Patents Act 1977 **Opinion Number** **03/19**

OPINION UNDER SECTION 74A

Patent	GB 2506885 B
Proprietor(s)	Dale Read
Exclusive Licensee	
Requester	Wynne-Jones IP Ltd
Observer(s)	Saunders & Dolleymore LLP
Date Opinion issued	06 June 2019

The Request

1. The comptroller has been requested to issue an opinion as to whether UK Patent GB2506885 B is invalid for either lack of novelty or lack of an inventive step according to Section 1(1)(a) and 1(1)(b) of the Act. The Patent was filed on 10 October 2012, first published on 16 April 2014 and granted on 12 April 2017. The Requestor provided four documents as evidence of the prior art :

D1 *GB 2279791 A (published 11 January 1995);*
D2 *WO 2013/009473 A2 (published 17 January 2013, filed 27 June 2012);*
D3 *US 2005/0023858 A1 (published 3 February 2005);*
D4 *US 2002/0196131 A1 (published 26 December 2002).*

Allowance of the Request

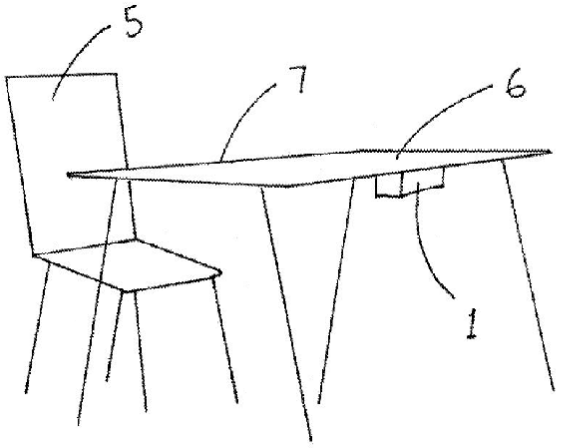
2. The document D2 was published after the filing date of the Patent and thus cannot be part of the prior art when considering inventive step. I decline to reach an opinion on invalidity through lack of inventive step involving document D2. I am however able to consider D2 with regarding invalidity though lack of novelty according to Section 2(3) of the Act.

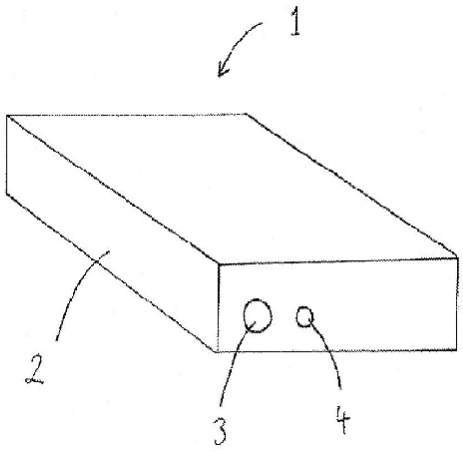
Observations

3. One set of observations were received, but no subsequent observations in reply. The Observations substantially focused on the novelty and inventiveness of claim 1 only, commenting on documents D1, D2 and D3.

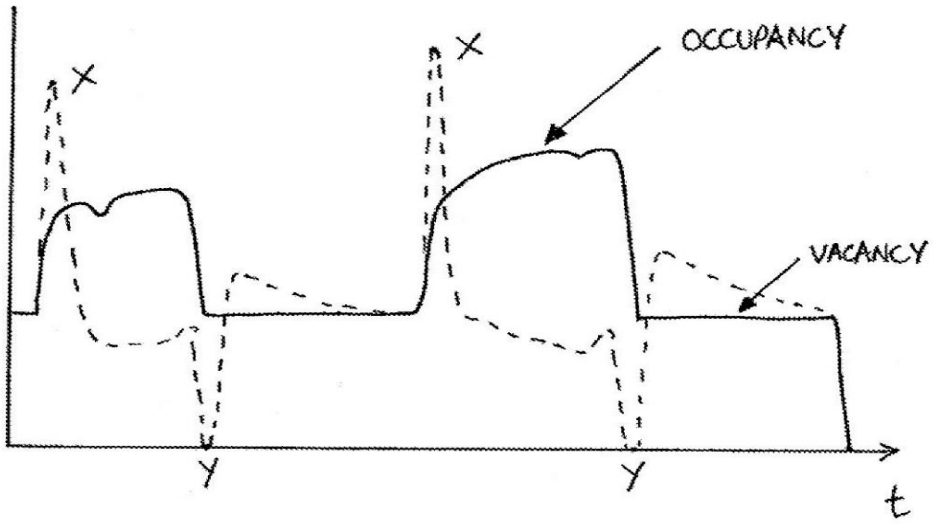
The Patent

4. The invention of claim 1 is an occupancy sensor that uses a combination of signals received from at least two sensors, a PIR movement sensor and a IR 'warm body' presence sensor. The embodiments describe sensing if a living person is occupying a space viewed by the sensor, for example if a person is at a workstation, such as next to a desk. Figures 1 and 2 are reproduced below showing occupancy sensor 1, having openings 3, 4 for the two sensors in a housing 2. The sensor 1 may be arranged to monitor a desk so it's field of view is below the desktop 6 and towards a potential occupant beyond the edge of the desk 7, with the openings of the housing facing the chair 5. Claim 16 is an automated occupancy monitoring system where one or more claimed sensors are in wireless communication with a data gathering unit. An example use of this system is for providing data to aid optimisation of office space usage, with the advantage of the data being collected by a low cost, reliable automated system, rather than by manual surveys.





5. Example signals from each sensor are plotted against time in figure 3 below. The dashed line is the PIR signal with X marking *'in events'* and Y *'out events'* representing a person approaching or moving away from the monitored location. The solid line is *'the trace from an IR sensor'*.



