctrine of equivalents. Defendant is thus liable for infringement of the '504 Patent pursuant to 35 U.S.C. § 271.

14. Defendant has been and is now infringing the '504 Patent in the State of Texas, in this judicial district, and elsewhere in the United States, by, among other things, directly or through intermediaries, making, using, importing, testing, providing, supplying, distributing, selling, and/or offering for sale apparatus and systems (including, without limitation, the Defendant's products including Apple CarPlay functionality of the Volkswagen Beetle, Beetle Cabriolet, CC, Fox, Golf, e-Golf, Golf SportWagen, Golf R, Jetta, Passat, Scirocco, Tiguan, and Atlas and Audi 2017 - 2018 A3, 2017 - 2018 A4, 2017 - 2018 A5, 2017 - 2018 A6, 2017 - 2018 A7, 2017 - 2018 Q2, 2017 - 2018 Q7, 2017 - 2018 R8, 2017 - 2018 TT, 2019 e-tron, 2019 Q8, identified herein as the "Accused Instrumentalities") that provide a remote resource access interface device, covered by at least claims 1, 2, 3, 4, 5, 6, 7, 8, and 9 of the '504 Patent to the injury of Dale Progress Ltd. Defendant is directly infringing, literally infringing, and/or infringing the '504 Patent under the doctrine of equivalents. Defendant is thus liable for infringement of the '504 Patent pursuant to 35 U.S.C. § 271.

15. Defendant has been and is now infringing the '504 Patent in the State of Texas, in this judicial district, and elsewhere in the United States, by, among other things, directly or through intermediaries, making, using, importing, testing, providing, supplying, distributing, selling, and/or offering for sale apparatus and systems (including, without limitation, the Defendant's products including MirrorLink functionality of the Volkswagen Passat, Golf, e-Golf, and Beetle

identified herein as the "Accused Instrumentalities") that provide a remote resource access interface device, covered by at least claims 1, 2, 3, 4, 5, 6, 7, 8, and 9 of the '504 Patent to the injury of Dale Progress Ltd. Defendant is directly infringing, literally infringing, and/or infringing the '504 Patent under the doctrine of equivalents. Defendant is thus liable for infringement of the '504 Patent pursuant to 35 U.S.C. § 271.

16. Defendant has induced and continues to induce infringement of the '504 Patent by intending that others use, offer for sale, or sell in the United States, products and/or methods covered by one or more claims of the '504 Patent, including, but not limited to, a remote resource access interface apparatus. Defendant provides these products to others, such as customers, resellers and end-use consumers who, in turn, use, offer for sale, or sell in the United States these a remote resource access interface apparatus that infringe one or more claims of the '504 Patent.

17. Defendant indirectly infringes the '504 Patent by inducing infringement by others, such as resellers, customers and end-use consumers, in accordance with 35 U.S.C. § 271(b) in this District and elsewhere in the United States. Direct infringement is a result of the activities performed by the resellers, customers and end-use consumers of a remote resource access interface apparatus.

18. Defendant received notice of the '504 Patent at least as of the date this lawsuit was filed.

19. Defendant affirmative acts of providing and/or selling the a remote resource access interface apparatus, including manufacturing and distributing, and providing instructions for using the a remote resource access interface apparatus in their normal and customary way to infringe one or more claims of the '504 Patent. Defendant performs the acts that constitute induced

infringement, and induce actual infringement, with the knowledge of the '504 Patent and with the knowledge or willful blindness that the induced acts constitute infringement.

20. Defendant specifically intends for others, such as resellers, customers and end-use consumers, to directly infringe one or more claims of the '504 Patent, or, alternatively, has been willfully blind to the possibility that its inducing acts would cause infringement. By way of example, and not as limitation, Defendant induces such infringement by its affirmative action by, among other things: (a) providing advertising on the benefits of using the Accused Instrumentalities' functionality; (b) providing information regarding how to use the Accused Instrumentalities' functionality; (c) providing instruction on how to use the Accused Instrumentalities' functionality; and (d) providing hardware and/or software components required to infringe the claims of the '504 Patent.

21. Accordingly, a reasonable inference is that Defendant specifically intends for others, such as resellers, customers and end-use consumers, to directly infringe one or more claims of the '504 Patent in the United States because Defendant has knowledge of the '504 Patent at least as of the date this lawsuit was filed and Defendant actually induces others, such as resellers, customers and end-use consumers, to directly infringe the '504 Patent by using, selling, and/or distributing, within the United States, a remote resource access interface apparatus.

22. As a result of Defendant acts of infringement, Plaintiff has suffered and will continue to suffer damages in an amount to be proved at trial.

23. Claim 2 of the '504 patent, claims:

A remote resource access interface apparatus comprising:

Apple CarPlay
The ultimate copilot.

Available on select cars, CarPlay is a smarter, safer way to use your iPhone in the car. CarPlay takes the things you want to do with your iPhone while driving and puts them right on your car's built-in display. You can get directions, make calls, send and receive messages, and listen to music, all in a way that allows you to stay focused on the road. Just connect your iPhone and go.

SOURCE: https://www.apple.com/ios/carplay/

CarPlay

2017 - 2018 Mokka
2017 - 2018 Zafira

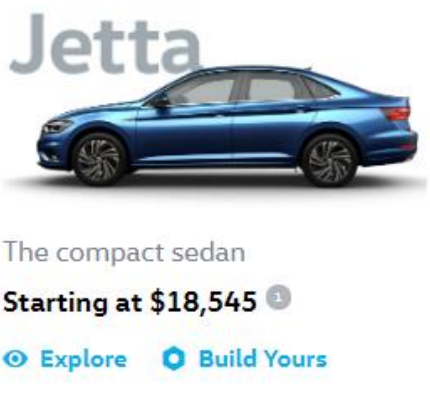
2016 Spacefox
2016 - 2018 Amarok
2016 - 2018 Beetle
2016 - 2018 Beetle Cabriolet
2016 - 2018 Caddy
2016 - 2018 California
2016 - 2018 Caravelle
2016 - 2018 CC
2016 - 2018 e-Golf
2016 - 2018 Fox
2016 - 2018 Golf
2016 - 2018 Golf Cabriolet
2016 - 2018 Golf SportsVan
2016 - 2018 Golf Variant
2016 - 2018 Golf R
2016 - 2018 Golf SportWagen
2016 - 2018 GTI
2016 - 2018 Jetta
2016 - 2018 Lamando
2016 - 2018 Multivan
2016 - 2018 Passat
2016 - 2018 Passat Variant
2016 - 2018 Polo
2016 - 2018 Scirocco
2016 - 2018 Sharan
2016 - 2018 Tiguan
2016 - 2018 Touran
2016 - 2018 Transporter
2017 - 2018 Atlas
2017 - 2018 Crafter
2017 - 2018 CrossFox
2017 - 2018 Gol
2017 - 2018 Saveiro
2017 - 2018 Voyage
2018 Arteon
2018 Bora
2018 Magotan
2018 Sagitar
2018 T-Roc

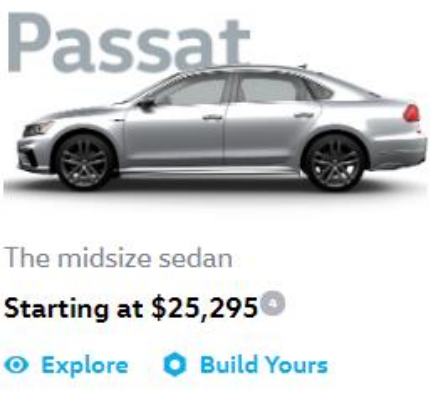
CarPlay

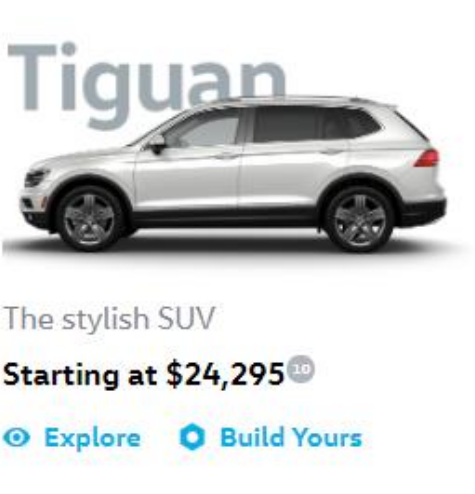
Audi

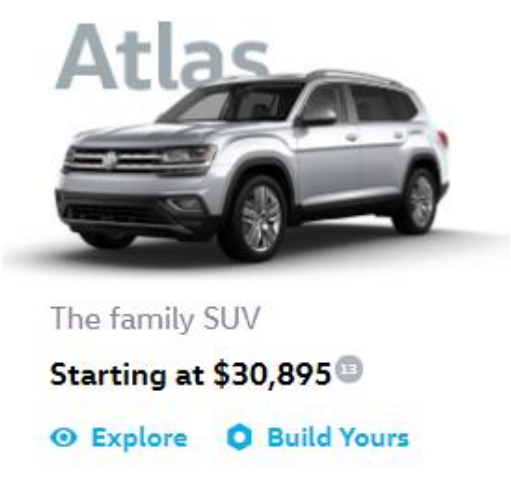
2017 - 2018 A3
2017 - 2018 A4
2017 - 2018 A5
2017 - 2018 A6
2017 - 2018 A7
2017 - 2018 Q2
2017 - 2018 Q7
2017 - 2018 R8
2017 - 2018 TT
2018 Q5
2019 e-tron
2019 Q8

Source: https://www.apple.com/ios/carplay/available-models/ (last accessed January 27, 2019)









Golf SportWagen

The wagon

Starting at $21,685[16]

Explore Build Yours

Golf GTI

The hot hatch

Starting at $27,595[28]

Explore Build Yours

Beetle

The sporty icon

Starting at $20,895[22]

Explore Build Yours

Golf

The modern hatch

Starting at $21,845[25]

Explore Build Yours

e-Golf

The electric hatch

Starting at $30,495[31]

Explore Build Yours

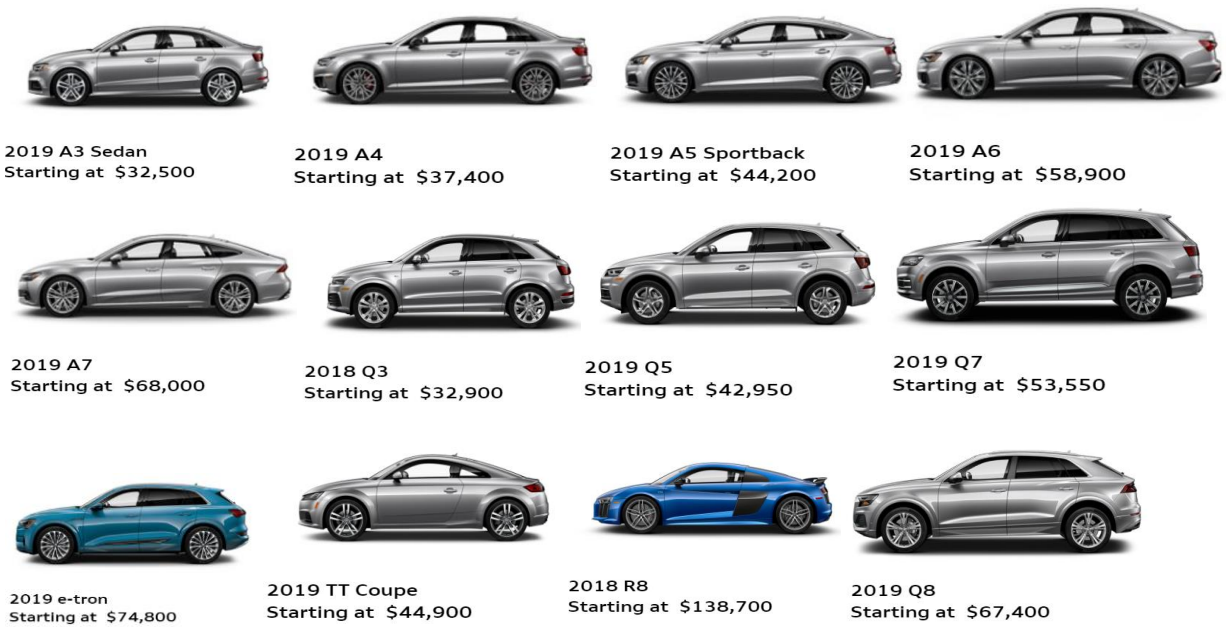
Golf R

The performance hatch

Starting at $40,395[34]

Explore Build Yours

Source: https://www.vw.com/models/ (last accessed January 3, 2019)



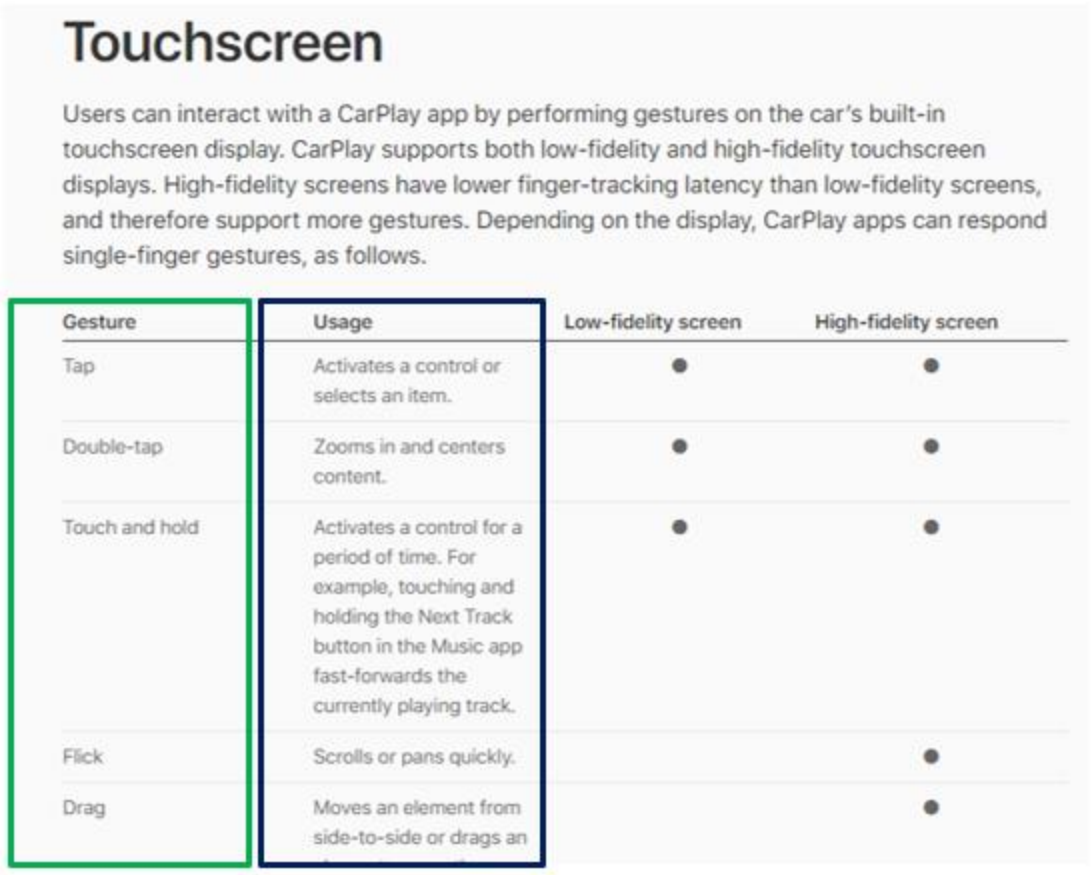
Source: https://www.audiusa.com/ (last accessed January 27, 2019)

a touch input detection unit configured to detect touch input on a display screen and to generate touch position information on a display screen;

Defendant provides a touch input detection unit configured to detect touch input on a display screen and to generate touch position information on a display screen;

The '504 patent specification clearly states that a touch input detection unit detects a touch input on the display screen and generates position information on the display screen in association of the current image.

The touch input detection unit detects a touch input on the display screen and generates position information on the display screen in association of the current image. The touch input detection unit transmits the position information associated with the current image to the portable device. The touch input detection unit is implemented in the form of a touch-sensitive touchscreen covering the display screen of the video output unit. The touch input detection unit may further include a processor for converting a pressure voltage sensed on the display screen to the position information. *See* '504 patent Col. 4 *l.* 42-47.



Touchscreen

Users can interact with a CarPlay app by performing gestures on the car's built-in touchscreen display. CarPlay supports both low-fidelity and high-fidelity touchscreen displays. High-fidelity screens have lower finger-tracking latency than low-fidelity screens, and therefore support more gestures. Depending on the display, CarPlay apps can respond single-finger gestures, as follows.

