The invention provides a door handle assembly (2) for a door (4) having a locked door status when locked and an unlocked door status when unlocked. The door handle assembly (2) comprises a door handle body (6) including illumination means (24) operable to provide light of a first colour as a visual indication of the locked door status, to provide light of a second colour as a visual indication of the unlocked door status and to provide light of a third colour as a visual indication of another status.
DOOR HANDLE ASSEMBLY

Technical Field

The invention relates to a door handle assembly. Particularly, but not exclusively, the invention relates to a door handle assembly of a passenger vehicle and is concerned with improving the functionality of vehicle door handles so as to provide convenience for the user.

Background Art

People are spending an increasing amount of time in their vehicles, for example for the purposes of recreation and commuting to and from places of work. As a result of this increased utility, there is a pressing requirement for vehicles to feature increased levels of comfort, convenience and safety.

One aspect of vehicle-related convenience is the vehicle lighting system, which typically includes several points of illumination. For example, light sources are provided on the tailgate of the trunk or boot to illuminate the vehicle registration plate. In addition, one or more light sources may usually be found within the trunk or boot itself in order to illuminate its contents so that items can be located more readily by a user. It is also known to incorporate light sources within the doors of vehicles to perform various functions. For example, conventionally a light source may be positioned in the door frame to be activated when the door is opened. It is also known to illuminate the general area of the door by incorporating a light source into the sill of the door, which is particularly important in poorly lit environments.

Whilst the aforementioned features are convenient, multiple sources of light installed at various points in the vehicle increase the complexity and thus the overall cost of the vehicle lighting system.
It is one aim of the present invention to provide an improvement in the lighting system of a vehicle which is aesthetically pleasing to the user in addition to providing improved convenience.

Disclosure of Invention

To this end, in a first aspect, the invention provides a door handle assembly for a door having a locked door status when locked and an unlocked door status when unlocked, the door handle assembly comprising a door handle body including illumination means operable to provide light of a first colour as a visual indication of the locked door status, to provide light of a second colour as a visual indication of the unlocked door status and to provide light of a third colour as a visual indication of a further status.

Preferably, the illumination means includes a first light source to provide the light of the first colour and a second light source to provide the light of the second colour.

Preferably, the first and second light sources are operable independently from one another and, moreover, when activated it is preferred that the first and second light sources remain activated for a predetermined time period before dimming gradually.

In a preferred embodiment, the first and second light sources are operable to activate substantially simultaneously and, in these circumstances, the colours of the first and the second light sources mix or combine to provide the light of the third colour. Thus, in addition to providing a door lock status indication, the invention provides a door handle assembly that can provide a visual signal indicative of a third function whilst using only two light sources.

Although the invention applies to various types of door, in the preferred embodiments the door handle assembly is designed for mounting upon a door of an automotive vehicle.
Preferably, the first colour is red to provide the visual indication of the locked door status and the second colour is green to provide the visual indication of the unlocked door status. It is preferred that the first and second colours are activated following a door lock activation command from an electronic keyfob. Although light of other colours could be provided, red and green are preferred since a user will recognise these colours intuitively as indicating a door locked/unlocked status.

When mounted to the exterior surface of a door of an automotive vehicle, the first and second light sources may be operable to activate simultaneously and intermittently to provide a visual vehicle direction indicator. Typically, therefore, the aforementioned third colour is amber or orange, being the usual colour of the vehicle direction indicator. It is a particular advantage of the invention that the red and green colours of the first and second light sources combine when activated simultaneously to create the third type of light having an amber or orange colour. This avoids the need for an additional light source which would add complexity to the light system and increase power consumption.

A further advantage is that, in addition to the conventional indicator lights located at the front and rear of the vehicle, and often on the forward flanks or wings of the vehicle, the invention provides an additional direction indicator to improve safety. In certain circumstances, for example, this may afford other road users and pedestrians an improved view of the indicator positions on the vehicle. Moreover, the additional functionality of the direction indicator is provided without requiring the added cost and complexity of a further, amber light source in the door handle assembly as the third light colour is achieved by activating the first and second light sources at the same time.