The description states that the positive 'approaching' PIR signal and raised IR signal, individually can be said to be "*indicating an occupied state"*, but when considered in

combination they give *"confirmation of an occupied or unoccupied state"* according to the scheme on page 5 :

> *IR values at or below ambient indicate the absence of a warm body. These taken in combination with a negative PIR value will confirm an UNOCCUPIED state.*
> *Conversely, IR values above ambient indicate the presence of a warm body. These taken in combination with a positive PIR value will confirm an OCCUPIED state.*

There is very little other detail of how the sensors work, or what circuitry may be used to give the signal in the plot. There is reference to possible use of a control microprocessor able to combine the signal data and I note a further mention on page 4 of the following:

> *Under the control of software, an automated occupancy monitoring system, which incorporates the occupancy sensor, may be configured to "learn" changing conditions sensed by the IR sensor (and the PIR sensor) to confirm an OCCUPIED or UNOCCUPIED state.*

but there is no detail at all as to what "learn" means or how it might be done.

Validity regarding Novelty and Inventive step – The Law

6. Section 1(1) of the Act reads:

> *A patent may be granted only for an invention in respect of the following conditions are satisfied, that is to say –*
> *(a) the invention is new;*
> *(b) it involves an inventive step…*

Sections 2(1), 2(2) and 2(3) of the Patents Act 1977 relate to novelty and state:

> *2(1) An invention shall be taken to be new if it does not form part of the state of the art.*
>
> *2(2)The state of the art in the case of an invention shall be taken to comprise all matter (whether a product, a process, information about either, or anything else) which has at any time before the priority date of that invention been made available to the public (whether in the United Kingdom or elsewhere) by written or oral description, by use or in any other way.*
>
> *2(3) The state of the art in the case of an invention to which an application for a patent or a patent relates shall be taken also to comprise matter contained in an application for another patent which was published on or after the priority date of that invention, if the following conditions are satisfied, that is to say -*
>
> > *(a) that matter was contained in the application for that other patent both as filed and as published; and*
> > *(b) the priority date of that matter is earlier than that of the invention.*

Section 3 of the Patents Act 1977 relates to inventive step :

> *3 An invention shall be taken to involve an inventive step if it is not obvious to a person skilled in the art, having regard to any matter which forms part of the state of the art by virtue only of section 2(2) above (and disregarding section 2(3) above).*

7. To determine whether or not an invention defined in a particular claim is inventive over the prior art, I will rely on the principles established in *Pozzoli SPA v BDMO SA [2007] EWCA Civ 588*, in which the well-known Windsurfing steps were reformulated:

> *(1)(a) Identify the notional "person skilled in the art";*
> *(1)(b) Identify the relevant common general knowledge of that person;*
> *(2) Identify the inventive concept of the claim in question or if that cannot readily be done, construe it;*
> *(3) Identify what, if any, differences exist between the matter cited as forming part of the "state of the art" and the inventive concept of the claim or the claim as construed;*
> *(4) Viewed without any knowledge of the alleged invention as claimed, determine whether those differences constitute steps which would have been obvious to the person skilled in the art.*

Claim construction

8. Before considering the novelty and inventive step issues raised in the request, I need to construe the claims of the patent – that is to say, I must interpret them in the light of the description and drawings as instructed by Section 125(1) :

> *125(1) For the purposes of this Act an invention for a patent for which an application has been made or for which a patent has been granted shall, unless the context otherwise requires, be taken to be that specified in a claim of the specification of the application or patent, as the case may be, as interpreted by the description and any drawings contained in that specification, and the extent of the protection conferred by a patent or application for a patent shall be determined accordingly.*

In doing so, I must interpret the claims in context through the eyes of the person skilled in the art. Ultimately, the question is what the person skilled in the art would have understood the patentee to be using the language of the claims to mean. This approach has been confirmed in the recent decisions of the High Court in *Generics UK Ltd (t/a Mylan) v Yeda Research and Dev. Co. Ltd & Anor [2017] EWHC 2629 (Pat)* and the Court of Appeal in *Actavis Group & Ors v ICOS Corp & Eli Lilly & Co. [2017] EWCA Civ 1671*.

9. The patent under review contains a single main independent claim 1 and a set of dependant claims 2 to 15 to a sensor. Final claim 16 being to a wireless system using the previously claimed sensor. Claim 1 reads as follows :

> *1. An occupancy sensor comprising a passive infrared sensor (PIR sensor)*

for detecting movement and an infrared sensor (IR sensor) for detecting the presence of warm bodies, the occupancy sensor being configured to confirm occupancy or non-occupancy in dependence on signals measured by both the PIR sensor and the IR sensor, wherein the confirmation of occupancy or non-occupancy occurs only when measurements taken from both the PIR sensor and the IR sensor are combined with one another.

10. I think the term *'occupancy sensor'* is straightforward to construe, meaning, a sensor able to monitor a location and discriminate between vacancy and occupation by a movable object, and suitable for use where the object is a human.

11. The first question I have to answer is how broadly should the two sensors, PIR and IR, each be construed ? That is, what range of functionality or limiting requirements are meant by the patentee. I think the skilled reader, given the description, will understand implicitly that the sensors are intended to respond to IR sensed in a field of view. They will have difficulty however understanding what the PIR is expected to do and how it is meant to differ from the IR sensor. I think it would be clear to the skilled reader that they are meant to at least differ somehow.

12. I note the example PIR device mentioned on page 4 (Murata IRS-B210ST01) is a three pin, two element pyro-electric device suitable for motion detection. The example IR sensor given (GE ZTP-135SR) is a thermopile packaged along with a compensation thermistor, with an individual pair of pins for each element, and suitable for temperature measurement. It could be said that both of these are 'passive' IR devices in the sense that they only observe ambient IR of a scene and do not rely on actively producing any IR.