Gesture	Usage	Low-fidelity screen	High-fidelity screen
Tap	Activates a control or selects an item.	●	●
Double-tap	Zooms in and centers content.	●	●
Touch and hold	Activates a control for a period of time. For example, touching and holding the Next Track button in the Music app fast-forwards the currently playing track.	●	●
Flick	Scrolls or pans quickly.		●
Drag	Moves an element from side-to-side or drags an		●

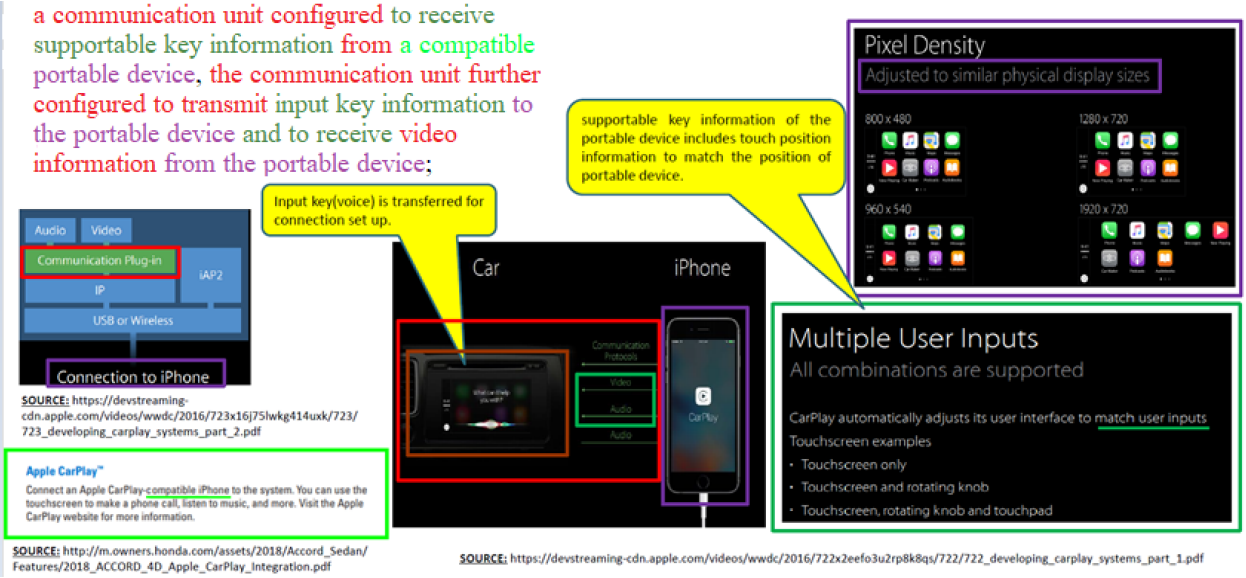
SOURCE: https://developer.apple.com/design/human-interface-guidelines/carplay/interaction/touchscreen/

a communication unit configured to receive supportable key information from a compatible portable device, the communication unit further configured to transmit input key information to the portable device and to receive video information from the portable device;

Defendant provides a communication unit configured to receive supportable key information from a compatible portable device, the communication unit further configured to transmit input key information to the portable device and to receive video information from the portable device;

The specification discloses sufficient structure for one of ordinary skilled in the art to build or program a communication unit. The specification clearly states that a communication unit utilizes wireless communication interfaces to perform the claim limitation functions.

The communication unit can be provided with at least one of wireless communication interfaces specified by Bluetooth, wireless fidelity (wi-fi), ZigBee, wireless broadband (WiBro) protocols for communicating with the portable device. The communication unit also can be connected to the portable device through a communication wire so as to exchange data with the portable device in series or in parallel. *See* '504 patent Col. 4 *l.* 8-15.

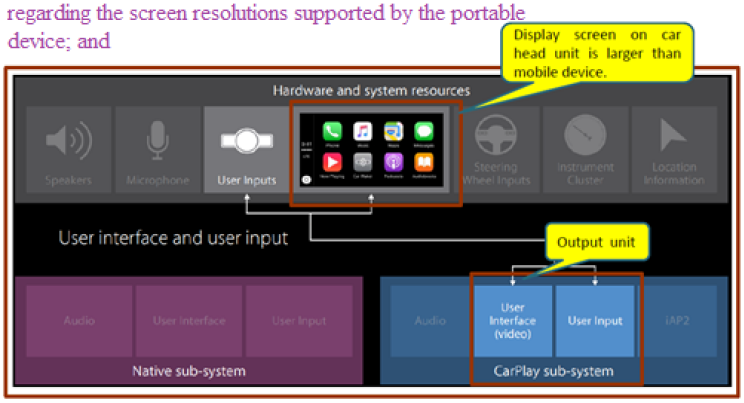


a video output unit configured to display adjusted video information in the form of a visual image, the video output unit having a display screen having a screen specification different from a screen specification of the portable device, wherein the screen specification includes screen resolution information regarding the screen resolutions supported by the portable device; and

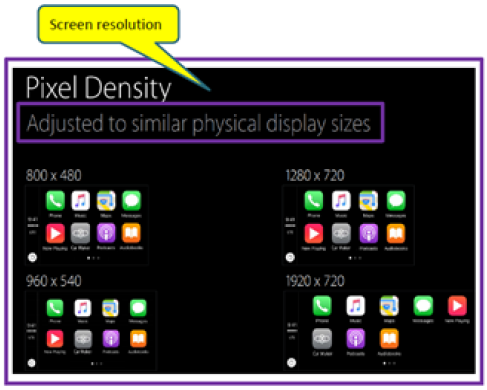
Defendant provides a video output unit configured to display adjusted video information in the form of a visual image, the video output unit having a display screen having a screen specification different from a screen specification of the portable device, wherein the screen specification includes screen resolution information regarding the screen resolutions supported by the portable device; and

The video output unit displays the video information output by the pixel information processing unit. The video output unit can be implemented with a liquid crystal display (LCD) panel or an organic light emitting diode (OLED) display panel. *See* '504 patent Col. 3 *l.* 11-15. The video output unit outputs the video information received from the pixel information processing unit in the form of a visual image. The video output unit can be implemented with a liquid crystal display (LCD) panel or an organic light emitting diode (OLED) panel. Preferably, the video output unit is provided with a display screen larger than that of the portable device. *See* '504 patent Col. 4 *l.* 29-35.

a video output unit configured to display adjusted video information in the form of a visual image, the video output unit having a display screen having a screen specification different from a screen specification of the portable device, wherein the screen specification includes screen resolution information regarding the screen resolutions supported by the portable device; and



SOURCE: https://devstreaming-cdn.apple.com/videos/wwdc/2016/723x16j75lwkg414uxk/723/723_developing_carplay_systems_part_2.pdf



SOURCE: https://devstreaming-cdn.apple.com/videos/wwdc/2016/722x2eefo3u2rp8k8qs/722/722_developing_carplay_systems_part_1.pdf

a key advisor unit configured to output the supportable key information to the video output unit wherein the key advisor unit is configured to receive the touch position information through the touch input detection unit, and wherein the adjusted video information is video data adjusted to screen resolution supported by the video output unit on the basis of the screen resolution information supported by the portable device, and the touch position information is mapped to one of key values indicated by the supportable key information of the portable device such that the touch position information matches key values of the portable device.

Defendant provides a key advisor unit configured to output the supportable key information to the video output unit wherein the key advisor unit is configured to receive the touch position information through the touch input detection unit, and wherein the adjusted video information is video data adjusted to screen resolution supported by the video output unit on the basis of the screen resolution information supported by the portable device, and the touch position information is mapped to one of key values indicated by the supportable key information of the portable device such that the touch position information matches key values of the portable device.

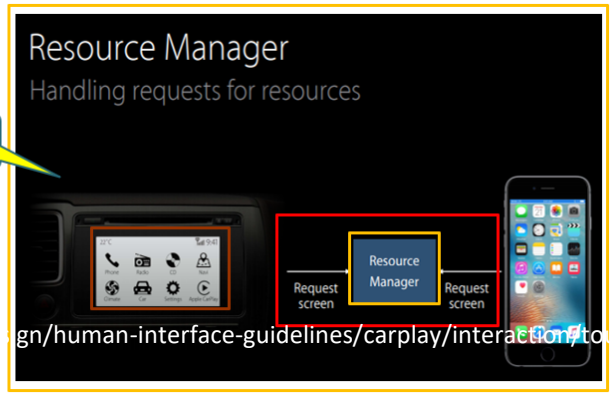
The key advisor unit and key input unit are each comprised of software utilizing a microprocessor and storage means on a computer to perform their respective steps as outlined in the specification. The specification describes an algorithm to transform a general-purpose microprocessor to a special purpose computer so that a person of ordinary skill in the art can implement the disclosed algorithm to achieve the claimed function. A disclosed algorithm can include steps for achieving a result as shown in the '504 patent specification.

In at least one embodiment, the key adviser unit extracts supportable key information from the connection establishment response signal and transmits the supportable key information to the video output unit so as to be displayed on the screen. *See* '504 patent Col. 3 *l.* 16-19. The key input unit is provided with a plurality of keys for generating input key commands. The input key commands are generated by matching the key values input through the key input unit to the key

values of the portable device with reference to the supportable key information. *See* '504 patent Col. 3 *l.* 20-25.

In at least one embodiment, the key advisor unit extracts compatible key information from the connection establishment response signal and displays the compatible key information on the display screen of the video output unit. The key advisor unit displays a key among the keys provided by the compatible key information, which is matched to the key input through the key input unit, on the display screen of the video output unit. If a set of keys are selected by through the key input unit, the key advisor unit displays the keys supported by the portable device on the display screen of the video output unit. If a key is input through the key input unit, the key advisor unit matches the key value of the input key to a key value of the corresponding key supported by the portable device. *See* '504 patent Col. 4 *l.* 48-62. The key input unit is provided with a plurality of keys for generating input key values. *See* '504 patent Col. 4 *l.* 63-64.

SOURCE: https://devstreaming-cdn.apple.com/videos/wwdc/2016/722x2eefo3u2rp8k8qs/722/722_developing_carplay_systems_part_1.pdf



SOURCE: https://devstreaming-cdn.apple.com/videos/wwdc/2016/723x16j75lwkg414uxk/723/723_developing_carplay_systems_part_2.pdf

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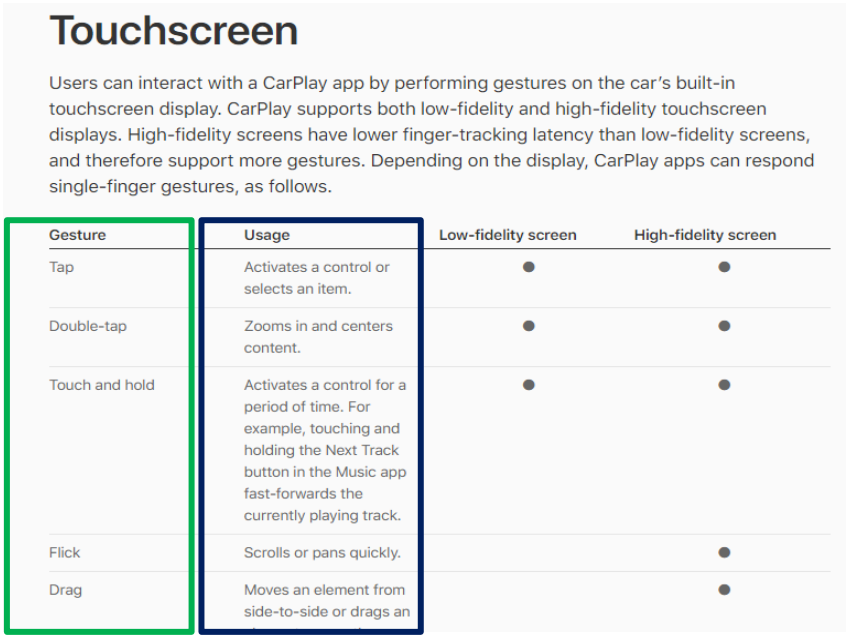

Touchscreen

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Gesture	Usage	Low-fidelity screen	High-fidelity screen
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Double-tap	Zooms in and centers content.	●	●
Touch and hold	Activates a control for a period of time. For example, touching and holding the Next Track button in the Music app fast-forwards the currently playing track.	●	●
Flick	Scrolls or pans quickly.		●
Drag	Moves an element from side-to-side or drags an		●

SOURCE: https://developer.apple.com/design/human-interface-guidelines/carplay/interaction/touchscreen/

COUNT II – PATENT INFRINGEMENT

24. Plaintiff refers to and incorporates herein the allegations of Paragraphs 1-22 above.

25. The '461 patent was duly and legally issued by the United States Patent and Trademark Office on November 27, 2012 after full and fair examination. Plaintiff is the owner by assignment of the '461 patent and possesses all rights of recovery under the '461 patent, including the exclusive right to sue for infringement and recover past damages and obtain injunctive relief.

26. Defendant owns, uses, operates, advertises, controls, sells, and otherwise provides apparatus and methods that infringe the '461 patent. Claim 9 of the '461 patent provides, among other things, "a remote resource access interface apparatus comprising: a key input unit configured to generate input key values; a communication unit configured to transmit a connection establishment request message to determine compatibility with a portable device and in order to establish a connection and, if compatible, to receive a connection establishment response message including screen resolution information and supportable key information from the portable device,

the communication unit further configured to transmit input key information and to receive video information from the portable device after establishing the connection; a video output unit configured to display the video information in the form of a visual image, the video output unit having a display screen larger than the portable device, wherein the screen resolution information includes information regarding the screen resolutions supported by the video output unit; and a key advisor unit configured to extract the supportable key information from the connection establishment response message and output the supportable key information to the video output unit, wherein the key advisor unit displays on a display screen of the video output unit, if a key configuration mode is activated, keys of the portable device and is configured to receive corresponding keys through the key input unit, and wherein key values corresponding to the keys of the key input unit match key values of the portable device, and wherein the video information is video data adjusted in resolution by the portable device for the video output unit on the basis of the screen resolution information, and the input key value is mapped to one of key values indicated by the supportable key information of the portable device."

27. Defendant has been and is now infringing the '461 Patent in the State of Texas, in this judicial district, and elsewhere in the United States, by, among other things, directly or through intermediaries, making, using, importing, testing, providing, supplying, distributing, selling, and/or offering for sale apparatus (including, without limitation, the Defendant's products including Android Auto functionality of the Volkswagen Atlas, Beetle, Beetle Cabriolet, CC, Golf, Golf Cabriolet, Jetta, Passat, Scirocco, Tiguan, and Touareg, and Audi 2017 - 2018 A3, 2017 - 2018 A4, 2017 - 2018 A5, 2017 - 2018 A6, 2017 - 2018 A7, 2017 - 2018 Q3, 2017 - 2018 Q7, 2017 - 2018 Q5, 2019 Q8, 2017 - 2018 R8, 2017 - 2018 TT, 2018 Q5, 2019 Q8 identified herein as the "Accused Instrumentalities") that provide a remote resource access interface device, covered

by at least claims 1, 2, 4, 5, 6, 7, 8, 9, and 10 of the '461 Patent to the injury of Dale Progress Ltd. Defendant is directly infringing, literally infringing, and/or infringing the '461 Patent under the doctrine of equivalents. Defendant is thus liable for infringement of the '461 Patent pursuant to 35 U.S.C. § 271.

28. Defendant has been and is now infringing the '461 Patent in the State of Texas, in this judicial district, and elsewhere in the United States, by, among other things, directly or through intermediaries, making, using, importing, testing, providing, supplying, distributing, selling, and/or offering for sale apparatus (including, without limitation, the Defendant's products including Apple CarPlay functionality of the Volkswagen Beetle, Beetle Cabriolet, CC, Fox, Golf, e-Golf, Golf SportWagen, Golf R, Jetta, Passat, Scirocco, Tiguan, and Atlas and Audi 2017 - 2018 A3, 2017 - 2018 A4, 2017 - 2018 A5, 2017 - 2018 A6, 2017 - 2018 A7, 2017 - 2018 Q2, 2017 - 2018 Q7, 2017 - 2018 R8, 2017 - 2018 TT, 2018 Q5, 2019 e-tron, 2019 Q8, identified herein as the "Accused Instrumentalities") that provide a remote resource access interface device, covered by at least claims 1, 2, 4, 5, 6, 7, 8, 9, and 10 of the '461 Patent to the injury of Dale Progress Ltd. Defendant is directly infringing, literally infringing, and/or infringing the '461 Patent under the doctrine of equivalents. Defendant is thus liable for infringement of the '461 Patent pursuant to 35 U.S.C. § 271.

29. Defendant has been and is now infringing the '461 Patent in the State of Texas, in this judicial district, and elsewhere in the United States, by, among other things, directly or through intermediaries, making, using, importing, testing, providing, supplying, distributing, selling, and/or offering for sale apparatus (including, without limitation, the Defendant's products including MirrorLink functionality of the Passat, Golf, e-Golf, and Beetle identified herein as the "Accused Instrumentalities") that provide a remote resource access interface device, covered by at

least claims 1, 2, 4, 5, 6, 7, 8, 9, and 10 of the ‘461 Patent to the injury of Dale Progress Ltd. Defendant is directly infringing, literally infringing, and/or infringing the ‘461 Patent under the doctrine of equivalents. Defendant is thus liable for infringement of the ‘461 Patent pursuant to 35 U.S.C. § 271.

30. Defendant has induced and continues to induce infringement of the ‘461 Patent by intending that others use, offer for sale, or sell in the United States, products and/or methods covered by one or more claims of the ‘461 Patent, including, but not limited to, a remote resource access interface apparatus. Defendant provides these products to others, such as customers, resellers and end-use consumers who, in turn, use, offer for sale, or sell in the United States these a remote resource access interface apparatus that infringe one or more claims of the ‘461 Patent.

31. Defendant indirectly infringes the ‘461 Patent by inducing infringement by others, such as resellers, customers and end-use consumers, in accordance with 35 U.S.C. § 271(b) in this District and elsewhere in the United States. Direct infringement is a result of the activities performed by the resellers, customers and end-use consumers of a remote resource access interface apparatus.

32. Defendant received notice of the ‘461 Patent at least as of the date this lawsuit was filed.

33. Defendant affirmative acts of providing and/or selling the a remote resource access interface apparatus, including manufacturing and distributing, and providing instructions for using the a remote resource access interface apparatus in their normal and customary way to infringe one or more claims of the ‘461 Patent. Defendant performs the acts that constitute induced infringement, and induce actual infringement, with the knowledge of the ‘461 Patent and with the knowledge or willful blindness that the induced acts constitute infringement.