The invention also enables the conventional flank indicator lamps on small cars to be omitted entirely by relying on the indicator function of the door handle. By omitting the conventional indicator lamps from the wings of the vehicles, a manufacturing step of fabricating the wing with an opening to receive the indicator lamp is avoided.
Additionally, in an aesthetic sense the ‘lines’ of the vehicle are improved since the wing panel is uninterrupted by protruding indicator lamps.

In a preferred embodiment, the door handle assembly includes a door handle body defining a cavity for receiving the illumination means. Still preferably, the door handle body is elongate and the cavity is longitudinally disposed with respect to the door handle body.

The functionality of the door handle assembly may be further extended by means of a further light source incorporated in the door handle body that provides a local area light source to assist the user in low visibility environments.

As an alternative to mounting the door handle assembly on the exterior of the vehicle door, the door handle assembly may be mounted to the interior surface of the vehicle door. Here, the door handle assembly provides a convenience to passengers inside the vehicle who can readily see whether the door is locked or unlocked.

In a second aspect, the invention resides in a vehicle comprising a vehicle door provided with a door handle assembly having a locked door status when locked and an unlocked door status when unlocked. The door handle assembly comprises a door handle body including illumination means operable to provide light of a first colour, light of a second colour and light of a third colour. A door control means receives signals indicative of the door locked status and a vehicle indicator status and activates the illumination means to provide the light of the first colour when the door is locked, the light of the second colour when the door is unlocked and the light of the third colour when the vehicle indicator status indicates the vehicle is turning.

It will be appreciated that preferred and/or optional aspects of the first aspect of the invention may be incorporated in the second aspect of the invention, alone or in appropriate combination.
Brief Description of the Drawings

In order that the invention may be more readily understood, reference will now be made, by way of example only, to the accompanying drawings in which:

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Figure 1 is a perspective view of a door handle assembly according to a first embodiment of the invention;

Figure 2 is an exploded perspective view of the door handle assembly in Figure 1;

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Figure 3 is a block diagram of a door control system for controlling the door handle assembly in Figures 1 and 2;

Figure 4 is an exploded perspective view of a door handle assembly according to an alternative embodiment;

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Figure 5 is a perspective view of a door handle assembly of a further alternative embodiment mounted to the interior of a vehicle door; and

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Figures 6 and 7 are front views of further embodiments of the invention.

Detailed Description of Preferred Embodiments

Figure 1 shows a perspective view of a door handle assembly, shown generally as 2, according to a first embodiment of the invention when mounted to the exterior surface of a door 4 of a passenger vehicle (not shown). For the purpose of the following description only the door handle assembly of one of the vehicle doors will be described in detail. In practice, however, a door handle assembly will be provided on both the left and right sides of the vehicle, and possibly also on both the front and rear quarters of the vehicle.
The door handle assembly 2 comprises a generally elongate door handle body 6 which includes an outer face having a shallow convex curvature along its longitudinal axis relative to the plane of the door 4.

In order to mount the door handle assembly 2 to the door 4, an inward face of the handle body 6 defines first and second mounting feet 8, 10 at either end which lie flat against the door 4. Between its two ends, the door handle body 6 includes a recessed region 12 which, when the door handle assembly 2 is mounted to the door 4, defines a clearance with the door surface that permits a hand of a user to grip the door handle body 6.

Figure 2 shows the door handle assembly 2 in greater detail. In a conventional manner, the door handle body 6 is divided into two body portions. A first body portion defines a moveable handle portion 14 and a second body portion defines a fixed handle portion 20. The moveable handle portion 14 is pivotable away from the door 4 about a pivot member 16 which is attached to the handle body 6 at its first foot 8. The pivot member 16 is embedded within the door interior and is shaped for cooperation with a mounting fixture (not shown) located internally within the door 4. A guide member 18 projects from the moveable handle portion 14 into the interior of the door 4 in the region of the second foot 10, distal from the pivot member 16. The guide member 18 provides a means to guide the pivotal movement of the moveable handle portion 14 about the pivot member 16 and also serves as a stop to limit the maximum permitted movement of the moveable handle portion 14 away from the vehicle door.