13. The particular embodiment shows the PIR is intended to produce a signal representing when the sensed IR level changes due to movement, rather than a signal simply proportional to the IR level. The plot of figure 3 gives an output signal showing a pulse like shape. There is no detailed disclosure of the instrumentation circuitry used with the PIR, or with the IR sensor for that matter. I think the skilled reader will understand that the PIR may include some circuitry at least.

14. It is well known in the art for a common type of PIR motion sensor to comprise two pyro-electric elements effectively connected with opposite polarity to give a differential output such that if both elements see the "same amount of IR" in terms of their response, they cancel out to give a null output, Whereas if a first element sees more IR than the second a positive signal is produced or conversely if the second sees more IR that the first, a negative signal is produced. The example PIR sensor from page 4 appears to be such a device.

15. In use such PIRs often have the two elements behind a complex lens to provide each element with one of two patterns of sensitivity which can be interleaved across the angle of view and depth of focus into the view. There appears to be no such complex lens specified with the example PIR sensor above, and I can't find mention of this in the patent.

16. The sensors' function is described on page 3 as

The PIR sensor detects movement only. It does not detect presence. The IR

sensor measures temperature but does not detect people. It is the unique combination of sensors in the occupancy sensor which, with the correct processing, detects occupancy.

This passage, on the face of it, may seem a little contradictory to what follows on page 4, but I think the skilled reader would not put much weight on "does not detect presence" as movement does imply something is present and is moving. Similarly, I think they would not give weight to "does not detect people", instead understanding that the temperature of people is detectable. Page 4 describes the signals a little more in passages explaining how they are combined :

High positive values sensed by the PIR sensor indicate a person approaching the occupancy sensor (indicating an OCCUPIED state) whilst high negative values indicate a person moving away from the occupancy sensor (indicating an UNOCCUPIED state).

The IR sensor is arranged to sense the presence (or absence) of warm bodies. When there is no warm body occupying the area covered by the IR sensor, the IR sensor will only sense (i.e. will only "see") the ambient conditions (indicating an UNOCCUPIED state). When there is a warm body occupying the area covered by the IR sensor, the IR levels sensed by the IR sensor will be above those sensed under ambient conditions (i.e. the IR sensor will "see" the warm body -indicating an OCCUPIED state).

17. I think the skilled addressee will understand, given all of the above, that the IR sensor is at least required to produce a signal that represents the temperature of the current viewed IR field. Other than that, there seems to be little limitation on the particular type of sensor. The sensor must respond to IR and is not a contact type of temperature sensor.

18. Whilst less clear, I think the skilled reader would understand the PIR sensor is meant to be construed more narrowly and, whilst not explicitly disclosed, I conclude it is implicitly required to be the type that can provide a differential signal from its constituent elements. Thus, the PIR is not a single IR sensitive element. However, of itself I do not construe *"a passive infrared sensor (PIR sensor) for detecting movement"* as particularly limiting the nature of the output signal from the sensor. I don't think there are limits to any signal modification or processing from occurring. The only limitation is that this output should be in response to motion in the field of view.

19. The next question in construing claim 1 is what meaning should be placed on the phrase *"configured to confirm occupancy or non-occupancy"*? To my mind, this must be construed broadly as the claim does not specify any particular application, location etc.

20. The final question is what is meant by *"the confirmation of occupancy or non-occupancy occurs only when measurements taken from both the PIR sensor and the IR sensor are combined with one another"*? Again, I think this must be construed broadly, and that any method of combination may be used as long as it does provide the required discrimination. What clearly isn't meant is a system that will respond to either sensor independent of what signal the other sensor provides.

The Prior Art

21. I shall now consider the arguments raised from D1, D2 and D3 in turn with regard to both the novelty and obviousness of claim 1. Only if it is my opinion that claim 1 lacks novelty or is obvious, shall I continue to consider the dependant claims 2 to 16. D4 was raised regarding the dependant claims and was not used to argue against claim 1 either as a single piece of prior art or in combination with the other documents raised. D4 is broadly similar to D3 and as will become apparent below, I will not need to discuss it in detail.

D1. GB 2279791 A – claim 1

22. Document D1 shows an intruder alarm type of motion detector that may use IR sensors or ultrasonic Doppler sensors or a combination of both. It aims to reduce false alarms by adapting the discrimination thresholds according to the background or ambient conditions of the monitored area. A preferred embodiment of a composite PIR and ultrasonic detector is shown by figure 1, reproduced below, with a PIR detector 2 behind a faceted Fresnel lens 3 and ultrasonic transducers 5, 6 combined with ultrasonic horns 4; The PCB 7 is shown with thermistor 8 responding to the enclosure temperature:

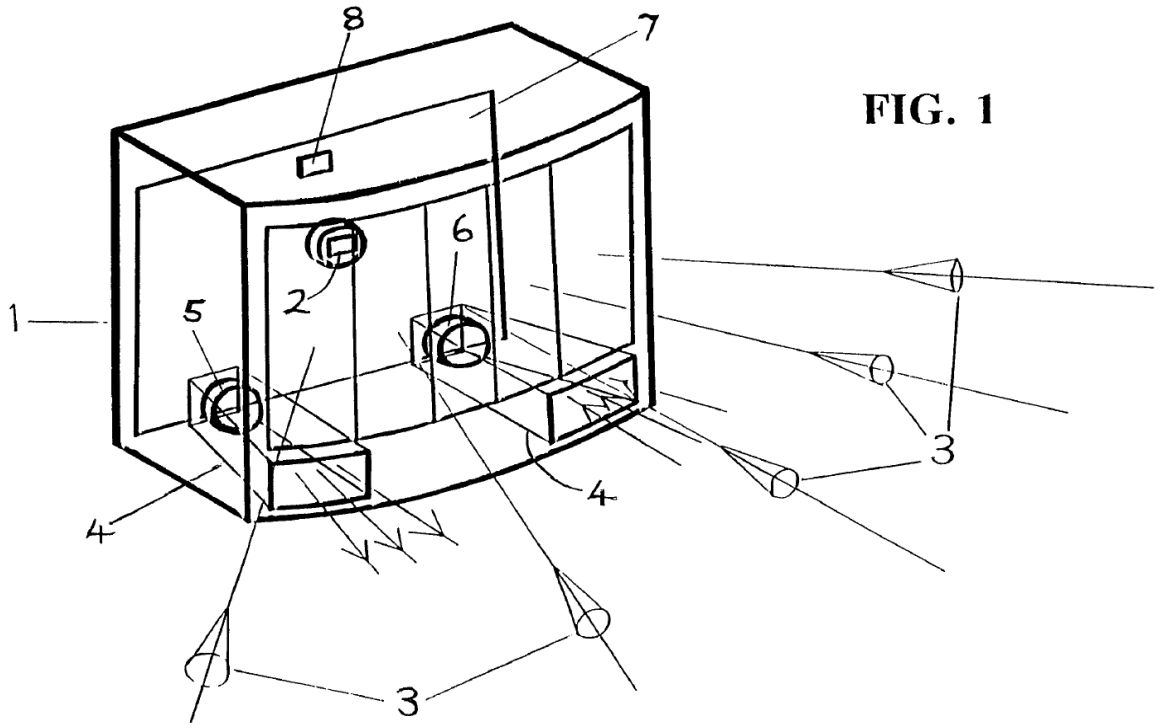


FIG. 1

23. The requestor notes pages 2, 5, 14 and in particular focusses on pages 6 to 7 which describe an IR only motion detection system that senses first and second conditions where the follow passage is highlighted :

> *"The first condition may be the direction or location of an infra-red source within a field of view, or the change in amount of infra-red radiation received*

by a sensor from a field of view, and such may be sensed by a pyroelectric sensor, as in the prior art systems described above. In this case the second condition could be a reference or background temperature, for example the temperature inside the enclosure of the sensor, so that both conditions could be considered to be related to temperature or heat.
Conveniently, sensing of the temperature of the enclosure can be effected using a thermistor, and a corresponding analogue or digital value input to subsequent circuitry to adjust an effective threshold value above which alarm events may be registered. A possible alternative is to sense the average temperature of the viewed field. This could be done using a separate sensor, or by processing the output of the same sensor over a time which is significantly longer than that corresponding to the frequency band representing the moving objects - however, with the pyroelectric type of sensor, which responds to temperature changes, it might be necessary to employ some mechanism such as a shutter to obtain a meaningful output."

24. The requestor refers to page 2 as describing the prior art use of a PIR detector, noting :

> *"One type of intruder detection system employs an infra-red sensor. This may be in the form of two pyroelectric elements connected together with opposed polarity, responsive to changes in the intensity of infra-red radiation at about 10 microns. Radiation is focused from the monitored field, for example by a plastics Fresnel lens with multiple facets, …"*

Whilst not specifically referenced by the requestor, I note that in the particular embodiment on page 11 of D1, the preferred "pyroelectric type of sensor" used is described specifically as a PIR :

> *The PIR sensor included a pyroelectric sensor (LHI958) at a fixed or variable focal position relative to a faceted lens. The output of the PIR sensor was fed to a differentiating ("flat response") amplifier with a bandpass of 0.2 to 7 Hz, with a peak gain of +2000 at 10 Hz.*

25. The requestor argues that the first and second sensed conditions can be understood as equivalent to the function of the *"infrared sensor (PIR sensor) for detecting movement"* and *"infrared sensor (IR sensor) for detecting the presence of warm bodies"* of claim 1.

26. The Observer argues that pages 6 and 7 do not go that far, instead they argue that three arrangements are disclosed. In each arrangement, the first condition is determined by using a pyroelectric sensor viewing the monitored area. The second condition however varies in each arrangement : 1). A thermistor located within the device enclosure for sensing the enclosure temperature; 2). The same (first) pyroelectric sensor also used to determine the average temperature of the viewed field, possibly using a shutter; 3). A second pyroelectric sensor used to determine average temperature of the viewed field. The Observer's argument concludes that the sensors of claim 1 are not disclosed and *"there is no sensor but a pyroelectric sensor referenced"*.

27. I do not wholly agree with either of these submissions. I do think that a PIR sensor

disclosed that will detect movement by producing a differential IR response signal as claim 1 requires. I don't think however that there is clear disclosure of using a second separate IR sensor. The passage over pages 6 and 7 above, does disclose trying to use the same PIR but with the addition of a shutter to somehow gain the average temperature of the field of view. The passage also refers to getting this average measure stating, "*This could be done using a separate sensor".* It is not made clear what this sensor might be; I do not think the skilled reader would understand this must mean a second IR sensor of some kind.

28. It is my opinion that the two sensors required by claim 1 are not disclosed by D1 and thus D1 does not show that claim 1 lacks novelty.

29. To assess inventive step, I need to consider who the skilled addressee is and what their common general knowledge encompasses. They will be able to manufacture motion or occupancy detectors and will have knowledge of common electronic sensors and the associated basic circuitry knowledge. They will be able to assemble and set-up the sensor elements and the overall detector according to requirements.