34. Defendant specifically intends for others, such as resellers, customers and end-use consumers, to directly infringe one or more claims of the ‘461 Patent, or, alternatively, has been willfully blind to the possibility that its inducing acts would cause infringement. By way of example, and not as limitation, Defendant induces such infringement by its affirmative action by, among other things: (a) providing advertising on the benefits of using the Accused Instrumentalities’ functionality; (b) providing information regarding how to use the Accused Instrumentalities’ functionality; (c) providing instruction on how to use the Accused Instrumentalities’ functionality; and (d) providing hardware and/or software components required to infringe the claims of the ‘461 Patent.

35. Accordingly, a reasonable inference is that Defendant specifically intends for others, such as resellers, customers and end-use consumers, to directly infringe one or more claims of the ‘461 Patent in the United States because Defendant has knowledge of the ‘461 Patent at least as of the date this lawsuit was filed and Defendant actually induces others, such as resellers, customers and end-use consumers, to directly infringe the ‘461 Patent by using, selling, and/or distributing, within the United States, a remote resource access interface apparatus.

36. As a result of Defendant acts of infringement, Plaintiff has suffered and will continue to suffer damages in an amount to be proved at trial.

37. Claim 9 of the ‘461 patent, claims:

a remote resource access interface apparatus comprising:

Apple CarPlay
The ultimate copilot.

Available on select cars, CarPlay is a smarter, safer way to use your iPhone in the car. CarPlay takes the things you want to do with your iPhone while driving and puts them right on your car's built-in display. You can get directions, make calls, send and receive messages, and listen to music, all in a way that allows you to stay focused on the road. Just connect your iPhone and go.

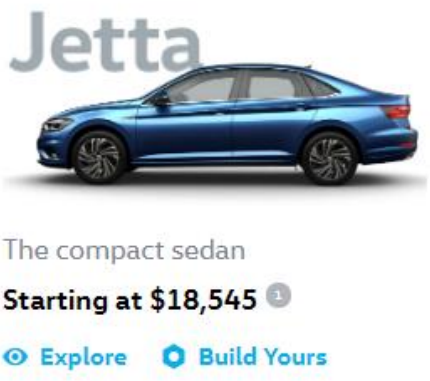
SOURCE: https://www.apple.com/ios/carplay/

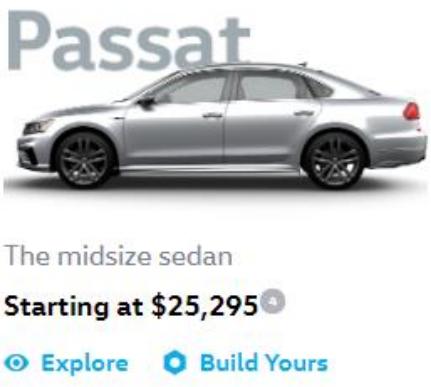
CarPlay

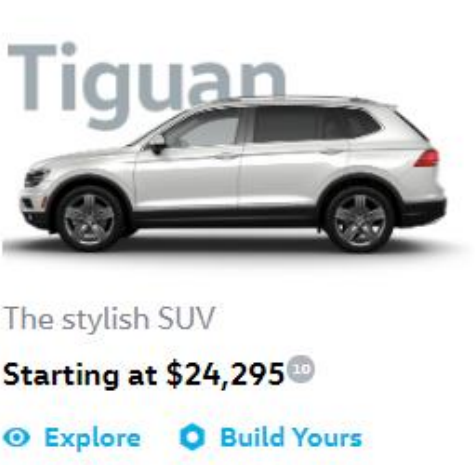
Audi

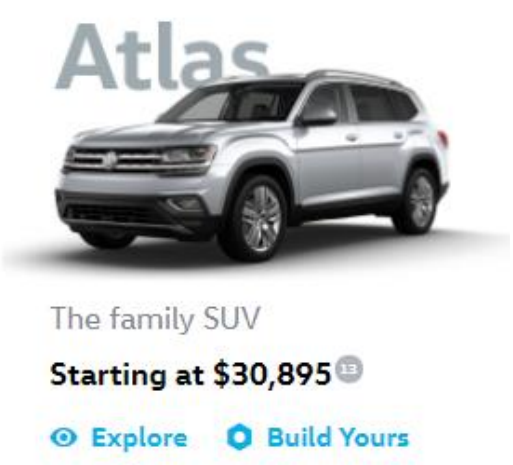
2017 - 2018 A3
2017 - 2018 A4
2017 - 2018 A5
2017 - 2018 A6
2017 - 2018 A7
2017 - 2018 Q2
2017 - 2018 Q7
2017 - 2018 R8
2017 - 2018 TT
2018 Q5
2019 e-tron
2019 Q8

Source: https://www.apple.com/ios/carplay/available-models/ (last accessed January 27, 2019)









The wagon

Starting at $21,685[16]

Explore Build Yours

The hot hatch

Starting at $27,595[28]

Explore Build Yours

The sporty icon

Starting at $20,895[22]

Explore Build Yours

The modern hatch

Starting at $21,845[25]

Explore Build Yours

The electric hatch

Starting at $30,495[31]

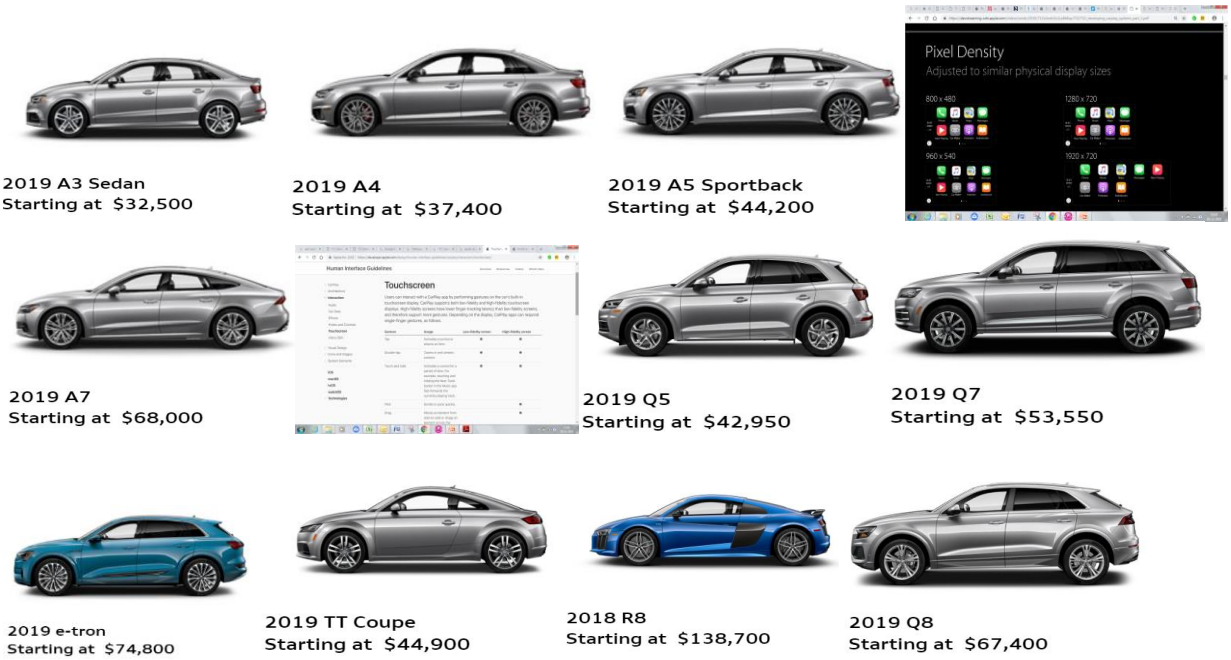
Explore Build Yours

The performance hatch

Starting at $40,395[34]

Explore Build Yours

Source: https://www.vw.com/models/ (last accessed January 3, 2019)



Source: https://www.audiusa.com/ (last accessed January 27, 2019)

a key input unit configured to generate input key values;

Defendant provides a key input unit configured to generate input key values.

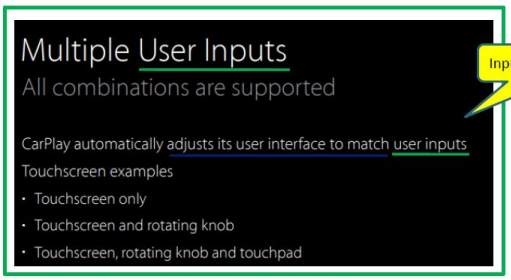
The key advisor unit and key input unit are each comprised of software utilizing a microprocessor and storage means on a computer to perform their respective steps as outlined in the specification. The specification describes an algorithm to transform a general-purpose microprocessor to a special purpose computer so that a person of ordinary skill in the art can implement the disclosed algorithm to achieve the claimed function. A disclosed algorithm can include steps for achieving a result as shown in the '461 patent specification.

In at least one embodiment, the key adviser unit extracts supportable key information from the connection establishment response signal and transmits the supportable key information to the video output unit so as to be displayed on the screen. *See* '461 patent Col. 3 *l.* 9-12. The key input unit is provided with a plurality of keys for generating input key commands. The input key commands are generated by matching the key values input through the key input unit to the key values of the portable device with reference to the supportable key information. *See* '461 patent Col. 3 *l.* 13-17.

In at least one embodiment, the key advisor unit extracts compatible key information from the connection establishment response signal and displays the compatible key information on the display screen of the video output unit. The key advisor unit displays a key among the keys provided by the compatible key information, which is matched to the key input through the key input unit, on the display screen of the video output unit. If a set of keys are selected by through the key input unit, the key advisor unit displays the keys supported by the portable device on the display screen of the video output unit. If a key is input through the key input unit, the key advisor unit matches the key value of the input key to a key value of the corresponding key supported by

the portable device. *See* '461 patent Col. 4 *l.* 37-46. The key input unit is provided with a plurality of keys for generating input key values. The input key commands are generated by matching the key values input through the key input unit to the key values of the portable device with reference to the supportable key information. *See* '461 patent Col. 3 *l.* 13-17.

a key input unit configured to generate input key values;



SOURCE: https://devstreaming-cdn.apple.com/videos/wwdc/2016/722x2eefo3u2rp8k8qs/722/722_developing_carplay_systems_part_1.pdf

SOURCE: https://www.apple.com/ios/carplay/

SOURCE: https://devstreaming-cdn.apple.com/videos/wwdc/2016/722x2eefo3u2rp8k8qs/722/722_developing_carplay_systems_part_1.pdf

a key input unit configured to generate input key values;

Touchscreen

Users can interact with a CarPlay app by performing gestures on the car's built-in touchscreen display. CarPlay supports both low-fidelity and high-fidelity touchscreen displays. High-fidelity screens have lower finger-tracking latency than low-fidelity screens, and therefore support more gestures. Depending on the display, CarPlay apps can respond single-finger gestures, as follows.

Gesture	Usage	Low-fidelity screen	High-fidelity screen
Tap	Activates a control or selects an item.	●	●
Double-tap	Zooms in and centers content.	●	●
Touch and hold	Activates a control for a period of time. For example, touching and holding the Next Track button in the Music app fast-forwards the currently playing track.	●	●
Flick	Scrolls or pans quickly.		●
Drag	Moves an element from side-to-side or drags an		●

SOURCE: https://developer.apple.com/design/human-interface-guidelines/carplay/interaction/touchscreen/

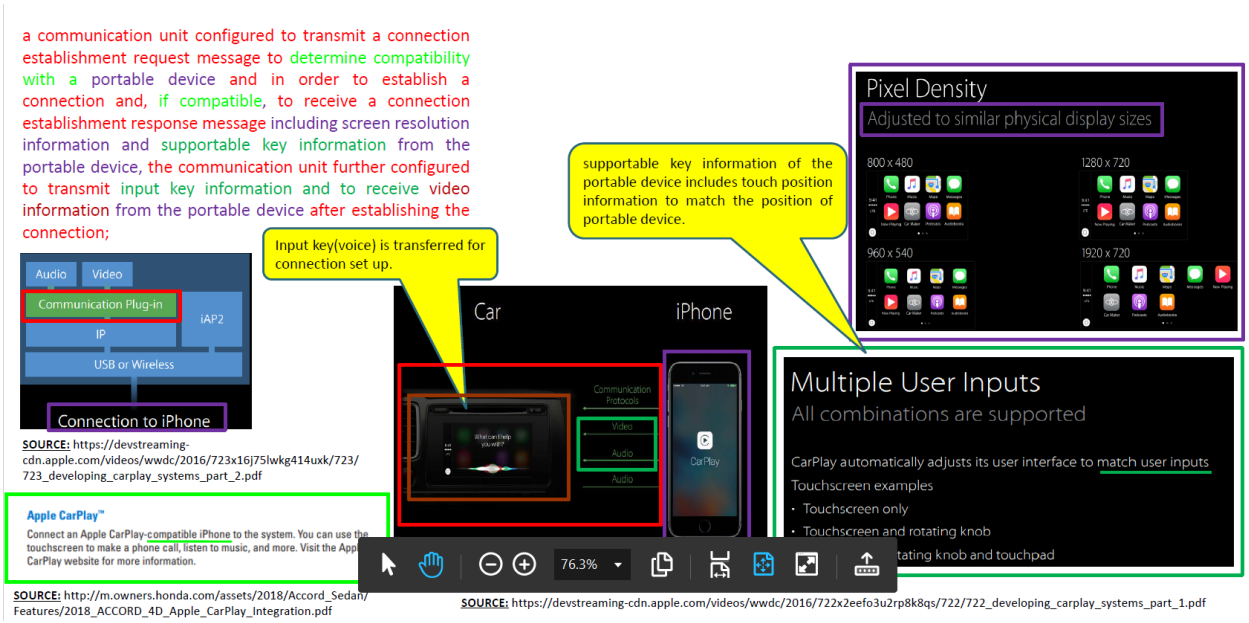
a communication unit configured to transmit a connection establishment request message to determine compatibility with a portable device and in order to establish a connection and, if compatible, to receive a connection establishment response message including screen resolution information and supportable key information from the portable device, the communication unit

further configured to transmit input key information and to receive video information from the portable device after establishing the connection;

Defendant provides a communication unit configured to transmit a connection establishment request message to determine compatibility with a portable device and in order to establish a connection and, if compatible, to receive a connection establishment response message including screen resolution information and supportable key information from the portable device, the communication unit further configured to transmit input key information and to receive video information from the portable device after establishing the connection.

The specification discloses sufficient structure for one of ordinary skilled in the art to build or program a communication unit. The specification clearly states that a communication unit utilizes wireless communication interfaces to perform the claim limitation functions.

The communication unit can be provided with at least one of wireless communication interfaces specified by Bluetooth, wireless fidelity (wi-fi), ZigBee, wireless broadband (WiBro) protocols for communicating with the portable device. The communication unit also can be connected to the portable device through a communication wire so as to exchange data with the portable device in series or in parallel. *See* '461 patent Col. 3 *l.* 65-67 & Col. 4 l. 1-5.



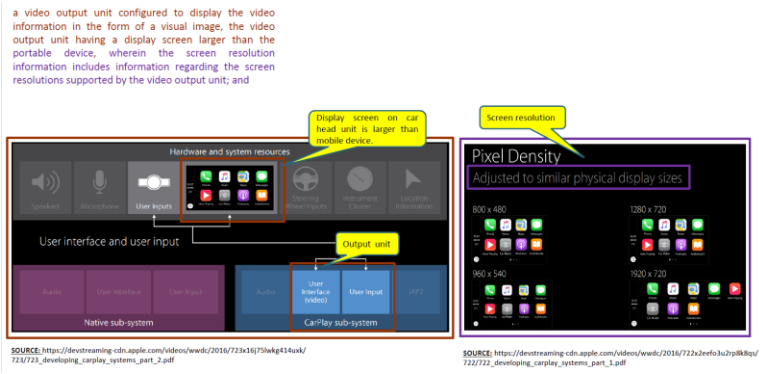
Source: https://devastreaming-cdn.apple.com/videos/wwdc/2016/723x16j75lwkg414uxk/723/723_developing_carplay_systems_part_2.pdf

a video output unit configured to display the video information in the form of a visual image, the video output unit having a display screen larger than the portable device, wherein the screen resolution information includes information regarding the screen resolutions supported by the video output unit; and

Defendant provides a video output unit configured to display the video information in the form of a visual image, the video output unit having a display screen larger than the portable device, wherein the screen resolution information includes information regarding the screen resolutions supported by the video output unit; and

The video output unit displays the video information output by the pixel information processing unit. The video output unit can be implemented with a liquid crystal display (LCD) panel or an organic light emitting diode (OLED) display panel. *See* '461 patent Col. 3 *l.* 4-8.

The video output unit outputs the video information received from the pixel information processing unit in the form of a visual image. The video output unit can be implemented with a liquid crystal display (LCD) panel or an organic light emitting diode (OLED) panel. Preferably, the video output unit is provided with a display screen larger than that of the portable device. *See* '461 patent Col. 4 *l.* 19-25.



a key advisor unit configured to extract the supportable key information from the connection establishment response message and output the supportable key information to the video output unit, wherein the key advisor unit displays on a display screen of the video output unit, if a key configuration mode is activated, keys of the portable device and is configured to receive corresponding keys through the key input unit, and

Defendant provides a key advisor unit configured to extract the supportable key information from the connection establishment response message and output the supportable key information to the video output unit, wherein the key advisor unit displays on a display screen of the video output unit, if a key configuration mode is activated, keys of the portable device and is configured to receive corresponding keys through the key input unit, and wherein key values corresponding to the keys of the key input unit match key values of the portable device, and wherein the video information is video data adjusted in resolution by the portable device for the video output unit on the basis of the screen resolution information, and the input key value is mapped to one of key values indicated by the supportable key information of the portable device.