The fixed handle portion 20 is located at the other end of the moveable handle portion 14, remote from the first foot 8, and remains against the door surface 4 at all times. The respective cross-sections of the moveable handle portion 14 and the fixed handle portion 20 match to provide a neat profile for the handle body 6 when the door handle assembly 2 is in its closed position, as shown in Figure 2. For reasons of aesthetics, the moveable handle portion 14 is provided with a contoured outward facing surface.
The outward facing surface of the moveable handle portion 14 is provided with an elongate cavity or slot 22 within which illumination means in the form of a light pipe 24 is received. The light pipe 24 is supplied power via an electrical lead 26 connected thereto which extends from the rear of the handle body 6 into the door 4 for connection to a vehicle wiring harness (not shown).

The light pipe 24 is retained in place within the cavity 22 by two clips 25 located one at each end of the light pipe 24. Although not shown in Figure 2, an optional translucent cover may be fitted over the cavity 22 for the purpose of protecting the light pipe 24 from possible damage. The light pipe 24 includes first and second light sources 28, 30 at respective ends of the pipe which are operable in order to provide a visual indication to the user of whether the door 4 is locked or unlocked.

As is shown in Figure 3, the vehicle includes a door control system 100 that provides a means to control the illumination of the light pipe 24 within each door handle assembly 2 of the vehicle. The door control system 100 includes a door control unit 102 that receives control input signals from a door open/close switch 104, an ignition switch 106, a keyfob lock/unlock switch 108, a manual door lock/unlock switch 110, left and right indicator switches 112, 114, and a hazard warning light switch 116. In response to the input signals from the abovementioned switches 104 to 116, the door control unit 102 transmits appropriate control signals 118 to control the operation of the light pipe 24 in each of the door handle assemblies 2, as will be described in further detail below.

When the door lock is activated so as to lock the vehicle door, either by means of the keyfob lock/unlock switch 108 or the manual lock/unlock switch 110, the first light source 28 is activated by the door control unit 102 to provide a red coloured light indicating to the user visually that the door is locked. The first light source 28 is activated for a predetermined period, for example 30 seconds, following locking of the door 4 before being deactivated by gradual dimming. The second light source 30 is not activated in these circumstances. In addition, the first light source 28 is deactivated instantly if the door 4 is unlocked or opened, or if the vehicle is started.
The door control unit 102 activates the second light source 30 when the door lock is activated so as to unlock the door 4 to provide a green coloured light indicating to the user visually that the door 4 is unlocked. In addition, the second light source 30 will be activated when the vehicle is unlocked and when the ignition is turned off and/or the ignition key is removed from the ignition barrel. Once again, the door control unit 102 is configured to activate the second light source 30 for a predetermined time period before being deactivated by gradual dimming although, if the door 4 is opened, the second light source 30 will remain activated. The first light source 28 is not activated alone in circumstances in which the door 4 is unlocked. The light pipe 24 thus provides a visual indication of the locked/unlocked status of the vehicle by activating the first and second light sources 28, 30 separately.

In addition to being activated individually, in an alternative mode of operation the first and second light sources 28, 30 may also be activated substantially simultaneously such that the red and green door status indicating colours combine to create a third, amber light that is suitable for providing a direction indicator for the vehicle. The door control unit 102 is configured to activate both the first and second light sources 28, 30 together and intermittently on either the nearside or offside door handle, respectively, when the left or right indicator control is triggered by a user so as to provide a flashing amber indicator signal.

In a further alternative mode of operation, the first and second light sources 28, 30 on both the nearside and offside door handle assemblies 2 are activated intermittently when the hazard warning light control switch 116 is triggered, or when the vehicle alarm is set, to provide a flashing amber signal.