30. I have above described the main difference between the invention of claim 1 and the D1 disclosure: there is no clear disclosure of the IR sensor. There is however disclosure of a PIR sensor used with a further temperature sensor such that signals from both are used when determining motion in the field of view.

31. Whilst the skilled reader is not told what the "*separate sensor*" is, they are directed to try to use a separate sensor for determining the average temperature of the field of view. Given the common general knowledge of IR sensors for remotely sensing temperature and their potential use in motion or occupancy sensors, an IR sensor equivalent to that of claim 1 would be obvious to try for the "*separate sensor*".

32. The next question is, does it follow that D1 then teaches the skilled reader towards making an "*occupancy sensor*" and one *"wherein the confirmation of occupancy or non-occupancy occurs only when measurements taken from both the PIR sensor and the IR sensor are combined with one another"* .

33. The sensor of D1 is described as a movement detector which inherently will detect if a space is, if only briefly, newly occupied by a warm body. Where the second condition is the average temperature of the field of view, this is used as a measure of the ambient background. A change in ambient temperature adjusts the threshold above which a movement signal from the PIR will be considered valid. Thus, D1 does use the measured signals from two sensors in combination to detect motion and thus necessarily this is also an occupancy sensor using PIR and IR sensors in combination.

34. I conclude that an obvious modification of D1, given the common general knowledge, results in the invention of claim 1 lacking an inventive step.

D2. WO 2013/ 009473 A2 – Claim 1

35. D2 shows a people counting system to determine the number of people who have passed through an EAS gate which may be placed at the entrance of a shop. The

system preferably determines the direction thought the gate the person has travelled, i.e. is the person entering or leaving the shop. The D2 system uses at least two detectors and preferably three, such that both direction and discrimination between a person and a shopping cart can be made; thus, a single person pushing a cart can be counted as one person, to avoid the cart erroneously being counted as a person. At least one detector is a PIR viewing a first location, the second may be either a second PIR viewing a different location spaced apart along the direction of travel, or a IR multi-beam-break sensor located near the ground. A pair of PIRs can together give direction of travel of a person and the low IR beam breaking sensor is used with one or both PIRs to discriminate shopping cart wheels from feet.

36. The requestor particularly references page 6 of D2 which reads

> *The EAS system combines traditional EAS detection capability with passive infrared detectors ("PIR") and infrared sensor arrays located near the floor on the base of the EAS pedestals to detect the movement of an object passing through the interrogation zone and to determine whether the object is a person or wheeled-object.*

and they simply state that this shows claim 1 lacks novelty. The requestor does not make it clear which sensors in D2 they consider is equivalent to each of the claimed sensors of claim 1.

37. The Observer makes the case that the PIR sensors and multi-beam-break sensor are all sensing movement, and that none are acting to “detect the presence of warm bodies”.

38. I consider that the multi-beam-break sensor is not responding to any temperature related IR change, merely the blocking of a directional beam and I agree that it does not discriminate between a warm or a cool body. The PIR sensors both act as movement sensors according to temperature induced IR changes. I do not think the skilled reader would expect the PIRs to provide a steady IR signal, representing a temperature measure. Thus, D2 does show a PIR movement sensor, but not in combination with an IR sensor representing the temperature of the field of view.

39. It is my opinion that D2 does not disclose the invention of claim 1 and does not cause the claim to lack novelty. I do not need to consider inventive step.

D3. US 2005/ 0023858 A1 – Claim 1

40. D3 discloses an occupancy detector for enclosed compartment of a vehicle, such as ‘the trunk space’, which is a luggage compartment of a car (generally known as ‘the boot’ in the UK). In particular, the detector is sensitive to a warm body, such as an animal or child, and a safety system may then be automatically triggered to, for example, allow a compartment door to unlatch or open, so the animal or child is not dangerously trapped.

41. The Requestor notes the system block schematic of figure 6 and paragraphs 82 and 89. Paragraph 82 specifically refers to figure 6 and is reproduced below with the requestors highlighted passages in bold :

Referring now to FIG. 6, control circuit 48 may also activate illumination source 46 and/or 82 in response to additional activating events, such as an ignition switch 62 of vehicle 20 being activated, a door sensor 64 signaling that a door of vehicle 20 is being opened or closed or other functions of vehicle 20 which pertain to the entering or leaving of vehicle 20 or movement of the vehicle. ***Safety release assembly 10 may further include one or more occupant sensors 65, such as a motion detector or sensor 66 (such as a pyro detector, and preferably a low current pyro detector*** *as are disclosed in commonly assigned U.S. patent application Ser. No. 08/901,929, filed Jul. 27, 1997 by Gimtong Teowee et al. of Donnelly Corporation entitled PYROELECTRIC INTRUSION DETECTION IN MOTOR VEHICLES, now U.S. Pat.No. 6,166,625)* ***and/or a temperature sensor 68, such as a bolometer, within trunk space 18, so as to provide a signal to control circuit 48 when a movement or predetermined temperature of an object in trunk space 18 is detected.*** *The occupant sensor 65 may be of the type disclosed in commonly assigned U.S. patent application Ser. No. 09/484,754, filed Jan. 18, 2000 by McCarthy et al. for COMPARTMENT SENSING SYSTEM, now U.S. Pat. No. 6,480,103, U.S. Provisional Application, Ser. No. 60/135,393, filed May 21, 1999 by McCarthy et al. for COMPARTMENT SENSING SYSTEM, and in EPC Application No. 00650023.5, filed Mar. 23, 2000 by Bingle et al. for SAFETY SYSTEM FOR A CLOSED COMPARTMENT OF A VEHICLE, the disclosures of which are hereby incorporated herein by reference. Safety release assembly 10 may also comprise a handle sensor 70 which detects contact with or movement of handle 12 to provide an additional signal to control circuit 48.Handle sensor 70 may be a push button or a motion detector at handle 12, or may be a touch pad at a surface of handle 12, which senses contact of handle 12. The touch pad may be temperature sensitive, so as to be capable of discriminating between the touch of a person and contact of the handle by an item stored within trunk space 18. The touch pad or soft touch surface of handle 12 may detect and discriminate human touch from other items via capacitive, resistive or inductive activation and control 48 may then activate the illumination source 46 and/or 82 and/or the assist mechanism 84 in response to such discrimination.*