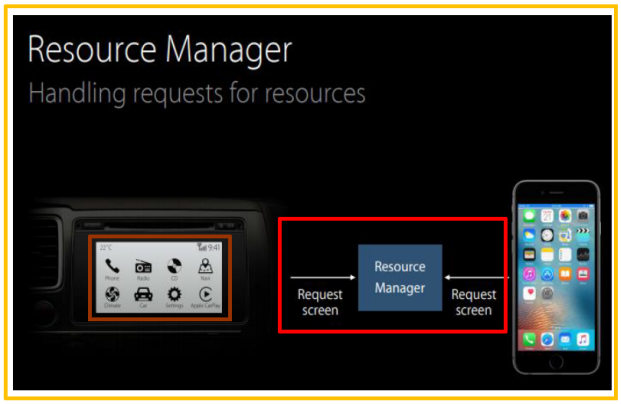
The key advisor unit and key input unit are each comprised of software utilizing a microprocessor and storage means on a computer to perform their respective steps as outlined in the specification. The specification describes an algorithm to transform a general-purpose microprocessor to a special purpose computer so that a person of ordinary skill in the art can implement the disclosed algorithm to achieve the claimed function. A disclosed algorithm can include steps for achieving a result as shown in the '461 patent specification.

In at least one embodiment, the key adviser unit extracts supportable key information from the connection establishment response signal and transmits the supportable key information to the video output unit so as to be displayed on the screen. *See* '461 patent Col. 3 *l.* 9-12. The key input unit is provided with a plurality of keys for generating input key commands. The input key commands are generated by matching the key values input through the key input unit to the key values of the portable device with reference to the supportable key information. *See* '461 patent Col. 3 *l.* 13-17.

In at least one embodiment, the key advisor unit extracts compatible key information from the connection establishment response signal and displays the compatible key information on the display screen of the video output unit. The key advisor unit displays a key among the keys provided by the compatible key information, which is matched to the key input through the key input unit, on the display screen of the video output unit. If a set of keys are selected by through the key input unit, the key advisor unit displays the keys supported by the portable device on the display screen of the video output unit. If a key is input through the key input unit, the key advisor unit matches the key value of the input key to a key value of the corresponding key supported by the portable device. *See* '461 patent Col. 4 *l.* 37-46. The key input unit is provided with a plurality of keys for generating input key values. The input key commands are generated by matching the key values input through the key input unit to the key values of the portable device with reference to the supportable key information. *See* '461 patent Col. 3 *l.* 13-17.

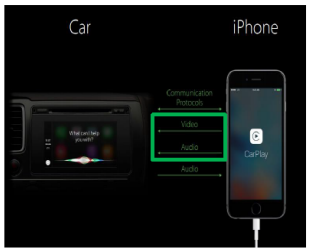
wherein key values corresponding to the keys of the key input unit match key values of the portable device, and wherein the video information is video data adjusted in resolution by the portable device for the video output unit on the basis of the screen resolution information, and the input key value is mapped to one of key values indicated by the supportable key information of the portable device.

and wherein key values corresponding to the keys of the key input unit match key values of the portable device, and wherein the video information is video data adjusted in resolution by the portable device for the video output unit on the basis of the screen resolution information, and the input key value is mapped to one of key values indicated by the supportable key information of the portable device.



SOURCE: https://www.idownloadblog.com/2014/04/19/app-store-guide/

SOURCE: https://devstreaming-cdn.apple.com/videos/wwdc/2016/722x2eefo3u2rp8k8qs/722/722_developing_carplay_systems_part_1.pdf



SOURCE: https://devstreaming-cdn.apple.com/videos/wwdc/2016/722x2eefo3u2rp8k8qs/722/722_developing_carplay_systems_part_1.pdf

and wherein key values corresponding to the keys of the key input unit match key values of the portable device, and wherein the video information is video data adjusted in resolution by the portable device for the video output unit on the basis of the screen resolution information, and the input key value is mapped to one of key values indicated by the supportable key information of the portable device.

Touchscreen

Users can interact with a CarPlay app by performing gestures on the car's built-in touchscreen display. CarPlay supports both low-fidelity and high-fidelity touchscreen displays. High-fidelity screens have lower finger-tracking latency than low-fidelity screens, and therefore support more gestures. Depending on the display, CarPlay apps can respond single-finger gestures, as follows.

Gesture	Usage	Low-fidelity screen	High-fidelity screen
Tap	Activates a control or selects an item.	●	●
Double-tap	Zooms in and centers content.	●	●
Touch and hold	Activates a control for a period of time. For example, touching and holding the Next Track button in the Music app fast-forwards the currently playing track.	●	●
Flick	Scrolls or pans quickly.		●
Drag	Moves an element from side-to-side or drags an		●

SOURCE: https://developer.apple.com/design/human-interface-guidelines/carplay/interaction/touchscreen/

38. Defendant's aforesaid activities have been without authority and/or license from Plaintiff.

39. To the extent 35 U.S.C. § 287 is determined to be applicable, Plaintiff is informed and believes its requirements have been satisfied with respect to the '504 and '461 patents.

40. Plaintiff is entitled to recover from Defendant the damages sustained by Plaintiff as a result of the Defendant's wrongful acts in an amount subject to proof at trial, which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

JURY DEMAND

Plaintiff hereby requests a trial by jury pursuant to Rule 38 of the Federal Rules of Civil Procedure.

PRAYER FOR RELIEF

Plaintiff respectfully requests that the Court find in its favor and against the Defendant, and that the Court grant Plaintiff the following relief:

A. A judgment in favor of Plaintiff that Defendant has infringed one or more of the claims, directly, jointly, and/or indirectly the '504 and '461 patents;

B. A permanent injunction pursuant to 35 U.S.C. § 283, enjoining Defendant and their officers, directors, agents servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all others acting in active concert therewith from infringement, inducing the infringement of, or contributing to the infringement of the '461 and '504 patents, or such other equitable relief the Court determines is warranted;

C. An award to Plaintiff of damages adequate to compensate Plaintiff for the Defendant's acts of infringement together with pre-judgment and post-judgment interest;

D. That, should Defendant's acts of infringement be found to be willful from the time that Defendant became aware of the infringing nature of their actions, which is the time of filing of Plaintiff's Original Complaint at the latest, that the Court award treble damages for the period of such willful infringement pursuant to 35 U.S.C. §

284;

E. Any further relief that this Court deems just and proper.

Dated: February 7, 2019

Respectfully submitted,

By: */s/ Austin Hansley*
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Facsimile: (972) 370-3559
Email: ahansley@hansleyfirm.com
www.hansleyfirm.com
ATTORNEY FOR PLAINTIFF
DALE PROGRESS LTD.

CERTIFICATE OF SERVICE

I hereby certify that on February 7, 2019, I electronically filed the foregoing document with the clerk of the court for the U.S. District Court, Eastern District of Texas, Marshall Division, using the electronic case filing system of the court. The electronic case filing system sent a "Notice of Electronic Filing" to the attorneys of record who have consented in writing to accept this Notice as service of this document by electronic means.

/s/ *Austin Hansley*
Austin Hansley

EXHIBIT A

US009686504B2

(12) **United States Patent**
Chang

(10) **Patent No.: US 9,686,504 B2**
(45) **Date of Patent: *Jun. 20, 2017**

(54) **REMOTE RESOURCE ACCESS INTERFACE APPARATUS**

(71) Applicant: **Gil Hoon Chang**, Seoul (KR)

(72) Inventor: **Gil Hoon Chang**, Seoul (KR)

(*) 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.: **14/924,286**

(22) Filed: **Oct. 27, 2015**

(65) **Prior Publication Data**

US 2016/0050388 A1 Feb. 18, 2016

Related U.S. Application Data

(63) Continuation of application No. 14/572,181, filed on Dec. 16, 2014, now Pat. No. 9,179,093, which is a (Continued)

(51) **Int. Cl.**
H04N 7/01 (2006.01)
G06F 1/16 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***H04N 7/0117*** (2013.01); ***G06F 1/1632*** (2013.01); ***G06F 3/0488*** (2013.01); ***G06F 3/04886*** (2013.01); ***H04N 5/4403*** (2013.01); ***H04N 21/4122*** (2013.01); ***H04N 21/41407*** (2013.01); ***H04N 21/43637*** (2013.01); ***H04N 21/4402*** (2013.01); ***H04N 21/4621*** (2013.01); *H04N 21/4222* (2013.01); *H04N 21/42207* (2013.01); *H04N 21/42209* (2013.01); *H04N 21/42214* (2013.01); *H04N 21/42224* (2013.01); *H04N 2005/4408* (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC H04N 5/44; H04N 5/4403; H04N 7/0117; H04N 2005/4408; H04N 2005/4417; H04N 2005/4425; H04H 40/00
USPC 375/240.21; 348/734, 445; 345/169, 168
See application file for complete search history.

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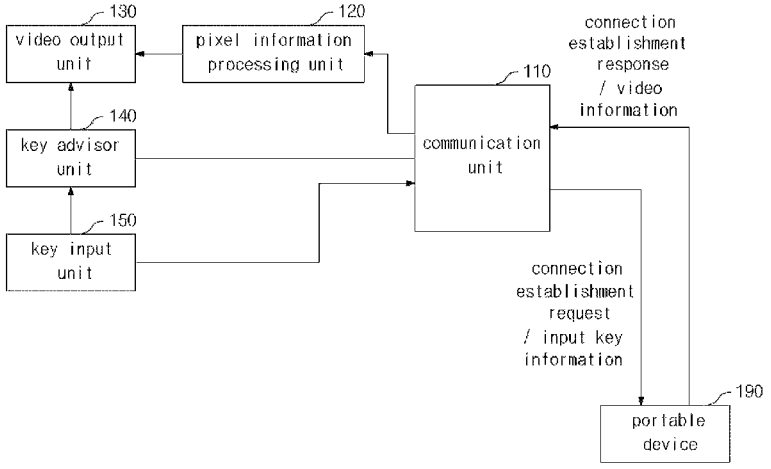
(Continued)

Primary Examiner — Jamal Javaid
(74) *Attorney, Agent, or Firm* — Alston & Bird LLP

(57) **ABSTRACT**

A remote resource access interface apparatus is provided. A key input unit has keys for generating input key values. A communication unit transmits a connection establishment request message including screen resolution information to, and receives a connection establishment response message including supportable key information from, a portable device. The communication unit transmits input key information to and receives video information from the portable device after establishing the connection. A pixel information processing unit converts the video information to pixel signals for a video output unit to display as a visual image. A key advisor unit extracts supportable key information from the response message and outputs the supportable key information to the video output unit. The video information is video data adjusted in resolution based on the screen resolution information, and the input key value is mapped to one of key values indicated by the key information of the portable device.

9 Claims, 5 Drawing Sheets



Related U.S. Application Data

continuation of application No. 13/659,241, filed on Oct. 24, 2012, now Pat. No. 8,942,291, which is a continuation of application No. 12/034,154, filed on Feb. 20, 2008, now Pat. No. 8,320,461.

(51) **Int. Cl.**

G06F 3/0488	(2013.01)
H04N 5/44	(2011.01)
H04N 21/41	(2011.01)
H04N 21/414	(2011.01)
H04N 21/4363	(2011.01)
H04N 21/4402	(2011.01)
H04N 21/462	(2011.01)
H04N 21/422	(2011.01)

(52) **U.S. Cl.**

CPC *H04N 2005/4416* (2013.01); *H04N 2005/4417* (2013.01); *H04N 2005/4425* (2013.01)

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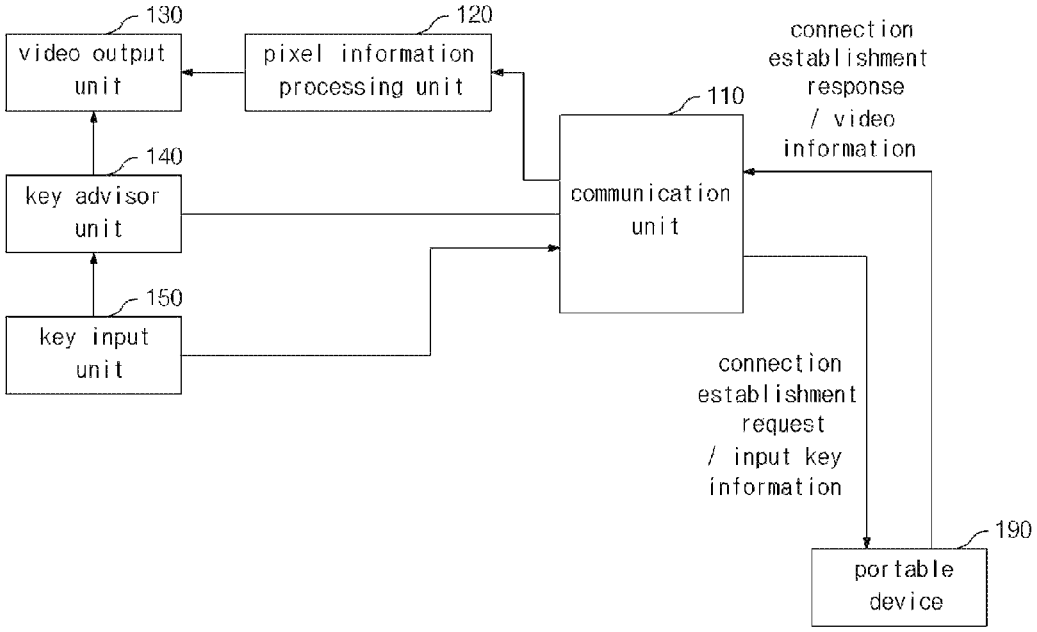
130
video output unit
120
pixel information processing unit
connection establishment response / video information
110
communication unit
140
key advisor unit
150
key input unit
connection establishment request / input key information
190
portable device

FIG. 1

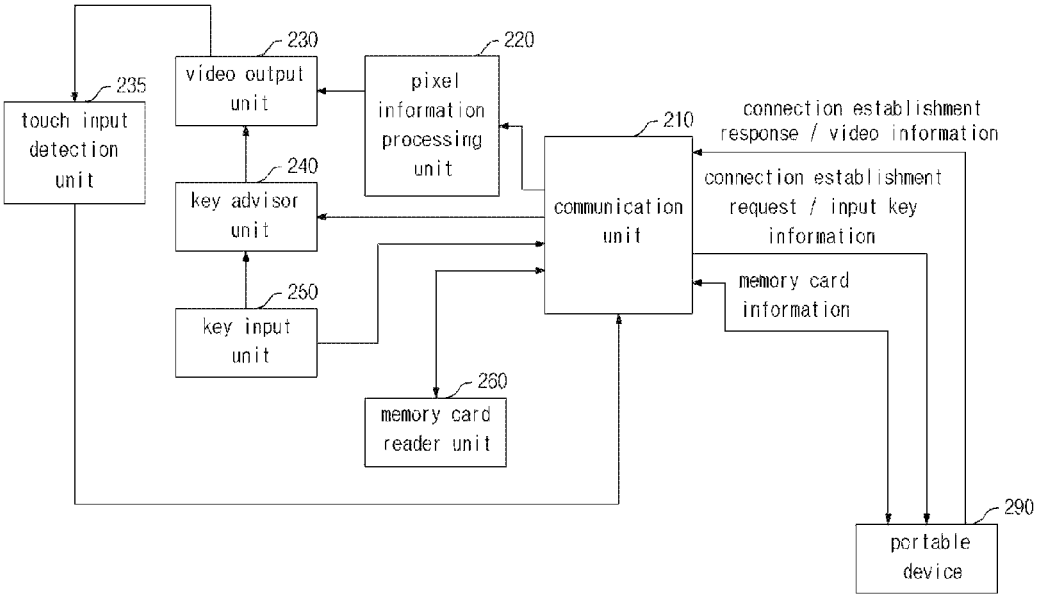
230
video output unit
220
pixel information processing unit
235
touch input detection unit
210
connection establishment response / video information
240
key advisor unit
communication unit
connection establishment request / input key information
250
key input unit
memory card information
260
memory card reader unit
290
portable device

