

Study Note. *The study of Module 4 should take about ten hours. For convenience, self-assessment questions (SAQs) are set out separately in Module 5 and should be done as indicated in the body of Module 4. Please send your answers to the SAQs and claim drafting exercises to your tutor. You are encouraged to seek the guidance of your tutor on any of the issues raised in Module 4.*

Module 4: Drafting a Patent Application; the description

Learning outcomes

On successful completion of this module, students will be able:

to draft the following parts of a patent application:

- a title
- a description of the technical field/ background to the invention
- a summary of the invention
- a brief description of any illustrative drawings, flow charts, chemical structure diagrams etc
- a detailed description of the invention, having regard to:
 - the common legal requirements around the world
 - what is meant by ‘sufficiency’ and by ‘a person skilled in the art’
 - the special requirements for inventions in biotechnology
 - the need to provide ‘support’ for the claims
 - the need to spell out alternatives and modifications of the invention
 - the need to choose words with care in order to ensure consistency between the description and the claims
 - what is important when illustrating the invention e.g. by means of drawings, flow charts, chemical structure diagrams etc
- an abstract

to describe how to prepare to draft a patent application including:

- considering where to apply for patent protection
- taking into account ‘prior art’
- beginning the process by drafting the claims

Contents of Module

- 4.1 Introduction
- 4.2 Title
- 4.3 Technical field/ background
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- 4.7 Drawings
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- 4.10 Preparing to draft an application
 - 4.10.1 Where should I apply for protection?
 - 4.10.2 What is the prior art?
 - 4.10.3 Start with the claims

4.1 Introduction

The *descriptive* part of a patent application typically comprises:

- A title
- A description of the technical field/ background to the invention
- A summary of the invention
- A brief description of the drawings (if any)
- **A detailed description of the invention** (which may be illustrated by drawings, flowcharts, circuit diagrams, chemical structure diagrams, photographs, computer graphics etc), and
- An abstract

4.2 Title

The title should be short and to the point – not too short; ‘*Control system*’ and ‘*Chemical*’ are a bit too brief and uninformative; but ‘*Controlling fuel injection*’ and ‘*Heterocyclic compounds*’ will do; as would ‘*Bicycle*’.

4.3 Technical field/ background

This might begin with an indication of the **technical field** in question e.g. *This invention relates to bicycles*. Followed by a brief description of the **background** and what the invention aims to do e.g. *Conventionally, bicycle handlebars are fixed to the top of the forks; this invention provides a way of adjustably coupling these two parts to suit riders of different heights*.

It is usually sensible to keep this section fairly short and simply set the stage for the full technical details to be provided in the detailed description. It can be a disadvantage in some jurisdictions to give too much detail of the prior art here, as it may be used against you when it comes to the Patent Office assessing whether or not the invention is obvious; and any reference to the invention should be in line with what is to come later in the claims.

The **technical field and background** may be presented as two distinct separate sections, as in the example given in section 1.9 below.

4.4 Summary of the invention

Some countries require a summary of the invention. This should be in line with what is going to come later in the claims. If this section significantly differs from what is said in the claims, the Patent Office may question whether the application as a whole is consistent as regards what is to be regarded as the invention.

The simplest (and safest) thing to do, and this is a technique adopted by many professional patent attorneys, is simply to turn each of the independent claims into individual paragraphs by adding an introductory phrase such as ‘*According to this invention there is provided*’ and repeat them here. For instance:

SUMMARY OF THE INVENTION

According to this invention there is provided a bicycle in which the handlebar stem is connected to the top of the forks by means of a coupling comprising a first part clamped to

the handlebar stem, and a second part clamped to the top of the forks, the two parts being relatively adjustable to alter the tilt of the handlebar stem.

According to this invention there is also provided a method of assembling a bicycle comprising clamping a first part of a coupling to the handlebar stem, clamping a second part of the coupling to the top of the forks, and relatively adjusting the two parts to a desired tilt

4.5 Description of the drawings (if any)

Just before the detailed description begins, if you have included any drawings, this is the place to provide a brief description of them. (The actual content of the drawings is dealt with in section 1.7 below). For instance;

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a first part of a coupling for clamping to the handlebar stem of a bicycle

Figure 2 shows a second part of a coupling for clamping to the forks of a bicycle

Figure 3 shows the handlebars and forks coupled together

Figures 4, 5 and 6 show similar views of a second embodiment of the invention

4.6 Detailed description of the invention

The basis of the patents system is the grant by the state to the applicant of an exclusive right to exploit the invention. In exchange the applicant has to disclose the invention, or in other words to provide a full description of how the invention works or how it is made.