The requestor notes occupant sensors 65 may include a first sensor 66 which is for sensing movement and may comprise a “pyro detector” and/or a temperature sensor 68, such as a bolometer. I note that figure 6 shows sensors 66 and 68 as discrete blocks both sending signals to a control. Paragraph 89 is also referred to, though I note this is part of the description that refers instead to figure 7. I it reproduced below with their highlighted passages again in bold :

Release module 110 may alternately, or additionally, include occupancy detection system 165, which is passively operable to detect a presence of a person or animal within the trunk of the vehicle. ***Occupancy detection system 165 is preferably similar to detection sensors 65 discussed above, and comprises a thermal sensor, such as a pyro detector, and/or a motion detector. The sensor or sensors are preferably operable to continuously monitor the trunk space of the vehicle.*** *If an occupant is detected, actuating device 184 is then actuated to automatically*

actuate release mechanism 14 to open the trunk of the vehicle. As discussed above with respect to actuating device 84, actuating device 184 may be operable to actuate release mechanism 14 only after it is determined that the vehicle is not moving. It is further envisioned that the occupancy detection system may be operable in a sentinel mode, whereby the sensors monitor the compartment and control 148 is operable to activate an illumination source or an audio device, such as a voice chip, to issue exit instructions, in response to an initial detection of an occupant. Upon further confirming detection of an occupant and/or in response to subsequent input to manual input device 112, actuating device 184 may then function to activate release mechanism 184.

42. The requestor asserts, based in particular on these passages and figure 6 , that claim 1 lacks novelty and an inventive step. I note they do not comment in detail as to how the disclosure is equivalent to the combining of signals from both PIR and IR sensors as claim 1 requires.

43. The Observer notes the line from paragraph 82 (which is underlined above) which says *"when a movement or predetermined temperature"* and that a separate consideration is made of movement, possibly from a pyro detector, and temperature, possibly from a bolometer. They argue that paragraph 82 does not disclose a determination based on signals from both of the sensors. The Observer goes on to say that following paragraphs 83 and 84 reinforce this. I reproduce the passages they highlight below, indicating in bold the further use 'or' the observer identifies :

> [from paragraph 83] *…Control circuit 48 may then, in response to a signal from the motion detector 66, the temperature sensor 68,* ***or*** *the handle sensor 70, activate illumination source 46 and/or 82 to provide illumination of handle 12 in trunk space 18 or may activate assist or actuating device 84. …*
>
> [from paragraph 84] *… The control 48 may be otherwise operable to initially activate illumination source 46 and/or 82 upon a first activating event, as discussed above, and delay activation of assist device 84 until the smart release occupant sensors confirm that an occupant is within the trunk space of the vehicle. For example, control 48 may delay actuation of assist device 84 until two or more movements are detected within the trunk space* ***or*** *until a threshold temperature is measured over a prolonged period of time. …*

The Observer also asserts that the two sensors as claimed are not disclosed.

44. Considering paragraphs 82 to 89 and figures 6 and 7, I think the skilled reader would understand the control logic of D3 to operate to respond to any individual sensor to trigger the occupancy detection. Further the skilled reader is not told that signals from separate sensors should be considered in combination to trigger the detection. To that extent I agree with the observer. I disagree however that the sensors of claim 1 are not shown. I think the skilled reader would understand that the motion detector may be a PIR device and that it would act as claim 1 requires. Further, they would understand the bolometer to act to detect the IR emitted from trapped warm bodies and thus is equivalent to the IR detector of claim 1. I therefore disagree with the observer that the individual sensors of claim 1 are not disclosed, I find they are.

45. It is my opinion that D3 does not disclose all of the features of claim 1 and thus claim 1 is novel in the light of D3.

46. Regarding inventive step, the difference I find is that sensors act independently in D3, but are combined to act together in claim 1. Taking in to account the common general knowledge of the skilled reader, D3 makes a clear teaching that independent sensors are used. Further D3 does not seem to directly raise issues of false alarms or possible ambiguities in the sensor signals. I think that the skilled reader would realise that sensor signals can be erroneous and that they will need to calibrate the control to allow sufficient discrimination, especially as the truck space environment and specific sensor outputs may significantly vary. I do not consider this need would lead to the skilled reader combining a motion sensor and a temperature signal; D3 rather seems to teach away from doing this.

47. It is my opinion that D3 does not render claim 1 obvious, rather the claim does have an inventive step.

Dependant claims 2 to 16.