It is a particular benefit of the invention that the functionality of the door handle illumination means 24 is two-fold due to the first and second light sources 28, 30 being operable independently to provide the door lock/unlock status indication, or operable together to provide the left/right turning status. In certain vehicles, particularly smaller vehicles, this reduces the need for an additional side indicator on
each of the vehicle flanks, hence reducing cost and manufacturing complexity. It is also beneficial that as the lock/unlock status functionality and the left/right status functionality are provided by the same hardware unit, vehicle part count is thus reduced and the electrical wiring required to power and control the unit is simplified.

In addition to the light pipe 24 integrated within the moveable handle portion 14, the handle body 6 is provided with a further light source 34 which is received within a circular opening 32 provided in the fixed handle portion 20. The purpose of the further light source 34 is to provide general area illumination to assist a user in dark environments. The vehicle control system is configured to activate the further light source 34 during circumstances when the vehicle ignition is turned to the off position, the key is removed from the ignition barrel, the door is triggered to unlock and/or when the door is opened. In a similar manner to the first and second light sources 28, 30, the further light source 34 is activated for a predetermined time period before dimming gradually. In addition, the vehicle control system is configured to deactivate the further light source 34 when the door 4 is locked or the vehicle is started. The further light source 34 illuminates the immediate vicinity of the vehicle doorway thus showing up possible hazards to a user, for example kerbs and pools of water. As the further light source 34 forms a part of the same unit as the door lock/unlock status illumination means, once again the electrical wiring is simplified.

Figure 4 shows an alternative embodiment of the invention which is similar to the previously described embodiment such that only the differences will be described here. Where possible, like parts will be denoted with like reference numerals.

In this embodiment, the moveable handle portion 14 of the door handle body 6 comprises a handle chassis 40 to which a handle cover 42 is fixed to define a volume therebetween. It will be appreciated that the handle chassis 40 and the handle cover 42 are illustrated as being spaced apart in Figure 3 although in practice the cover 42 mates with the chassis 40 in a streamlined manner. The handle chassis 40 is provided with two part-circular clips 44, each of which receives a respective end of the light pipe 24, to secure the light pipe 24 to the handle chassis 40. The handle cover 42
closes over the light pipe 24 to secure it within the door handle assembly 2. The handle cover 42 includes an elongate opening or slot 46, the position of which corresponds to the position of the light pipe 24 within the handle chassis 40 so that the light pipe 24 is visible through it.

The end of the handle chassis 40 in the region of the first foot 8 defines an opening 48 through which the electrical lead 26 of the light pipe 24 passes into the interior of the door and, thus, to the electrical wiring harness of the vehicle.

In general, many variations are possible within the inventive concept without departing from the scope of the invention, as defined by the claims. For example, the above arrangements provide a door handle assembly 2 that is mounted on the exterior surface of a vehicle. However, as is shown by Figure 5, the invention is also applicable to a door handle assembly 50 located within the interior of a vehicle, typically within the door recess 52. In the embodiment of Figure 5, the illumination means 24 thus provides a visual indication of the door lock status to the occupants of the vehicle. Since the light source provided by the interior door handle assembly 50 is readily detected by the peripheral vision of an occupant of the vehicle, the occupant can readily determine whether the door 4 is locked or unlocked without being required to look for a conventional vehicle door status indicator, for example the lock/unlock button located on the upper ledge of the door 4. It should be appreciated, however, that the brightness of the illumination means 24 in this embodiment would be modulated appropriately so as not to present a distraction to the driver of the vehicle when the vehicle is in motion.

Although it is a feature of the preferred embodiments that the first and second light sources 28, 30 combine to provide an appropriate colour for a direction indicator light, it will be appreciated that in an alternative embodiment a third light source could also be provided in the light pipe 24 for this purpose.