4.6.1 Sufficiency

What is required of the description is set out in the law of the country or region in which you wish to apply for a patent. Here are some typical examples:

European Patent Convention, Article 84 *The European patent application shall disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.*

Japan Patents Act, Article 36(4) *the description 'shall be clear and sufficient as to enable any person ordinarily skilled in the art to which the invention pertains to work the invention'*

United States 35 U.S.C. 112(a) *(a) IN GENERAL.—The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.*

What is required by each of these laws is that the applicant describe the invention *clearly and completely enough for it to be carried out by a person skilled in the art*. This requirement means that if the invention relates to a nuclear reactor, then the description does *not* have to be pitched at the level at which *anyone* can understand it; instead a

nuclear engineer must be capable of understanding it. And if it relates to a new organic compound, then it must be clear to an organic chemist.

This does not mean that the description has to give the dimensions of every brick or the composition of every fuel rod used in the construction of the reactor, unless of course the invention lies in either of these areas. The engineer, being skilled in the art, will know about these matters – or have access to the relevant information.

Similarly, if the invention involves polymer X and it is common knowledge in the art that every polymer X has to be cured for 5 hours at 200 degrees, this does not have to be stated, unless the invention modifies this procedure in some way.

What the patent application has to do is to explain how the invention works **in sufficient detail** for a person of ordinary familiarity with that particular technical field - to make it (if a product) or carry it out (if a process). Hence this requirement is sometimes called 'sufficiency'. (It is not necessary however to explain why an invention works, although that may help the reader to understand it)

There may be more than one way of carrying out the invention, and applicants often describe several alternatives or examples (called *embodiments*).

In some jurisdictions (eg the US and India), applicants are required to describe the best way they know of carrying out the invention. So if the invention works well at a temperature of 115 to 140 degrees, but works best at 120 degrees, that has to be made clear in the description. (In the US however, from September 2011 failure to meet this requirement 'is not a basis on which any claim of a patent may be cancelled or held invalid or otherwise unenforceable ...in patent validity or infringement proceedings', see <https://www.uspto.gov/web/offices/pac/mpep/s2165.html>)

Biotechnology

There are special requirements in respect of sufficiency for inventions in biotechnology:

- If an invention involves biological material, it may be necessary to deposit a sample at an approved depository (see the *Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure*, 1977).
- If nucleotide and amino acid sequences are disclosed, a sequence listing may be required in an approved form (see *WIPO Standard ST25*).

Some judgements

The meaning of insufficiency has been examined in a number of judgements in the UK courts.

In *Eli Lilly v Human Genome Sciences* [2008] EWHC 1903 (Pat) (<http://www.bailii.org/ew/cases/EWHC/Patents/2008/1903.html>), Kitchin J gave the following summary, in paragraph 239, of how the law regarding insufficiency should be applied:

The specification must disclose the invention clearly and completely enough for it to be performed by a person skilled in the art. The key elements of this requirement which bear on the present case are these:

- i) the first step is to identify the invention and that is to be done by reading and construing the claims;
- ii) in the case of a product claim that means making or otherwise obtaining the product;
- iii) in the case of a process claim, it means working the process;
- iv) sufficiency of the disclosure must be assessed on the basis of the specification as a whole including the description and the claims;
- v) the disclosure is aimed at the skilled person who may use his common general knowledge to supplement the information contained in the specification;
- vi) the specification must be sufficient to allow the invention to be performed over the whole scope of the claim;
- vii) the specification must be sufficient to allow the invention to be so performed without undue burden.