48. As claim 1 lacks an inventive step given D1, I will now consider if any of the dependant claims also lack novelty or are obvious. Effectively the requestor's argument uses document D1 as the primary piece of prior art. The requestor has commented in detail on the dependant claims, though sometimes they merely highlight relevant passages from the prior art. The observer does not specifically comment on the novelty or obviousness of the individual dependant claims, nor do they comment on document D4. The dependant claims are :

> *2. An occupancy sensor as claimed in Claim 1, wherein an ambient temperature sensor is further provided.*
>
> *3. An occupancy sensor as claimed in Claim 2 wherein the occupancy sensor is configured to deduct a value sensed by the ambient temperature sensor from a value sensed by the IR sensor.*
>
> *4. An occupancy sensor as claimed in any preceding claim, which comprises one or more batteries as the only power source.*
> *5. An occupancy sensor as claimed in any preceding claim, which comprises wireless communication means, which are arranged such that the occupancy sensor may transmit a signal regarding occupancy to a remote device.*
>
> *6. An occupancy sensor as claimed in any preceding claim comprising a microprocessor, which is arranged to run a software package for controlling the operation of the occupancy sensor.*
>
> *7. An occupancy sensor as claimed in any preceding claim, wherein the occupancy sensor is configured such that it is ordinarily switched off, switching on intermittently for a predetermined period of time, which is shorter than the intermittent period during which it is switched off, to monitor the signals sensed by the sensors.*

8. An occupancy sensor as claimed in Claim 7, wherein the occupancy sensor is configured to switch on for 2-3 milliseconds per second.

9. An occupancy sensor as claimed in any of Claims 6 to 8, wherein, under control of the software, the occupancy sensor is configured to process the information received from the sensors to confirm occupancy or non-occupancy.

10. An occupancy sensor as claimed in any of Claims 6 to 9 when dependent on Claim 6, wherein the occupancy sensor is configured to wirelessly transmit a signal regarding occupancy only when it is determined by the software that the occupancy state has changed.

11. An occupancy sensor as claimed in any preceding claim, wherein the IR sensor and PIR sensor face in the same direction.

12. An occupancy sensor as claimed in any of Claims 2 to 11, wherein the ambient temperature sensor comprises a thermistor.

13. An occupancy sensor as claimed in any preceding claim, wherein all of the components are housed together in a self-contained housing.

14. An occupancy sensor as claimed in any preceding claim in combination with a desk, the occupancy sensor being arranged under the surface of the desk with the PIR and IR sensors facing in the direction of a user sitting at the desk.

15. An occupancy sensor as claimed in Claim 14, wherein the IR sensor is configured such that its field of view is below the desk surface out beyond the rear edge of the desk surface, in a direction of the user, by a predetermined distance.

16. An automated occupancy monitoring system comprising one or more occupancy sensors as claimed in any preceding claim and at least one data gathering unit, the data gathering unit and the occupancy sensor being arranged to be in wireless communication with one another.

49. **Claims 2, 3 and 12** introduce a third sensor along with the PIR and IR sensors of claim 1. Claim 2 specifies an ambient temperature sensor, with no detail of what type of sensor it is, with claim 12 saying it is a thermistor. Claim 3 additional states how values from this third sensor are combined with those from the IR sensor. The requestor notes that page 7 of D1 : *"In this case the second condition could be a reference or background temperature…."* and *"Sensing of the temperature of the enclosure can be effected using a thermistor, and a corresponding analogue or digital value input to subsequent circuitry to adjust an effective threshold value above which alarm events may be registered."*. I do not find these passages help. In finding claim 1 obvious I have taken the second condition in D1 to be an obvious IR sensor, instead of the thermistor, not in addition to it. There is no disclosure of three temperature sensitive sensors, nor do I think it obvious to use the thermistor of D1 in addition as D1 describes this as an alternative option. The requestor also talks

about how D3 and D4 disclose adding further sensors and quotes this passage :

> *Additional occupant detectors are suitably used to augment the thermal sensor in order to reduce false trigger events, or alternatively replace the thermal sensor as the system occupant detector and serve as a stand-alone occupant detector, or serve as the primary occupant detector and with a pyrodetector to augment it in order to reduce false trigger occurrences.*

I am not persuaded that this is of any help. Neither document was found to show claim 1 lacked novelty or inventive step, and I don't think the skilled reader of D1 would look to select D3 or D4 to be read along with D1. The requestor does not seem to assert that this passage reflects the common general knowledge. I do think that in general, the reader of D1 is told that using multiple sensors can reduce false alarms. A problem with D1 is that the second sensor (second condition) of D1 is actually doing a job similar to that of the third sensor of these claims, so the skilled reader is directed away from using a third sensor for the task already done by the second. It is my opinion that claim 2 has an inventive step over D1 and the common general knowledge. It follows that claims 3 and 12 also have an inventive step over D1.

50. **Claim 4** is about using battery power. The requestor argues that battery use is common general knowledge and further refers to battery use in document D2. Whilst document D2 is not persuasive, I agree that it is likely common general knowledge that small electronic motion or occupancy detectors can be powered by batteries rather than from an external power source. Also, I think the skilled reader of D1 would appreciate that the electronics disclosed are suitable to be solely battery powered. D1 does not disclose anything explicit about how the detector might be powered. It is my opinion that claim 4 lacks an inventive step.

    Claim 5 is about wirelessly transmitting signals to a remote device. The requestor does not make any relevant comments on claim 5. I think it likely common general knowledge that small electronic motion or occupancy detectors can wirelessly send measurement signals and/or alarm signals to a remote location. Pages 1 and 2 of D1 discuss the use of detectors as part of an intruder detection alarm system, but is silent about what the is done with the alarm signal, and nothing is said about communicating signals to other devices. I find the skilled reader would find adding wireless transmission an obvious modification to try for the detector of D1, so my opinion is claim 5 lacks an inventive step.

51. **Claim 6** is about microprocessor control. The requestor states that a microprocessor is disclosed by D1 and I agree. I note particularly that page 15 refers to software in line 9. Thus, D1 does disclose using a microprocessor running software that controls the operation of the detector. The 'software package' of claim 6 is construed broadly here to mean any control software or firmware, and I do not think the skilled addressee would put much weight on the word 'package'. The matter of claim 6 is shown in D1 and it is my opinion the claim lacks an inventive step.