FIG. 2a

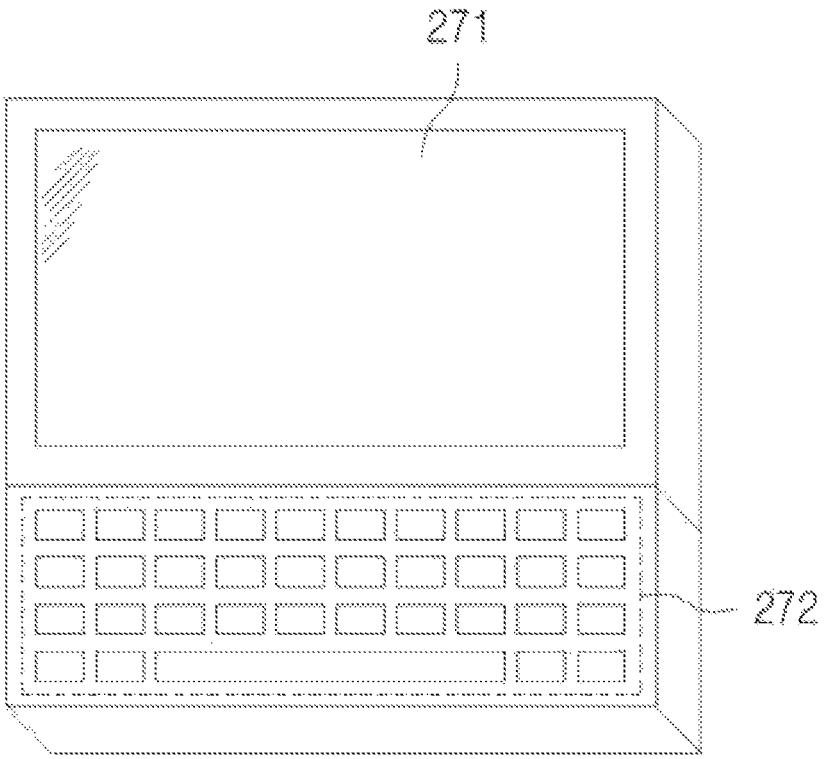

FIG. 2b

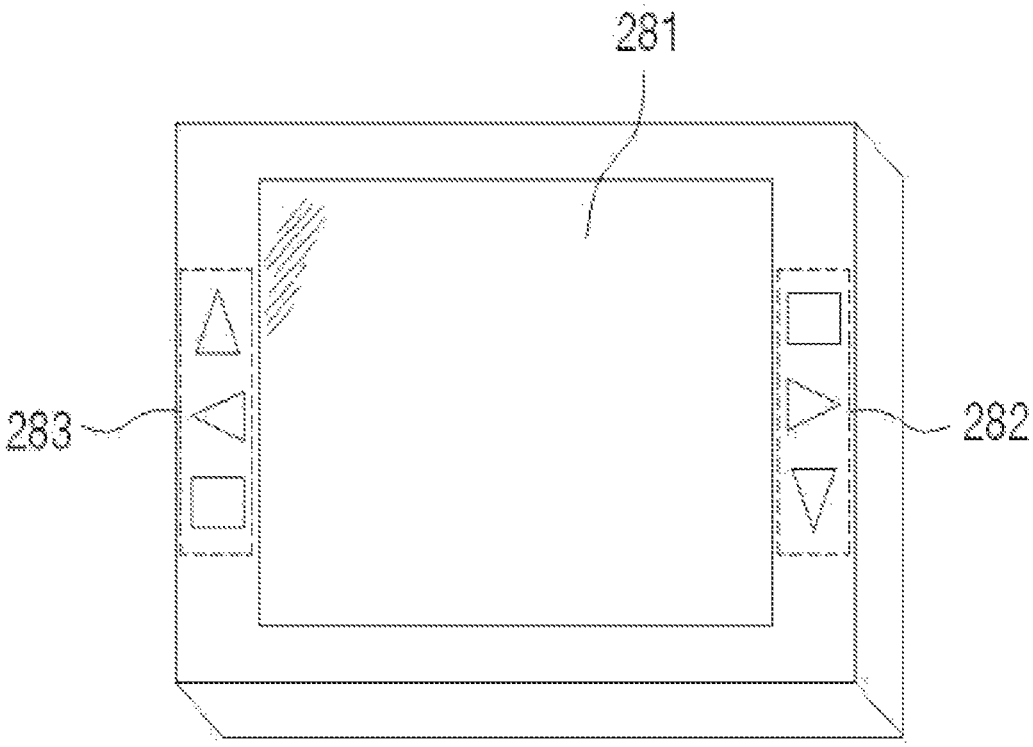

FIG. 2c

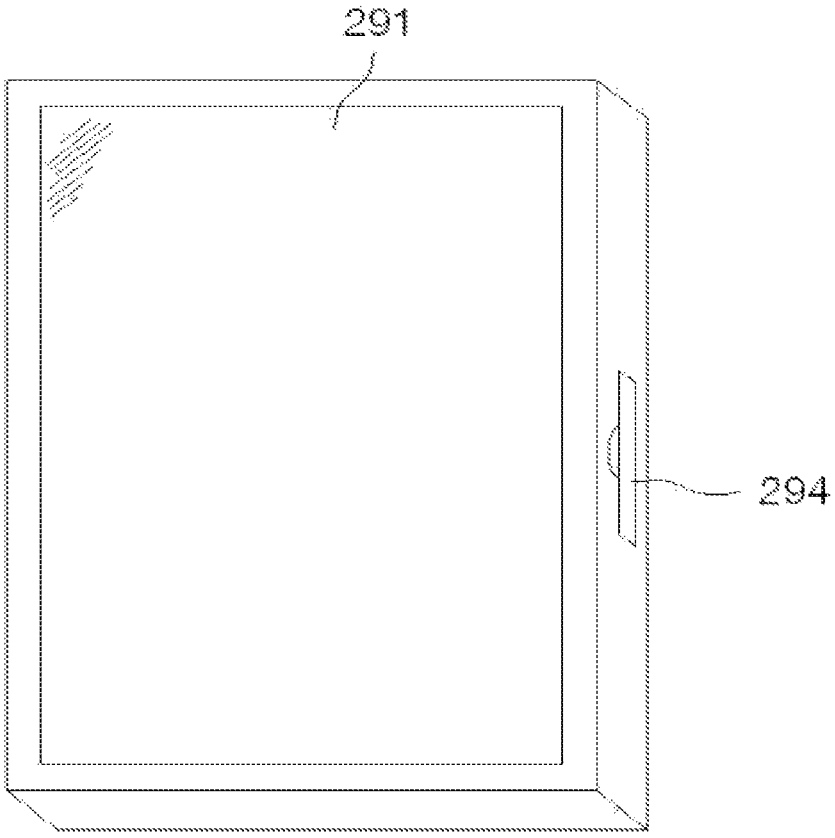

FIG. 2d

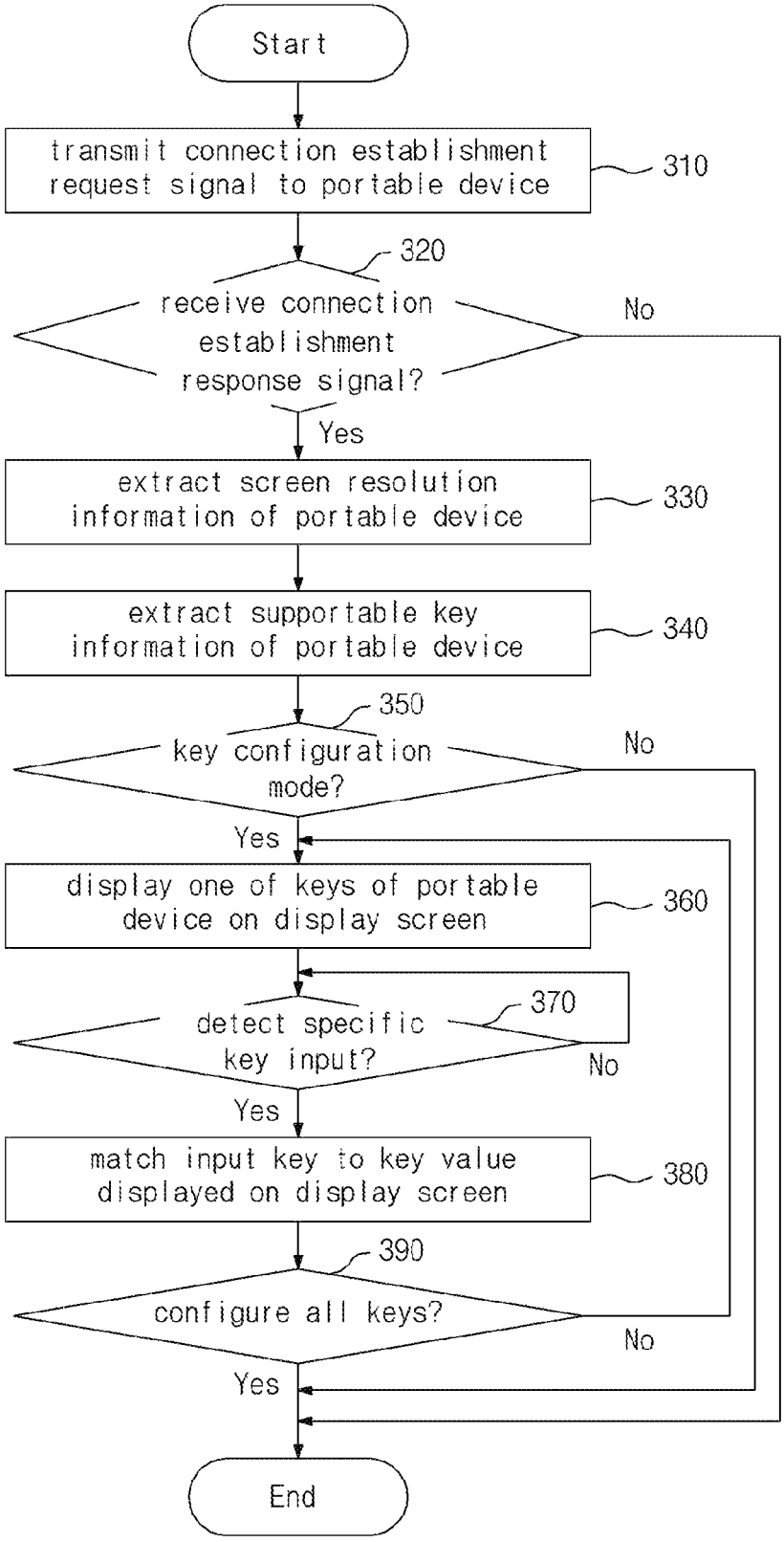
Start
transmit connection establishment request signal to portable device
310
320
receive connection establishment response signal?
No
Yes
extract screen resolution information of portable device
330
extract supportable key information of portable device
340
350
key configuration mode?
No
Yes
display one of keys of portable device on display screen
360
detect specific key input?
370
No
Yes
match input key to key value displayed on display screen
380
390
configure all keys?
No
Yes
End

FIG. 3

REMOTE RESOURCE ACCESS INTERFACE APPARATUS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. application Ser. No. 14/572,181, filed Dec. 16, 2014, which is a continuation of U.S. application Ser. No. 13/659,241, filed Oct. 24, 2012, which is a continuation of U.S. application Ser. No. 12/034,154, filed Feb. 20, 2008, each of which is hereby incorporated in its entirety by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a portable device and, in particular, to a remote resource access interface apparatus for a portable device.

Description of the Related Art

Recently, most people carry one or more portable electronic devices such as laptop computer, Personal Digital Assistant (PDA), and cellular phone, and such devices are basically provided with communication functions. With the advance of communication technologies and recent tendency toward functional convergence, the portable devices are evolving to multifunctional devices. For example, recent mobile phones support various functions such as short message service (SMS), internet access, game, e-book, and the like. This means that a mobile phone is used for accessing the Internet as with a personal computer (PC), and a PDA can be used as a communication device.

In the meantime, the portable devices are becoming slim and compact in their designs while maintaining tight integration and full functionality of the components, whereby display screen and keypad are becoming smaller in size, resulting in manipulation inconvenience. Also, since the portable devices are provided with their respectively integrated input/output (IO) modules, their portability and usability are limited by redundant IO modules. Furthermore, overlapped functionality of the portable devices, caused by similar hardware and software components, are not integrally managed, resulting in waste of resources.

SUMMARY OF THE INVENTION

The present invention has been made in an effort to solve the above problems, and it is an object of the present invention to provide a remote resource access interface apparatus that is capable of outputting video and audio signals of a portable device through external devices such as external display panel and speaker system and receiving signals input through an external input device, thereby improving extendibility and portability of a portable device.

In accordance with an aspect of the present invention, the above and other objects are accomplished by a remote resource access interface apparatus. The remote resource access interface apparatus includes a key input unit having a plurality of keys for generating input key values; a communication unit for transmitting a connection establishment request message including screen resolution information to a portable device and receiving a connection establishment response message including supportable key information from the portable device, the communication unit transmitting input key information to and receiving video information from the portable device after establishing the connection; a video output unit for displaying the video information in the form of a visual image; a pixel information processing unit for converting the video information to pixel signals appropriate for the video output unit; and a key advisor unit for extracting supportable key information from the connection establishment response message and outputting the supportable key information to the video output unit, wherein the video information is video data adjusted in resolution on the basis of the screen resolution information, and the input key value is mapped to one of key values indicated by the key information of the portable device.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the present invention will be more apparent from the following detailed description in conjunction with the accompanying drawings, in which:

FIG. **1** is a block diagram illustrating a remote resource access interface apparatus according to an exemplary embodiment of the present invention;

FIG. **2***a* is a block diagram illustrating a remote resource access interface apparatus according to another exemplary embodiment of the present invention;

FIGS. **2***b* to **2***d* are exemplary views illustrating remote resource access interface apparatus according to exemplary embodiments of the present invention; and

FIG. **3** is a flowchart illustrating a remote resource access interface method according to an exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

Exemplary embodiments of the present invention are described with reference to the accompanying drawings in detail. The same reference numbers are used throughout the drawings to refer to the same or like parts. Detailed descriptions of well-known functions and structures incorporated herein may be omitted to avoid obscuring the subject matter of the present invention.

FIG. **1** is a block diagram illustrating a remote resource access interface apparatus according to an exemplary embodiment of the present invention.

Referring to FIG. **1**, the interface apparatus includes a communication unit **110** connected to a portable device **190**, a pixel information processing unit **120**, a video output unit **130**, a key advisor unit **140**, and a key input unit **150**.

The communication unit **110** transmits a connection establishment request signal to the portable device **190**. The connection establishment request signal includes information on the resolutions supported by the video output unit **130**. Here, the portable device **190** is an electronic device having a small display screen, such as a mobile phone, PDA, etc.

The connection establishment request signal may include information on the type of input/output (IO) device of the remote resource access interface apparatus. The IO device can be a keypad-type device or a gaming consol-type device.

The communication unit **110** receives a connection establishment response signal from the portable device **190**. The connection establishment response signal includes information of function keys supported by the portable device **190**. The communication establishment response signal is received, the communication unit **110** transmits an input key information to the portable device **190** and receives screen information from the portable device **190**. The screen information is of a resolution adjusted on the basis of the

resolution received from the portable device **190**. That is, the screen information received from the portable device **190** is pixel information corresponding to the screen resolution according to a specification of the video output unit **130**.

The pixel information processing unit **120** converts the video information received from the communication unit **110** to an electrical signal appropriate for a display panel and a panel driving circuit. That is, the pixel information processing unit **120** is provided with a graphical interface circuit for the video output unit **130**.

The video output unit **130** displays the video information output by the pixel information processing unit **120**. The video output unit **130** can be implemented with a liquid crystal display (LCD) panel or an organic light emitting diode (OLED) display panel.

The key adviser unit **140** extracts supportable key information from the connection establishment response signal and transmits the supportable key information to the video output unit **130** so as to be displayed on the screen.

The key input unit **150** is provided with a plurality of keys for generating input key commands. The input key commands are generated by matching the key values input through the key input unit **150** to the key values of the portable device **190** with reference to the supportable key information.

The portable device **190** extracts display resolution information of the video output unit **130** from the connection establishment request signal and transmits video information of which resolution is adjusted on the basis of the screen resolution information. For example, the portable device **190** processes the video information or the pixel information to fit for the specification of the video output unit **130** by means of firmware or preinstalled software.

The portable device **190** extracts the device type information from the connection establishment request signal and resets the user interface menu thereof on the basis of the device type information.

In a case that a keypad-type IO device is connected to the portable device **190**, the user interface menu of the portable device may be reconfigured such that a text composition functionality associated with an e-mail or document has the priority.

In a case that a game consol is connected to the portable device **190**, the user interface menu of the portable device may be reconfigured such that a gaming menu has the priority.

FIG. **2***a* is a block diagram illustrating a remote resource access interface apparatus according to another exemplary embodiment of the present invention.

Referring to FIG. **2***a*, the interface apparatus includes a communication unit **210** connected to a portable device **290**, a pixel information processing unit **220**, a video output unit **230**, a touch input detection unit **235**, a key advisor unit **240**, a key input unit **250**, and a memory card reader unit **260**.

The communication unit **210** transmits a connection establishment request signal to the portable device **290**. The connection establishment request signal includes information on the screen resolutions supported by the video output unit **230**. Here, the portable device **290** is an electronic device having a small display screen, such as a mobile phone, PDA, etc.

The communication unit **210** received a connection establishment response signal from the portable device in response to the connection establishment request signal. The connection establishment response signal includes compatibility information for informing of compatible connection features. If the connection establishment response signal is received, the communication unit **210** transmits key input information to the portable device **290** and prepares to receive video information from the portable device **290**. At this time, the portable device **290** adjusts the video information on the basis of the compatibility information such that video information adjusted to fit for the resolution of the video output unit **230** is transmitted.

The communication unit **210** can be provided with at least one of wireless communication interfaces specified by Bluetooth, wireless fidelity (wi-fi), ZigBee, wireless broadband (WiBro) protocols for communicating with the portable device **290**. The communication unit **210** also can be connected to the portable device **290** through a communication wire so as to exchange data with the portable device **290** in series or in parallel.

Preferably, the communication unit **210** is provided with a digital signal processor (DSP) to perform encoding and decoding on the signals to be transmitted and received and a communication interface for connecting the portable device **290** to an external auxiliary storage device or memory card reader unit **260** for extending storage capability of the portable device **290**.

The pixel information processing unit **220** converts the video information received through the communication unit **210** to an electrical signal appropriate for a display panel and panel driving circuit of the video output unit **230**. That is, the pixel information processing unit **220** is provided with a graphic interface circuit for the video output unit **220**.

The video output unit **230** outputs the video information received from the pixel information processing unit **220** in the form of a visual image. The video output unit **230** can be implemented with a liquid crystal display (LCD) panel or an organic light emitting diode (OLED) panel. Preferably, the video output unit **230** is provided with a display screen larger than that of the portable device **290**.

The touch input detection unit **235** detects a touch input on the display screen and generates position information on the display screen in association of the current image. The touch input detection unit **235** transmits the position information associated with the current image to the portable device **290**.