In *Zipher Ltd v Markem Systems Ltd* [2009] FSR1

(<http://www.bailii.org/ew/cases/EWHC/Patents/2008/1379.html>) the Court stated (paragraph 362) that sufficiency is required in order 'to prevent a patentee laying claim to products or processes which the teaching of the patent does not enable in the relevant sense' or in other words *to prevent a patentee laying claim to products or processes which the teaching of the patent does not enable a person skilled in the art to perform*

The question of who is to be regarded as 'a person skilled in the art' is also addressed in *Zipher v Markem*, where it is stated at paragraph 98 that:

'The person skilled in the art is the legal construct which the law uses to ascertain the meaning of the language used in the patent as well as to test allegations of novelty, obviousness and insufficiency. He or she is a person with practical knowledge and experience of the field in which the invention is to be applied: *Catnic Components Ltd v Hill & Smith Ltd* [1982] RPC 183 at 242-243. In a case where the patent calls for a range of skills, the addressee is a team of people who between them have the requisite skills: *Minnesota Mining & Manufacturing Co v ATI Atlas Ltd* [2001] FSR 31 at [30]'

4.6.2 Support for the claims

As we saw in sections 2.1 and 2, it is generally one of the legal requirements of the claims that they must be '*supported by the description*'.

So anything found in the claims must have a basis in the description and/or the drawings, and the description and claims must be consistent with one another. What does this mean in practice? Here are some examples:

- If the description simply says that a component is made of 'metal', then the claims cannot say that component can be of aluminium or copper. So that's simply a matter of consistency; make sure that any detail in the claims is also in the description.
- On the other hand, since the claims are generalisations of the described embodiments, if the description says a component is made of 'aluminium or copper' then that statement will provide support for a generalisation of this, i.e. the claim can say that the component is made of 'metal'. So it's all right when the boot is on the other foot.
- Generalisations can only go so far however; they have to be justifiable in the light of what is described in the embodiments. For instance, say the invention is to a fuel oil composition having a specific property. If the only way of obtaining fuel oils with this property is by using a specific additive the Patent Office might argue that this is an essential feature of the invention and should be included in claim 1. This problem

can't be put right by amending the description to include other ways of getting the right property, since as we've already seen in section 5, that is not allowed. However, the problem could be resolved by amending claim 1 to include the essential additive.

Remember you can add new features to a claim, but only if the feature is already in the description (or in a dependent claim).

- Similarly, the description must be sufficient to enable the claimed invention to be performed across the whole of its breadth or scope. So if a particular temperature range is specified in claim 1, the description should give examples sufficient to demonstrate that the invention works across the whole of that range. Otherwise the claim might be regarded as being *broad and speculative*.

4.6.3 Alternatives and modifications

When drafting claims, we have seen that it is important to think of different ways of carrying out the invention: different uses of the invention, different components; different materials etc – and to word the claims so that these are all covered.

It is also important to spell out these alternatives and modifications in the description. In the pencil and eraser example of section 1.2, we redrafted claim 1 so that we would not exclude different shapes for the end of the pencil or for the aperture in the eraser, different adhesives, a friction-fit with no adhesive etc.

We also need to spell out these specific alternatives in the description. That will provide options if later on the claims have to be narrowed on account of prior art.

Also when the patent is published, it will itself constitute prior art against anyone who comes along later and tries to claim these particular alternatives.

This is sometimes called '*armchair inventing*' (!), but it can only go so far – your alternatives must be realistic and it must be clear how they work.

4.6.4 Words in the description

The same invention can be described in lots of different ways, and the actual words used are rarely critical, just as long as there is sufficient detail for the reader to understand how the invention works. Drafting the description is more of a technical than a legal exercise.

That said however, you should be very careful of making absolute statements in the description involving such words as 'must' and 'always'. If you say the component 'must' be of metal, that means it's an essential feature of the invention and should arguably be in claim 1. And if the temperature should 'always be 120 degrees', the same thing applies. This again is to do with maintaining consistency between what is said in the claims and what is said in the description.