52. **Claims 7 and 8** are about intermittent switching. I firstly need to construe claim 7 to decide what the terms 'ordinarily switched off' and 'switching on intermittently' mean. Page 5 of the Patent description states that :

"The occupancy sensor is an ultra-low power device. The microprocessor is configured such that the occupancy sensor is normally switched off. Under control of the microprocessor, the occupancy sensor will switch on (wake") intermittently"

and

"When switched on, the occupancy sensor will process the signals from the IR sensor and PIR sensor."

It is not explicitly said what happens when the sensor is 'switched off', but the skilled reader would understand that when 'off', the occupancy sensor is in a lower power mode where the sensors are not used, nor signals processed. The skilled reader also would understand that the microprocessor is still operational when 'off' as it controls the intermittent on-off cycle; off here does not mean totally inactive. Thus, I construe the highlighted terms of claim 7 to mean 'on' as 'actively detecting and processing sensor signals' and 'off' as 'in a lower power mode not processing signals'.

53. The Requestor argues that the matter of both claims is part of the common general knowledge and says that choosing the particular on cycle time in claim 8 would be routine. The Requestor also notes this passage from page 7 of D1 *"The measurement at the emitted frequency can be effected by switching off the ultrasonic emitter and, after a short delay, monitoring the received signal."* This passage is not helpful as it is describing a particular method of using the ultrasonic sensor for avoiding crosstalk from the emitter to the detector by direct transmission; the passage isn't about power saving for example.

54. As I mention above, D1 is silent about how the detecting system is powered. Thus, the skilled reader is not directed to any particular solution for supplying power, but clearly must address this if trying to make what D1 discloses. I find nothing in D1 either about saving power or only intermittently powering the detection sensors and their signal processing. As I explain above, my opinion is that it is obvious to try to power the system of D1 using self-contained batteries and obvious to try wireless communications. What the requestor has not done is present evidence persuading me that this kind of power saving is common general knowledge. Nor is there evidence to persuade me the other way. I am unable to decide whether either claim is obvious because of this doubt and thus unable to reach an opinion as to the validity of either claim 7 or 8.

55. **Claim 9** essentially states software does the processing of the sensor signals to confirm occupancy. As with claim 6, I agree with the requestor that D1 does disclose software processing signals on a microprocessor. I find the matter of claim 9 is disclosed by D1 and it is my opinion that claim 9 lacks an inventive step.

56. **Claim 10** talks about wirelessly transmitting a signal when occupancy changes. I construe claim 10 to mean that a signal is sent at least when either an occupant has arrived or when an occupant has left, and I note that the claim is silent regarding any additional signalling that might occur. The requestor states that claim 10 is common general knowledge to the extent that signals may be transmitted wirelessly and the determination be made by software. Whilst I agree as far as this goes, the requestor

does not comment on the key aspect of claim 10 : that a signal is sent when occupancy changes. A potential application of the Patent is counting occupancy at a desk, and thus for that task, there is no need for signals to be sent confirming continuing occupancy or vacancy. Document D1 is a motion detector triggered when any movement occurs, and thus will necessarily trigger an alarm event on any change of occupancy of the field of view. It is likely that this motion detector will trigger additional alarm events due to further motion inside the field of view. I therefore can see how D1's alarm event signals might not be useful for the counting application of the Patent. However, claim 10 does not distinguish itself from D1's operation and I find that D1 does disclose the features in an enabling fashion. In my opinion, claim 10 lacks an inventive step.

57. **Claims 11 and 13** talk about the sensors facing the same way and there being a single housing. I agree with the requestor that the sensors of D1 will have a common field of view and thus it would be obvious to arrange them to 'face the same direction'. Also, D1 does shows a single housing for all components. It is my opinion claims 11 and 13 lack an inventive step.

58. **Claims 14 and 15** talk about using the occupancy sensor in combination with a desk, the sensor arranged under the desktop to view where a user may sit, a location which may be beyond the edge of the desk. The Requestor asserts this would be within the common general knowledge and merely a routine design task. Given the lack of supporting evidence, there is too much doubt whether an under-desk location is common general knowledge for use of motion or occupation sensors. I am unable to decide whether claims 14 and 15 have an inventive step and thus cannot come to an opinion on the validity of either claim.

59. **Claim 16** now refers to a system using the occupancy sensor, where one or more sensors wirelessly communicates with at least one data gathering unit. I do not find any problems with construction of the claim. The Requestor argues this would be common general knowledge and that wireless communication is well known in the computing and communication technology art. The Requestor also highlights the first paragraph of page 3 of D1 suggesting the microprocessor mentioned might be equivalent to a data gathering unit. I do not find this passage is of any help regarding claim 16. As with claim 5 above, I find it obvious that the motion sensor of D1 could be modified to wirelessly signal alarm events to a second device, such an intruder alarm controller. I note D1 discusses intruder alarms. As before, the operation of the modified D1 system is not distinguishable from the function of the claimed occupancy monitoring system. It is my opinion that claim 16 lacks an inventive step and is invalid.

Conclusion

60. It is my opinion that claims 1, 4 to 6, 9 to 11, 13 and 16 lack an inventive step given and the common general knowledge and thus are invalid.

61. It is my opinion that claims 2, 3 and 12 are novel and have an inventive step over the documents D1 to D4 and thus are valid.

62. I am unable to determine if claims 7, 8, 14 or 15 have an inventive step or not and

therefore I am unable to offer my opinion on their validity.

Application for review

63. Under section 74B and rule 98, the proprietor may, within three months of the date of issue of this opinion, apply to the comptroller for a review of the opinion.

Gareth Lewis
Examiner

NOTE

This opinion is not based on the outcome of fully litigated proceedings. Rather, it is based on whatever material the persons requesting the opinion and filing observations have chosen to put before the Office.