The touch input detection unit **235** is implemented in the form of a touch-sensitive touchscreen covering the display screen of the video output unit **230**. The tough input detection unit **235** may further include a processor for converting a pressure and voltage sensed on the display screen to the position information.

The key advisor unit **240** extracts compatible key information from the connection establishment response signal and displays the compatible key information on the display screen of the video output unit **230**. The key advisor unit **240** displays a key among the keys provided by the compatible key information, which is matched to the key input through the key input unit **250**, on the display screen of the video output unit **230**.

If a set of keys are selected by through the key input unit **250**, the key advisor unit **240** displays the keys supported by the portable device **290** on the display screen of the video output unit **230**. If a key is input through the key input unit **250**, the key advisor unit **240** matches the key value of the input key to a key value of the corresponding key supported by the portable device **290**.

The key input unit **250** is provided with a plurality of keys for generating input key values.

The memory card reader unit **260** is provided with at least one slot for receiving an external memory card. The memory card reader unit **260** can read from and write to the external

memory card. If an access command for specific information stored in the external memory card is received from the portable device **290**, the memory card reader unit **260** reads the information indicated by the access command from the external memory card and transmits the read information to the portable device **290**. On the other hand, if specific information is received from the portable device **290** together with a write command, the memory card reader unit **260** writes the information within the external memory unit. The memory card can be any of Secure Digital (SD) card, Memory Stick (MS), and Compact Flash (CF).

The remote resource access interface according to an embodiment of the present invention can be provided with a microphone and a speaker so as to input and output sound information to and from the portable device **290**.

FIGS. **2***b* to **2***d* are exemplary views illustrating remote resource access interface apparatus according to exemplary embodiments of the present invention.

The apparatus of FIG. **2***b* is provided with a key input unit **272** having a plurality of alphanumeric keys and a video output unit **271** having relatively large screen. Due to the large display screen, this type of remote resource access interface apparatus is useful for text-based applications such as electronic mail (e-mail) reader, electronic dictionary, scheduler, etc.

The apparatus of FIG. **2***c* is provided with a key input unit **282** and **283** having simplified functional keys characterized for gaming and internet surfing. Particularly, this type of apparatus can be appropriate for implementing as a navigator integrated with a hands free functionality by connecting to audio system of a vehicle by means of an auto connection kit.

The apparatus of FIG. **2***d* is provided with a large display screen as of an input/output (IO) unit of a desktop PC so as to be useful for executing data and programs and local area communication. This apparatus is also provided with a memory card reader **294** which allows data backup and expansion of storage capability of the portable device.

Although the remote resource access interface apparatus is exemplary proposed in specific contour as depicted in FIGS. **2***b* to **2***d*, it is obvious to those skilled in the art that the remote resource access interface apparatus of the present invention can be implemented in various configurations.

FIG. **3** is a flowchart illustrating a remote resource access interface method according to an exemplary embodiment of the present invention.

In FIG. **3**, it is assumed that a portable device provides a remote resource access interface apparatus of FIG. **1** with screen resolution information.

Referring to FIG. **3**, after establishing a communication channel with a portable device, the remoter resource access interface device transmits a connection establishment request message to the portable device at step **S310**.

Upon receiving the connection establishment request message is received, the portable device checks a compatibility of the remote resource access interface device and transmits, if the remote resource access interface device is compatible, a connection establishment response message to the remote resource access interface device.

The remote resource access interface device determines whether a connection establishment response message is received from the portable device at step **S320**.

If a connection establishment response message is received, the remote resource access interface apparatus extracts supportable screen resolution and key information from the connection establishment response message at steps **S330** and **S340**.

Next, the remote resource access interface apparatus determines whether a key configuration mode is activated at step **S350** and selects and displays, if the key configuration mode is activated, one of keys supported by the portable device at step **S360**. For example, if the selected key is a dial key, the remote resource access interface apparatus displays the dial key on its display screen.

Next, the remote resource access interface apparatus determines whether a specific key is input while displaying the selected key at step **S379** and matches, if a specific key is input, the key value of the input key to the key value of the selected key at step **S380**.

Next, the remote resource access interface apparatus determines whether a key configuration termination command is input at step **S390**. If no key configuration termination command is input, the remote resource access interface apparatus repeats steps **S360** to **S380**. If a key configuration termination command is input, the remote resource access interface apparatus ends the key configuration procedure and transmits, if a key input is detected, a value corresponding to the key input to the portable device.

Although exemplary embodiments of the present invention have been described in detail hereinabove, it should be clearly understood that many variations and/or modifications of the basic inventive concepts herein taught which may appear to those skilled in the present art will still fall within the spirit and scope of the present invention, as defined in the appended claims.

As described above, the remote resource access interface apparatus of the present invention is provided as an independent input/output device attachable to individual portable devices, whereby the remote resource access interface apparatus improves the portability of multiple portable devices and reduces waste of resources by removing redundant components in both hardware and software. Also, the remote resource access interface apparatus can effectively provide multifunctional interface for portable multimedia devices.

What is claimed is:

1. A remote resource access interface apparatus comprising:

a key input unit configured to generate input key values;

a communication unit configured to receive supportable key information from a compatible portable device, the communication unit further configured to transmit input key information to the portable device and to receive video information from the portable device;

a video output unit configured to display adjusted video information in the form of a visual image, the video output unit having a display screen having a screen specification different from a screen specification of the portable device, wherein the screen specification includes screen resolution information regarding the screen resolutions supported by the portable device; and

a key advisor unit configured to extract the supportable key information from a response message;

wherein the video output unit displays on the display screen, if a key configuration mode of the key advisor unit is activated, one or more keys of the portable device,

wherein the key advisor unit is configured to receive corresponding keys through the key input unit, and

wherein the adjusted video information is video data adjusted to screen resolution supported by the video output unit on the basis of the screen resolution information supported by the portable device, and the input

key value is mapped to one of key values indicated by the supportable key information of the portable device such that key values corresponding to the keys of the key input unit match key values of the portable device.

2. A remote resource access interface apparatus comprising:

a touch input detection unit configured to detect touch input on a display screen and to generate touch position information on a display screen;

a communication unit configured to receive supportable key information from a compatible portable device, the communication unit further configured to transmit input key information to the portable device and to receive video information from the portable device;

a video output unit configured to display adjusted video information in the form of a visual image, the video output unit having a display screen having a screen specification different from a screen specification of the portable device, wherein the screen specification includes screen resolution information regarding the screen resolutions supported by the portable device; and

a key advisor unit configured to output the supportable key information to the video output unit wherein the key advisor unit is configured to receive the touch position information through the touch input detection unit, and

wherein the adjusted video information is video data adjusted to screen resolution supported by the video output unit on the basis of the screen resolution information supported by the portable device, and the touch position information is mapped to one of key values indicated by the supportable key information of the portable device such that the touch position information matches key values of the portable device.

3. A remote resource access interface apparatus comprising:

a key input configured to generate touch position information;

a communication unit configured to transmit screen resolution information of the remote resource access interface apparatus to a compatible portable device, the communication unit further configured to transmit the touch position information to the portable device and to receive video information from the portable device; and

a video output unit configured to display adjusted video information in the form of a visual image, the video output unit having a screen specification different from a screen specification of the portable device, wherein the screen specification includes screen resolution information regarding screen resolutions supported by the video output unit,

wherein the portable device displays on a display screen, if a key configuration mode is activated, one or more keys of the portable device and is configured to receive the touch position information from the communication unit, and

wherein the adjusted video information is video data adjusted in resolution for the video output unit on the basis of the screen resolution information, and the touch position information is mapped to one of key values indicated by the supportable key information of the portable device such that the touch position information matches key values of the portable device.

4. A remote resource access interface system comprising:

a remote resource access interface apparatus; and a portable device,

wherein the remote resource access interface apparatus comprises:

a key input configured to generate touch position information;

a communication unit configured to transmit screen resolution information of the remote resource access interface apparatus to a compatible portable device, the communication unit further configured to transmit the touch position information to the portable device and to receive video information from the portable device; and

a video output unit configured to display adjusted video information in the form of a visual image, the video output unit having a screen specification different from a screen specification of the portable device, wherein the screen specification includes screen resolution information regarding screen resolutions supported by the video output unit,

wherein the portable device displays on a display screen, if a key configuration mode is activated, one or more keys of the portable device and is configured to receive the touch position information from the communication unit, and

wherein the adjusted video information is video data adjusted in resolution for the video output unit on the basis of the screen resolution information, and the touch position information is mapped to one of key values indicated by the supportable key information of the portable device such that the touch position information matches key values of the portable device.

5. A remote resource access interface system for use with a portable device, the system comprising a remote resource access interface apparatus that comprises:

a key input configured to generate touch position information;

a communication unit configured to transmit screen resolution information of the remote resource access interface apparatus to a compatible portable device, the communication unit further configured to transmit the touch position information to the portable device and to receive video information from the portable device; and

a video output unit configured to display adjusted video information in the form of a visual image, the video output unit having a screen specification different from a screen specification of the portable device, wherein the screen specification includes screen resolution information regarding screen resolutions supported by the video output unit,

wherein the communication unit transmits the touch position information to the portable device that displays on a display screen, if a key configuration mode is activated, one or more keys of the portable device, and

wherein the adjusted video information is video data adjusted in resolution for the video output unit on the basis of the screen resolution information, and the touch position information is mapped to one of key values indicated by the supportable key information of the portable device such that the touch position information matches key values of the portable device.

6. A remote resource access interface system comprising:

a remote resource access interface apparatus; and a portable device, wherein the remote resource access interface apparatus comprises:

a key input unit configured to generate input key values;

a communication unit configured to transmit screen resolution information to a compatible portable device, the communication unit further configured to transmit

input key information and to receive video information from the portable device; and

a video output unit configured to display the video information in the form of a visual image, the video output unit having a display screen having a screen specification different from a screen specification of the portable device, wherein the screen resolution information includes information regarding the screen resolutions supported by the video output unit,

wherein the portable device configured to output the supportable key information,

wherein the portable device displays on a display screen, if a key configuration mode is activated, one or more keys of the portable device and is configured to receive corresponding keys through the key input unit, and wherein key values corresponding to the keys of the key input unit match key values of the portable device, and

wherein the video information is video data adjusted in resolution by the portable device for the video output unit on the basis of the screen resolution information, and the input key value is mapped to one of key values indicated by the supportable key information of the portable device.

7. A remote resource access interface system for use with a portable device that can output a supportable key information, the system comprising a remote resource access interface apparatus that comprises:

a key input unit configured to generate input key values;

a communication unit configured to transmit screen resolution information to a compatible portable device, the communication unit further configured to transmit input key information and to receive video information from the portable device; and

a video output unit configured to display the video information in the form of a visual image, the video output unit having a display screen having a screen specification different from a screen specification of the portable device, wherein the screen resolution information includes information regarding the screen resolutions supported by the video output unit,

wherein the communication unit transmits corresponding keys to the portable device so that the portable device displays on a display screen, if a key configuration mode is activated, one or more keys of the portable device, and

wherein the video information is video data adjusted in resolution by the portable device for the video output unit on the basis of the screen resolution information, and the input key value is mapped to one of key values indicated by the supportable key information of the portable device.

8. A remote resource access interface method comprising:

generating input key values using a key input unit;

receiving supportable key information from a compatible portable device using a communication unit, and transmitting input key information and receiving video information from the portable device using the communication unit;

displaying adjusted video information in the form of a visual image using a video output unit, the video output unit having a display screen having a screen specification different from a screen specification of the portable device, wherein the screen specification includes screen resolution information regarding the screen resolutions supported by the portable device; and

extracting the supportable key information from a response message;

wherein one or more keys of the portable device are displayed on a display screen of the video output unit if a key configuration mode is activated, and corresponding keys are input through the key input unit, and

wherein the adjusted video information is video data adjusted to screen resolution supported by the video output unit on the basis of the screen resolution information supported by the portable device, and the input key value is mapped to one of key values indicated by the supportable key information of the portable device such that key values corresponding to the keys of the key input unit match key values of the portable device.

9. A remote resource access interface method comprising:

generating touch position information using a key input unit;

transmitting screen resolution information to a compatible portable device using a communication unit, and transmitting touch position information and receiving video information from the portable device using the communication unit; and

displaying adjusted video information in the form of a visual image using a video output unit, the video output unit having a display screen having a screen specification different from a screen specification of the portable device, wherein the screen resolution information includes information regarding the screen resolutions supported by the video output unit,

if a key configuration mode is activated, displaying one or more keys of the portable device and receiving the touch position information from the communication unit, and

wherein the adjusted video information is video data adjusted in resolution by the portable device for the video output unit on the basis of the screen resolution information, and the touch position information is mapped to one of key values indicated by the supportable key information of the portable device such that the touch position information match key values of the portable device.

* * * * *

EXHIBIT B

US008320461B2

(12) **United States Patent**
Chang

(10) **Patent No.: US 8,320,461 B2**
(45) **Date of Patent: Nov. 27, 2012**

(54) **REMOTE RESOURCE ACCESS INTERFACE APPARATUS**

(76) Inventor: **Gil Hoon Chang**, Seoul (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1022 days.

(21) Appl. No.: **12/034,154**

(22) Filed: **Feb. 20, 2008**

(65) **Prior Publication Data**

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(51) **Int. Cl.**
H04B 1/66 (2006.01)

(52) **U.S. Cl.** **375/240.21**; 710/67; 719/324; 455/3.06; 345/169

(58) **Field of Classification Search** 375/240.21; 455/3.06; 719/324; 345/169; 710/67
See application file for complete search history.

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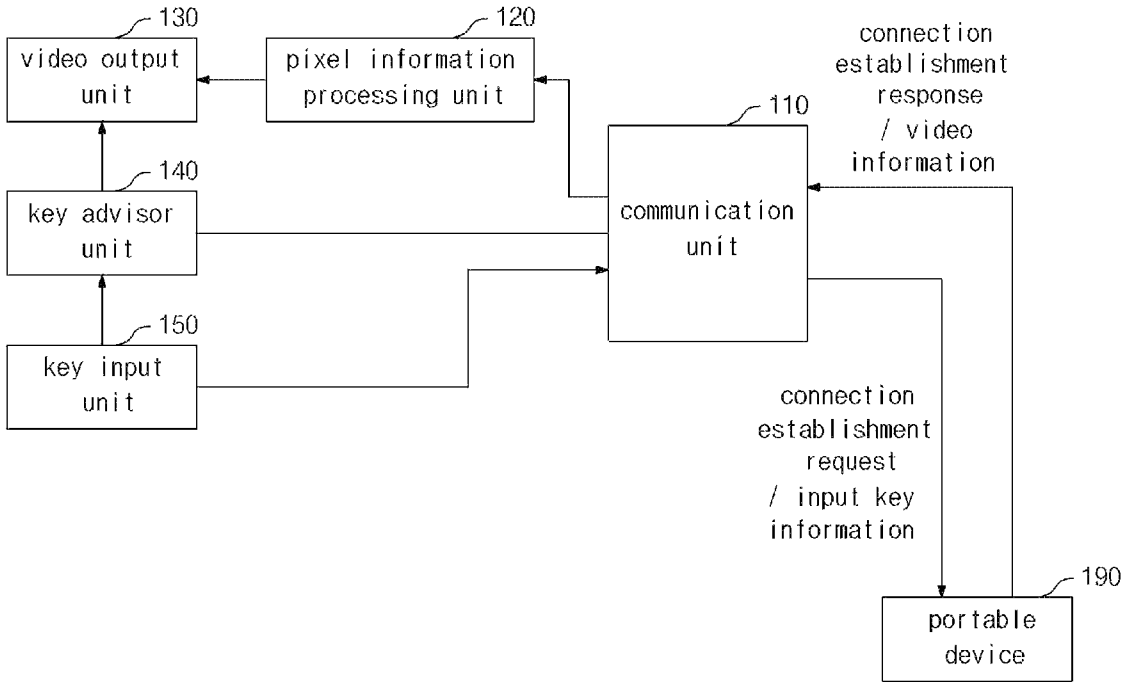
* cited by examiner

Primary Examiner — Michael Thier
Assistant Examiner — Jamal Javaid
(74) *Attorney, Agent, or Firm* — Alston & Bird LLP

(57) **ABSTRACT**

A remote resource access interface apparatus is provided. A key input unit has keys for generating input key values. A communication unit transmits a connection establishment request message including screen resolution information to, and receives a connection establishment response message including supportable key information from, a portable device. The communication unit transmits input key information to and receives video information from the portable device after establishing the connection. A pixel information processing unit converts the video information to pixel signals for a video output unit to display as a visual image. A key advisor unit extracts supportable key information from the response message and outputs the supportable key information to the video output unit. The video information is video data adjusted in resolution based on the screen resolution information, and the input key value is mapped to one of key values indicated by the key information of the portable device.