As has been described, the embodiments of Figures 1, 2 and 4 incorporate a single opening 32 which houses a general area light source 34. However, other
configurations are possible, for example Figure 6 shows a modification of the general area light source 34 in that upper and lower openings 60 are provided in the fixed handle portion 20 to provide a directed source of light. A further modification is shown in Figure 7 in which an elongate opening 62 in the form of a slot or band is provided in the fixed handle portion 20.

Although the embodiments herein are described as using light pipes, it will be appreciated that other light sources may be used, for example incandescent lamps, LEDs and electroluminescent devices.

Furthermore, although the invention is described with reference to door handles of automotive vehicles in particular, it should be appreciated that the invention is also applicable to handles mounted on other types of door – for example, doors covering entrance ways to rooms within a house or office. This is particularly useful where it is desirable to indicate the status of the room to the area external to the door, a W.C. or a photographic darkroom for instance, which could be either locked, unlocked, or out of order. When locked a red light source of the door handle indicates the locked door status, when unlocked a green light source of the door handle indicates the unlocked door status and when the facility is out of order, the red and green light sources are activated together to generate an amber light.
CLAIMS

1. A door handle assembly (2) for a door (4) having a locked door status when locked and an unlocked door status when unlocked, the door handle assembly (2) comprising a door handle body (6) including illumination means (24) operable to provide light of a first colour as a visual indication of the locked door status, to provide light of a second colour as a visual indication of the unlocked door status and to provide light of a third colour as a visual indication of a further status.

2. The door handle assembly (2) of Claim 1, wherein the illumination means (24) includes a first light source (28) to provide the light of a first colour and a second light source (30) to provide the light of a second colour.

3. The door handle assembly (2) of Claim 2, whereby in one mode of operation the first and second light sources (28, 30) are operable to illuminate independently of one another.

4. The door handle assembly (2) of Claim 2 or Claim 3, wherein the door handle assembly (2) is mountable upon a door (4) of an automotive vehicle.

5. The door handle assembly (2) of Claim 4, wherein the door handle assembly (2) is mountable upon the interior surface of the vehicle door (4).

6. The door handle assembly (2) of Claim 4, wherein the door handle assembly (2) is mountable upon the external surface of the vehicle door (4).

7. The door handle assembly (2) of Claim 6, whereby in one mode of operation the first and second light sources (28, 30) are operable to illuminate substantially simultaneously and intermittently to provide a visual vehicle direction indicator.
8. The door handle assembly (2) of any of Claims 1 to 7, wherein the door handle body (6) defines a cavity (22) for receiving the illumination means (24).

9. The door handle assembly (22) of Claim 8, wherein the door handle body (6) is elongate and the cavity (22) is longitudinally disposed with respect to the door handle body (6).

10. The door handle assembly (2) of any of Claims 1 to 9, wherein the door handle body (6) includes a further light source (34) to provide local area lighting.

11. The door handle assembly (2) of Claim 10, wherein the further light source (34) is provided in a second cavity (32) provided in the door handle body (6).

12. The door handle assembly (2) of Claim 2 or Claim 3, wherein the first and second light sources (28, 30) are operable to illuminate substantially simultaneously to display the light of the third colour.

13. A door handle assembly (2) as described herein with reference to or as illustrated in any of Figures 1 to 7.

14. A vehicle comprising a vehicle door (4) provided with a door handle assembly (2) having a locked door status when locked and an unlocked door status when unlocked, the door handle assembly (2) comprising a door handle body (6) including illumination means (24) operable to provide light of a first colour, light of a second colour and light of a third colour, the vehicle further comprising a door control means (102) for receiving signals indicative of the door locked status and a vehicle indicator status and for activating the illumination means (24) to provide the light of the first colour when the door is locked, the light of the second colour when the door is unlocked and the
light of the third colour when the vehicle indicator status indicates the vehicle is turning.
Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

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Field of Search:
Search of GB, EP, WO & US patent documents classified in the following areas of the UKC$^X$:

- E2A

Worldwide search of patent documents classified in the following areas of the IPC$^{07}$:

- E05B

The following online and other databases have been used in the preparation of this search report:

- EPODOC, WPI