10 Claims, 5 Drawing Sheets



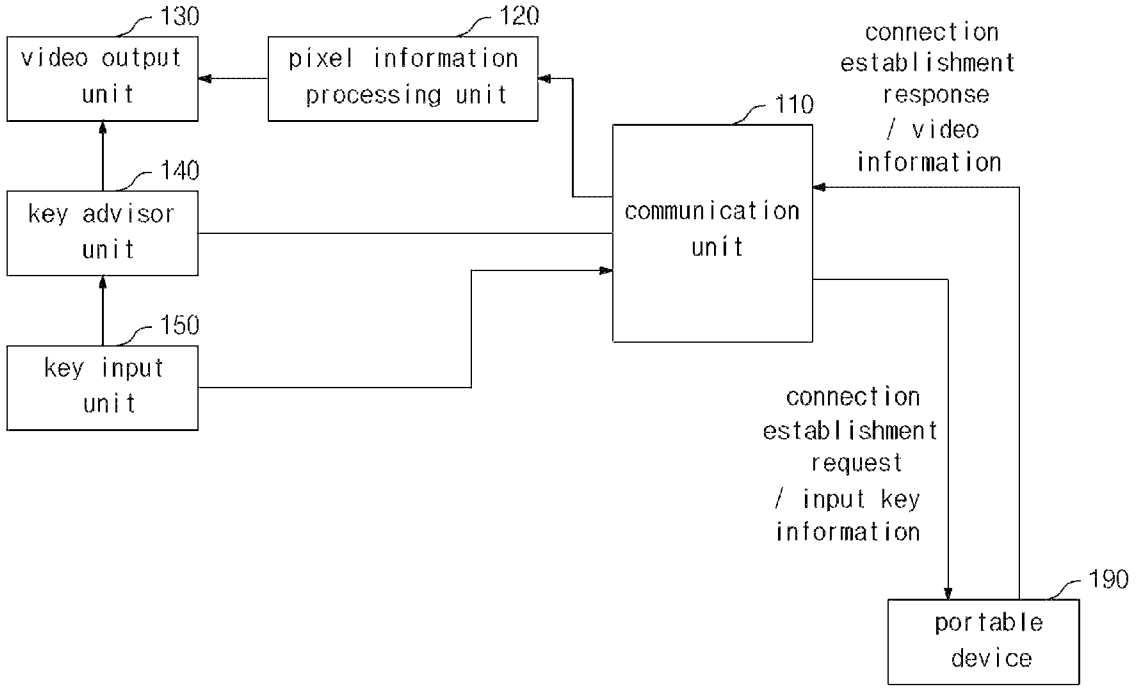

130
video output unit
120
pixel information processing unit
connection establishment response / video information
110
communication unit
140
key advisor unit
150
key input unit
connection establishment request / input key information
190
portable device

FIG. 1

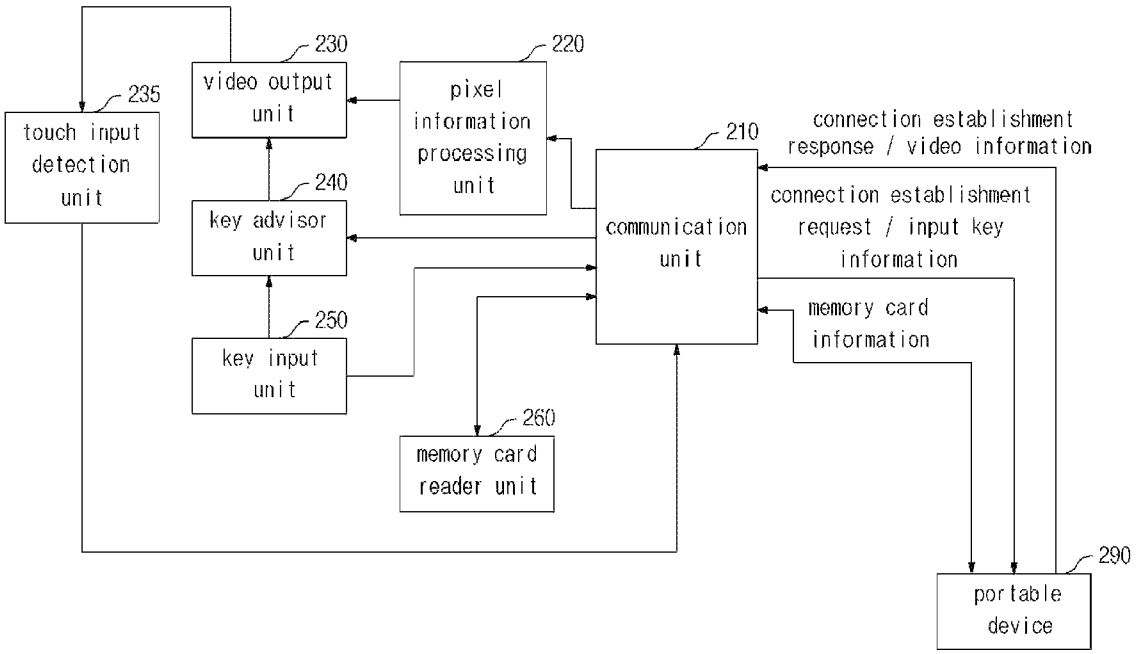

230
video output unit
220
pixel information processing unit
235
touch input detection unit
210
connection establishment response / video information
240
key advisor unit
communication unit
connection establishment request / input key information
250
key input unit
memory card information
260
memory card reader unit
290
portable device

FIG. 2a

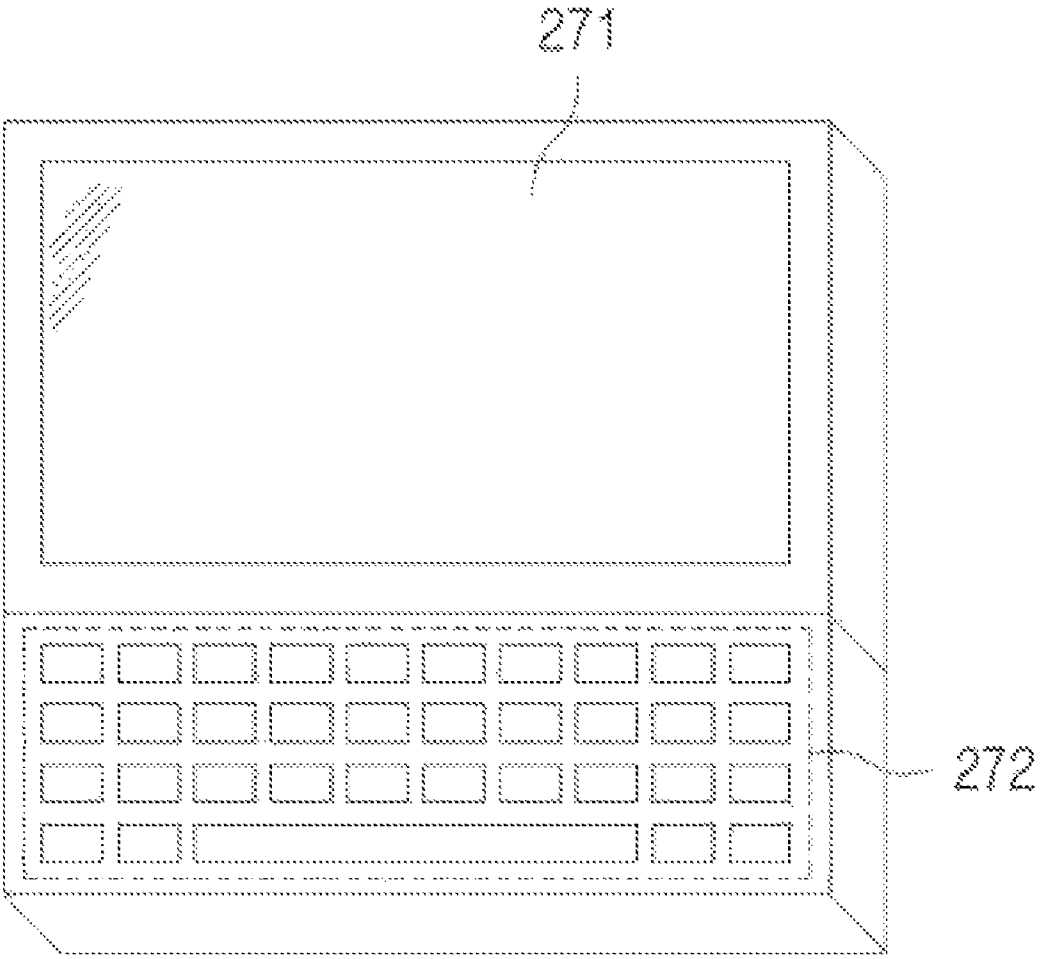


FIG. 2b

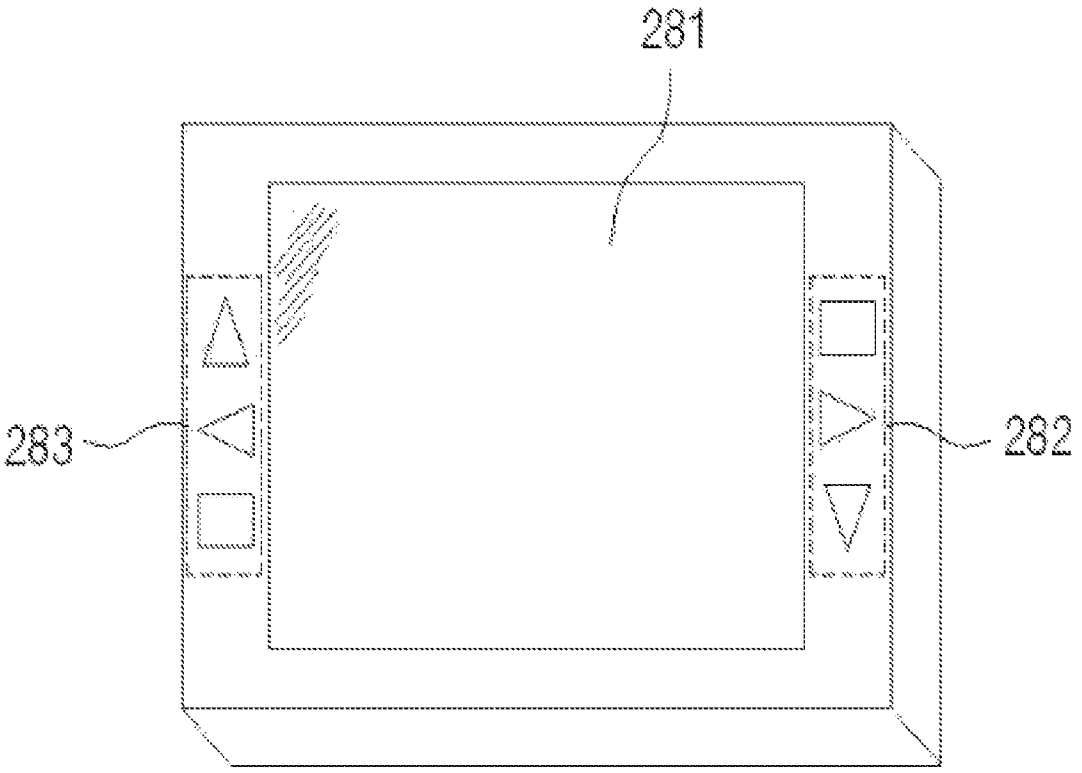


FIG. 2c

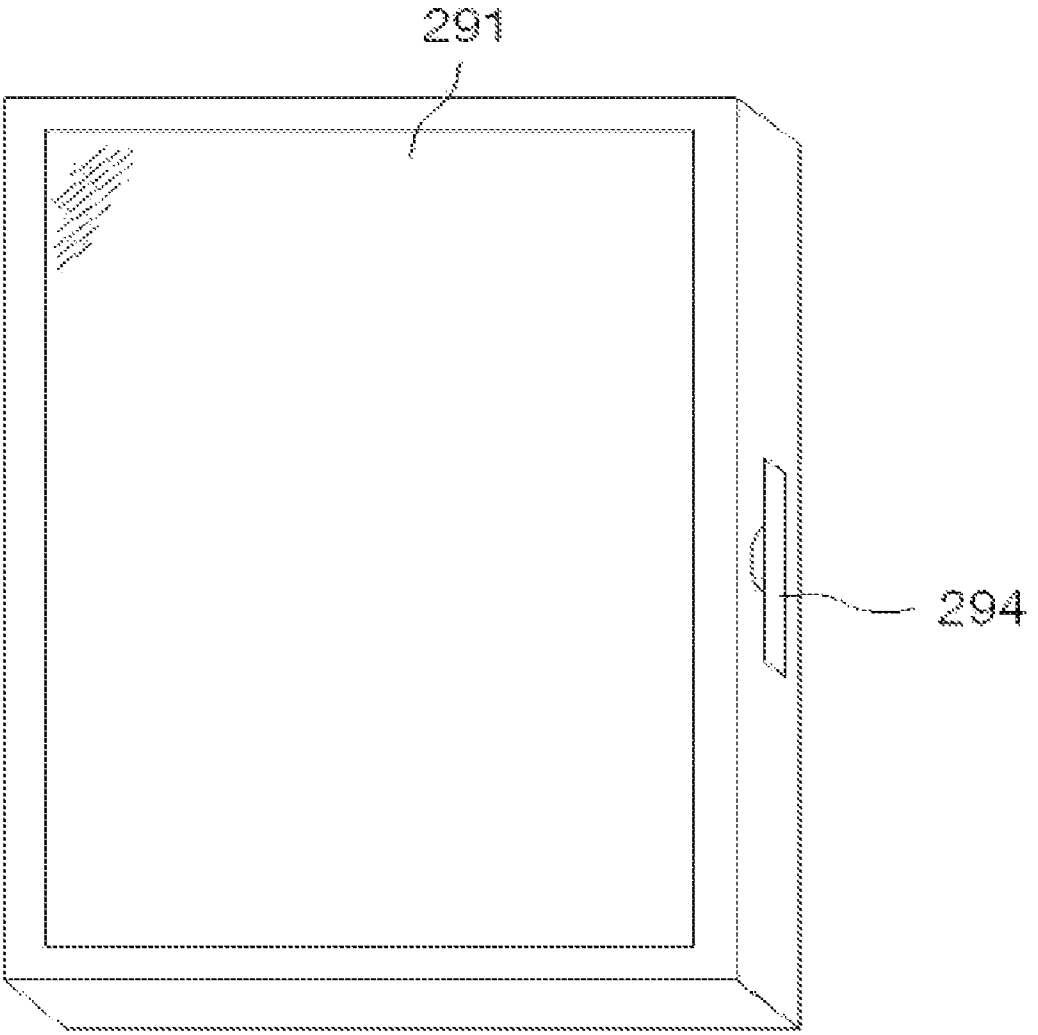


FIG. 2d

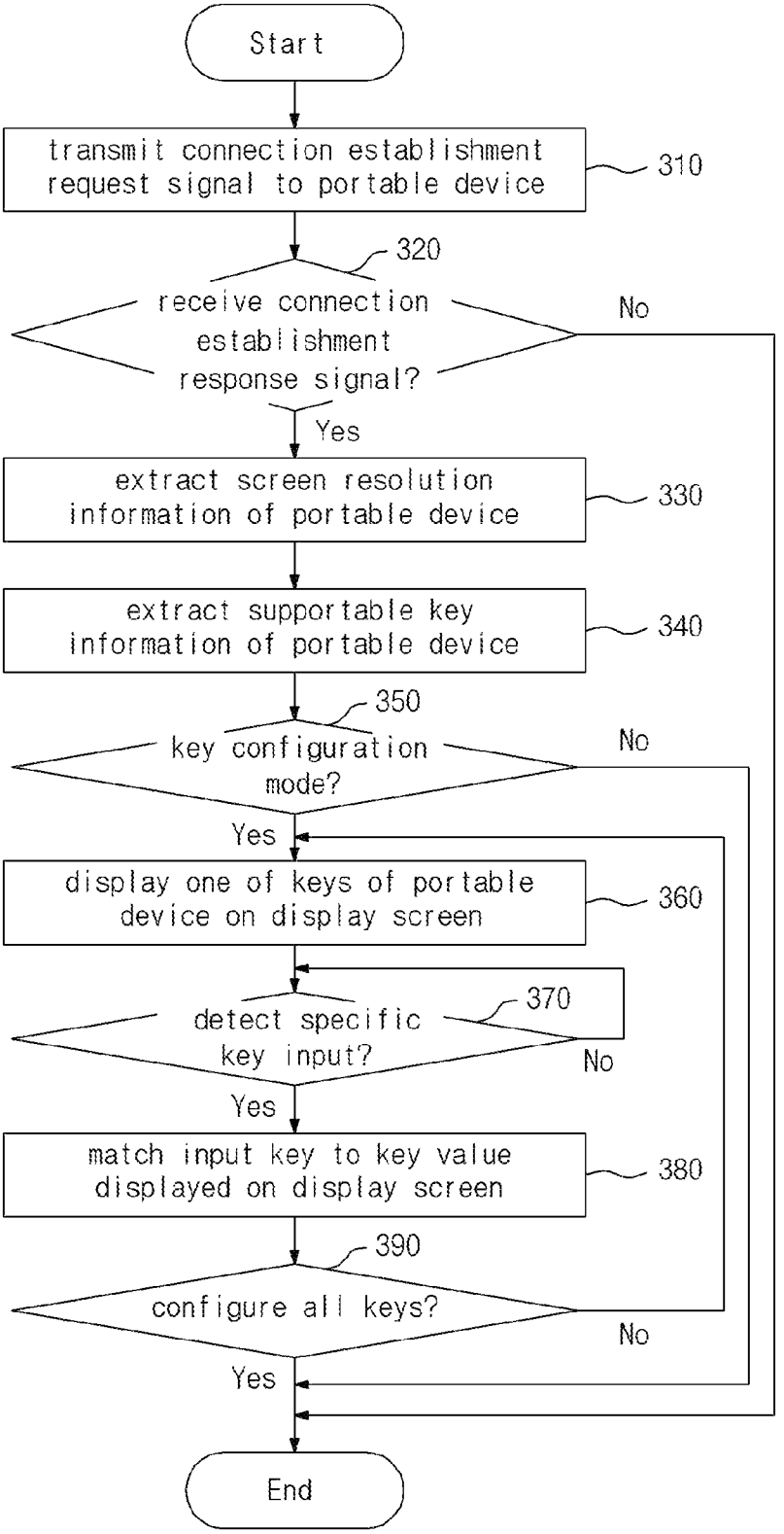

Start
transmit connection establishment request signal to portable device
310
320
receive connection establishment response signal?
No
Yes
extract screen resolution information of portable device
330
extract supportable key information of portable device
340
350
key configuration mode?
No
Yes
display one of keys of portable device on display screen
360
detect specific key input?
370
No
Yes
match input key to key value displayed on display screen
380
390
configure all keys?
No
Yes
End

FIG. 3

REMOTE RESOURCE ACCESS INTERFACE APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a portable device and, in particular, to a remote resource access interface apparatus for a portable device.

2. Description of the Related Art

Recently, most people carry one or more portable electronic devices such as laptop computer, Personal Digital Assistant (PDA), and cellular phone, and such devices are basically provided with communication functions. With the advance of communication technologies and recent tendency toward functional convergence, the portable devices are evolving to multifunctional devices. For example, recent mobile phones support various functions such as short message service (SMS), internet access, game, e-book, and the like. This means that a mobile phone is used for accessing the Internet as with a personal computer (PC), and a PDA can be used as a communication device.

In the meantime, the portable devices are becoming slim and compact in their designs while maintaining tight integration and full functionality of the components, whereby display screen and keypad are becoming smaller in size, resulting in manipulation inconvenience. Also, since the portable devices are provided with their respectively integrated input/output (IO) modules, their portability and usability are limited by redundant IO modules. Furthermore, overlapped functionality of the portable devices, caused by similar hardware and software components, are not integrally managed, resulting in waste of resources.

SUMMARY OF THE INVENTION

The present invention has been made in an effort to solve the above problems, and it is an object of the present invention to provide a remote resource access interface apparatus that is capable of outputting video and audio signals of a portable device through external devices such as external display panel and speaker system and receiving signals input through an external input device, thereby improving extendibility and portability of a portable device.

In accordance with an aspect of the present invention, the above and other objects are accomplished by a remote resource access interface apparatus. The remote resource access interface apparatus includes a key input unit having a plurality of keys for generating input key values; a communication unit for transmitting a connection establishment request message including screen resolution information to a portable device and receiving a connection establishment response message including supportable key information from the portable device, the communication unit transmitting input key information to and receiving video information from the portable device after establishing the connection; a video output unit for displaying the video information in the form of a visual image; a pixel information processing unit for converting the video information to pixel signals appropriate for the video output unit; and a key advisor unit for extracting supportable key information from the connection establishment response message and outputting the supportable key information to the video output unit, wherein the video information is video data adjusted in resolution on the basis of the screen resolution information, and the input key value is mapped to one of key values indicated by the key information of the portable device.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the present invention will be more apparent from the following detailed description in conjunction with the accompanying drawings, in which:

FIG. **1** is a block diagram illustrating a remote resource access interface apparatus according to an exemplary embodiment of the present invention;

FIG. **2***a* is a block diagram illustrating a remote resource access interface apparatus according to another exemplary embodiment of the present invention;

FIGS. **2***b* to **2***d* are exemplary views illustrating remote resource access interface apparatus according to exemplary embodiments of the present invention; and

FIG. **3** is a flowchart illustrating a remote resource access interface method according to an exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

Exemplary embodiments of the present invention are described with reference to the accompanying drawings in detail. The same reference numbers are used throughout the drawings to refer to the same or like parts. Detailed descriptions of well-known functions and structures incorporated herein may be omitted to avoid obscuring the subject matter of the present invention.

FIG. **1** is a block diagram illustrating a remote resource access interface apparatus according to an exemplary embodiment of the present invention.

Referring to FIG. **1**, the interface apparatus includes a communication unit **110** connected to a portable device **190**, a pixel information processing unit **120**, a video output unit **130**, a key advisor unit **140**, and a key input unit **150**.

The communication unit **110** transmits a connection establishment request signal to the portable device **190**. The connection establishment request signal includes information on the resolutions supported by the video output unit **130**. Here, the portable device **190** is an electronic device having a small display screen, such as a mobile phone, PDA, etc.

The connection establishment request signal may include information on the type of input/output (IO) device of the remote resource access interface apparatus. The IO device can be a keypad-type device or a gaming consol-type device.

The communication unit **110** receives a connection establishment response signal from the portable device **190**. The connection establishment response signal includes information of function keys supported by the portable device **190**. The communication establishment response signal is received, the communication unit **110** transmits an input key information to the portable device **190** and receives screen information from the portable device **190**. The screen information is of a resolution adjusted on the basis of the resolution received from the portable device **190**. That is, the screen information received from the portable device **190** is pixel information corresponding to the screen resolution according to a specification of the video output unit **130**.

The pixel information processing unit **120** converts the video information received from the communication unit **110** to an electrical signal appropriate for a display panel and a

panel driving circuit. That is, the pixel information processing unit **120** is provided with a graphical interface circuit for the video output unit **130**.

The video output unit **130** displays the video information output by the pixel information processing unit **120**. The video output unit **130** can be implemented with a liquid crystal display (LCD) panel or an organic light emitting diode (OLED) display panel.

The key adviser unit **140** extracts supportable key information from the connection establishment response signal and transmits the supportable key information to the video output unit **130** so as to be displayed on the screen.

The key input unit **150** is provided with a plurality of keys for generating input key commands. The input key commands are generated by matching the key values input through the key input unit **150** to the key values of the portable device **190** with reference to the supportable key information.

The portable device **190** extracts display resolution information of the video output unit **130** from the connection establishment request signal and transmits video information of which resolution is adjusted on the basis of the screen resolution information. For example, the portable device **190** processes the video information or the pixel information to fit for the specification of the video output unit **130** by means of firmware or preinstalled software.

The portable device **190** extracts the device type information from the connection establishment request signal and resets the user interface menu thereof on the basis of the device type information.

In a case that a keypad-type IO device is connected to the portable device **190**, the user interface menu of the portable device may be reconfigured such that a text composition functionality associated with an e-mail or document has the priority.

In a case that a game consol is connected to the portable device **190**, the user interface menu of the portable device may be reconfigured such that a gaming menu has the priority.

FIG. **2***a* is a block diagram illustrating a remote resource access interface apparatus according to another exemplary embodiment of the present invention.

Referring to FIG. **2***a*, the interface apparatus includes a communication unit **210** connected to a portable device **290**, a pixel information processing unit **220**, a video output unit **230**, a touch input detection unit **235**, a key advisor unit **240**, a key input unit **250**, and a memory card reader unit **260**.

The communication unit **210** transmits a connection establishment request signal to the portable device **290**. The connection establishment request signal includes information on the screen resolutions supported by the video output unit **230**. Here, the portable device **290** is an electronic device having a small display screen, such as a mobile phone, PDA, etc.

The communication unit **210** received a connection establishment response signal from the portable device in response to the connection establishment request signal. The connection establishment response signal includes compatibility information for informing of compatible connection features. If the connection establishment response signal is received, the communication unit **210** transmits key input information to the portable device **290** and prepares to receive video information from the portable device **290**. At this time, the portable device **290** adjusts the video information on the basis of the compatibility information such that video information adjusted to fit for the resolution of the video output unit **230** is transmitted.

The communication unit **210** can be provided with at least one of wireless communication interfaces specified by Bluetooth, wireless fidelity (wi-fi), ZigBee, wireless broadband (WiBro) protocols for communicating with the portable device **290**. The communication unit **210** also can be connected to the portable device **290** through a communication wire so as to exchange data with the portable device **290** in series or in parallel.

Preferably, the communication unit **210** is provided with a digital signal processor (DSP) to perform encoding and decoding on the signals to be transmitted and received and a communication interface for connecting the portable device **290** to an external auxiliary storage device or memory card reader unit **260** for extending storage capability of the portable device **290**.

The pixel information processing unit **220** converts the video information received through the communication unit **210** to an electrical signal appropriate for a display panel and panel driving circuit of the video output unit **230**. That is, the pixel information processing unit **220** is provided with a graphic interface circuit for the video output unit **220**.

The video output unit **230** outputs the video information received from the pixel information processing unit **220** in the form of a visual image. The video output unit **230** can be implemented with a liquid crystal display (LCD) panel or an organic light emitting diode (OLED) panel. Preferably, the video output unit **230** is provided with a display screen larger than that of the portable device **290**.

The touch input detection unit **235** detects a touch input on the display screen and generates position information on the display screen in association of the current image. The touch input detection unit **235** transmits the position information associated with the current image to the portable device **290**.

The touch input detection unit **235** is implemented in the form of a touch-sensitive touchscreen covering the display screen of the video output unit **230**. The tough input detection unit **235** may further include a processor for converting a pressure and voltage sensed on the display screen to the position information.

The key advisor unit **240** extracts compatible key information from the connection establishment response signal and displays the compatible key information on the display screen of the video output unit **230**. The key advisor unit **240** displays a key among the keys provided by the compatible key information, which is matched to the key input through the key input unit **250**, on the display screen of the video output unit **230**.

If a set of keys are selected by through the key input unit **250**, the key advisor unit **240** displays the keys supported by the portable device **290** on the display screen of the video output unit **230**. If a key is input through the key input unit **250**, the key advisor unit **240** matches the key value of the input key to a key value of the corresponding key supported by the portable device **290**.

The key input unit **250** is provided with a plurality of keys for generating input key values.

The memory card reader unit **260** is provided with at least one slot for receiving an external memory card. The memory card reader unit **260** can read from and write to the external memory card. If an access command for specific information stored in the external memory card is received from the portable device **290**, the memory card reader unit **260** reads the information indicated by the access command from the external memory card and transmits the read information to the portable device **290**. On the other hand, if specific information is received from the portable device **290** together with a write command, the memory card reader unit **260** writes the information within the external memory unit. The memory card can be any of Secure Digital (SD) card, Memory Stick (MS), and Compact Flash (CF).

The remote resource access interface according to an embodiment of the present invention can be provided with a microphone and a speaker so as to input and output sound information to and from the portable device **290**.

FIGS. **2***b* to **2***d* are exemplary views illustrating remote resource access interface apparatus according to exemplary embodiments of the present invention.

The apparatus of FIG. **2***b* is provided with a key input unit **272** having a plurality of alphanumeric keys and a video output unit **271** having relatively large screen. Due to the large display screen, this type of remote resource access interface apparatus is useful for text-based applications such as electronic mail (e-mail) reader, electronic dictionary, scheduler, etc.

The apparatus of FIG. **2***c* is provided with a key input unit **282** and **283** having simplified functional keys characterized for gaming and internet surfing. Particularly, this type of apparatus can be appropriate for implementing as a navigator integrated with a hands free functionality by connecting to audio system of a vehicle by means of an auto connection kit.

The apparatus of FIG. **2***d* is provided with a large display screen as of an input/output (IO) unit of a desktop PC so as to be useful for executing data and programs and local area communication. This apparatus is also provided with a memory card reader **294** which allows data backup and expansion of storage capability of the portable device.

Although the remote resource access interface apparatus is exemplary proposed in specific contour as depicted in FIGS. **2***b* to **2***d*, it is obvious to those skilled in the art that the remote resource access interface apparatus of the present invention can be implemented in various configurations.

FIG. **3** is a flowchart illustrating a remote resource access interface method according to an exemplary embodiment of the present invention.

In FIG. **3**, it is assumed that a portable device provides a remote resource access interface apparatus of FIG. **1** with screen resolution information.

Referring to FIG. **3**, after establishing a communication channel with a portable device, the remoter resource access interface device transmits a connection establishment request message to the portable device at step S**310**.

Upon receiving the connection establishment request message is received, the portable device checks a compatibility of the remote resource access interface device and transmits, if the remote resource access interface device is compatible, a connection establishment response message to the remote resource access interface device.

The remote resource access interface device determines whether a connection establishment response message is received from the portable device at step S**320**.

If a connection establishment response message is received, the remote resource access interface apparatus extracts supportable screen resolution and key information from the connection establishment response message at steps S**330** and S**340**.

Next, the remote resource access interface apparatus determines whether a key configuration mode is activated at step S**350** and selects and displays, if the key configuration mode is activated, one of keys supported by the portable device at step S**360**. For example, if the selected key is a dial key, the remote resource access interface apparatus displays the dial key on its display screen.

Next, the remote resource access interface apparatus determines whether a specific key is input while displaying the selected key at step S**379** and matches, if a specific key is input, the key value of the input key to the key value of the selected key at step S**380**.

Next, the remote resource access interface apparatus determines whether a key configuration termination command is input at step S**390**. If no key configuration termination command is input, the remote resource access interface apparatus repeats steps S**360** to S**380**. If a key configuration termination command is input, the remote resource access interface apparatus ends the key configuration procedure and transmits, if a key input is detected, a value corresponding to the key input to the portable device.

Although exemplary embodiments of the present invention have been described in detail hereinabove, it should be clearly understood that many variations and/or modifications of the basic inventive concepts herein taught which may appear to those skilled in the present art will still fall within the spirit and scope of the present invention, as defined in the appended claims.

As described above, the remote resource access interface apparatus of the present invention is provided as an independent input/output device attachable to individual portable devices, whereby the remote resource access interface apparatus improves the portability of multiple portable devices and reduces waste of resources by removing redundant components in both hardware and software. Also, the remote resource access interface apparatus can effectively provide multifunctional interface for portable multimedia devices.

What is claimed is:

1. A remote resource access interface apparatus comprising:

a key input unit having a plurality of keys configured to generate input key values;

a communication unit configured to transmit a connection establishment request message including screen resolution information to a portable device in order to establish a connection and, if compatible, receive a connection establishment response message including supportable key information from the portable device, the communication unit configured to transmit input key information to and receive video information from the portable device after establishing the connection;

a video output unit configured to display the video information in the form of a visual image, wherein the screen resolution information includes information regarding the screen resolutions supported by the video output unit;

a pixel information processing unit configured to convert the video information to pixel signals appropriate for the video output unit; and

a key advisor unit configured to extract the supportable key information from the connection establishment response message and output the supportable key information to the video output unit,

wherein the key advisor unit displays on a display screen of the video output unit, if a key configuration mode is activated, keys of the portable device and is configured to receive corresponding keys through the key input unit, and wherein key values corresponding to the keys of the key input unit match key values of the portable device, and

wherein the video information is video data adjusted in resolution by the portable device for the video output unit on the basis of the screen resolution information, and the input key value is mapped to one of key values indicated by the supportable key information of the portable device.

2. The remote resource access interface apparatus of claim 1, wherein the key advisor unit outputs a key value of the portable device corresponding to an input key to the video output unit.

3. The remote resource access interface apparatus of claim 1, further comprising a memory card reader for receiving a memory card, writing and reading information to and from the memory card, and transmitting, if an access request for reading information stored in the memory card, information read from the memory card to the portable device.

4. The remote resource access interface apparatus of claim 1, further comprising a touch input detection unit for detecting a touch input on a display screen of the video output unit, generating position information of the touch input with reference to a screen resolution of the video output unit, and transmitting the position information to the portable device.

5. The remote resource access interface apparatus of claim 1, wherein the connection establishment response message includes compatibility information for verifying compatibility of the portable device.

6. The remote resource access interface apparatus of claim 1, wherein the communication unit comprises at least one of Bluetooth, wireless fidelity (wi-fi), ZigBee, and wireless broadband (WiBro) modules for wireless communication with the portable device.

7. The remote resource access interface apparatus of claim 1, wherein the communication unit comprises at least one connection module for connecting to the communication unit to the portable device in series or in parallel.

8. The remote resource access interface apparatus of claim 1, wherein the connection establishment request message comprises information on input/output device type in order for the portable device to reconfigure a user interface menu correspondingly.

9. A remote resource access interface apparatus comprising:

a key input unit configured to generate input key values;

a communication unit configured to transmit a connection establishment request message to determine compatibility with a portable device and in order to establish a connection and, if compatible, to receive a connection establishment response message including screen resolution information and supportable key information from the portable device, the communication unit further configured to transmit input key information and to receive video information from the portable device after establishing the connection;

a video output unit configured to display the video information in the form of a visual image, the video output unit having a display screen larger than the portable device, wherein the screen resolution information includes information regarding the screen resolutions supported by the video output unit; and

a key advisor unit configured to extract the supportable key information from the connection establishment response message and output the supportable key information to the video output unit,

wherein the key advisor unit displays on a display screen of the video output unit, if a key configuration mode is activated, keys of the portable device and is configured to receive corresponding keys through the key input unit, and wherein key values corresponding to the keys of the key input unit match key values of the portable device, and

wherein the video information is video data adjusted in resolution by the portable device for the video output unit on the basis of the screen resolution information, and the input key value is mapped to one of key values indicated by the supportable key information of the portable device.

10. A remote resource access interface apparatus comprising:

a key input unit configured to generate input key values;

a communication unit configured to receive a connection establishment request message from a portable device to determine compatibility with the portable device and in order to establish a connection and, if compatible, to transmit a connection establishment response message including screen resolution information and supportable key information to the portable device, the communication unit further configured to transmit input key information and to receive video information from the portable device after establishing the connection;

a video output unit configured to display the video information in the form of a visual image, the video output unit having a display screen larger than the portable device, wherein the screen resolution information includes information regarding the screen resolutions supported by the video output unit; and

a key advisor unit configured to extract the supportable key information from the connection establishment response message and output the supportable key information to the video output unit,

wherein the key advisor unit displays on a display screen of the video output unit, if a key configuration mode is activated, keys of the portable device and is configured to receive corresponding keys through the key input unit, and wherein key values corresponding to the keys of the key input unit match key values of the portable device, and

wherein the video information is video data adjusted in resolution by the portable device for the video output unit on the basis of the screen resolution information, and the input key value is mapped to one of key values indicated by the supportable key information of the portable device.

* * * * *