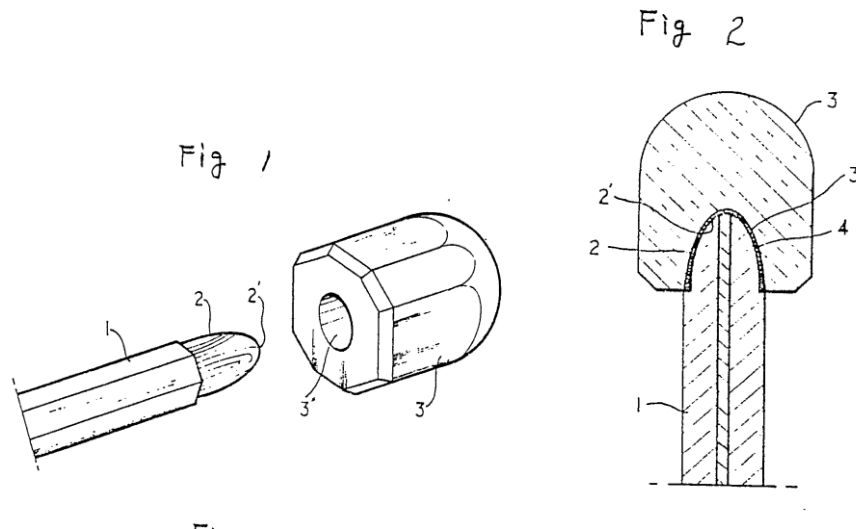
4.7 Drawings

There is an old saying that '*a picture is worth a thousand words*'. That is probably a bit of an exaggeration, but certainly as regards patent applications, the drawings play a very important role.

Here are some points to bear in mind when preparing drawings:

- The drawings may show details of a mechanical device, a chemical structure (as in 1.8 below), a flowchart, a circuit diagram – in fact whatever is the clearest way of helping the reader to understand the invention
- The level of detail shown in the drawings will again depend on the invention.

- In a simple invention such as the pencil and eraser example shown below, Figure 1 of the drawings shows a three-dimensional view of the invention, and Figure 2 a cross-section. Everything is illustrated, but note that no dimensions are given, since they are not necessary to understand the invention. Parts of the invention referred to in the description should be indicated by reference numerals, so that the description can refer for example to a pencil 1 and an eraser 3.
- Each reference numeral should indicate the same part in all the drawings
- These are not engineering drawings, they can be relatively informal



In the bicycle example referred to in 1.5 above, there is no need to show every part of the bicycle, just individual views of the two parts of the coupling and a view of the whole thing assembled. In the case of a method or process, the invention might be best illustrated by a flow chart.

As noted above, as well as drawings, the description may be illustrated by flowcharts, circuit diagrams, chemical structure diagrams, photographs, computer graphics etc

4.8 Abstract

Some patents are short; others are long; and some can be very long indeed. When scanning published patents in online databases, searchers need to get to grips quickly with what the invention is about, so that they can decide whether it's worth reading the whole patent, or whether to pass on to the next one.

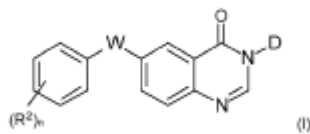
To make life easier for searchers, each patent in the database has a short (no more than say 150 words) *summary of the invention* generally illustrated by a drawing. Note, this is a summary of the *invention*, not the whole description, so the content of the abstract should be guided by what's in the claims.

One word of warning, when drafting an abstract *make sure that everything in the abstract is in the patent application itself*. You do not want to disclose in the abstract - by mistake - any ideas or details not in the application. It is possible that you might want to protect these at a future date.

Rather than attempting to cover everything in the application, the abstract should be more of a *signpost* to what is there. Here is an example of an abstract (together with the title). The description in the application runs to over 200 pages; the abstract is just 36 words.

Title QUINAZOLINONE DERIVATIVES USEFUL AS FGFR KINASE MODULATORS

Abstract:



The invention relates to new quinazolinone derivative compounds, to pharmaceutical compositions comprising said compounds, to processes for the preparation of said compounds and to the use of said compounds in the treatment of diseases, e.g. cancer.

4.9 Example

And here is an example of the introductory parts of a patent application which follows the pattern described above.

Title

METHOD, SYSTEM AND COMPUTER PROGRAM FOR DETERMINING THE ORIENTATION OF AN APPARATUS

Technical Field

The present invention relates to a method, system and computer program for determining the orientation of an apparatus attached to a vehicle.

Background

It is known to provide tracking devices for installation in or on vehicles. The tracking device can include a positioning system, such as a satellite positioning system such as a Global Positioning System (GPS) receiver or the like, and a transmitter for reporting data to a control centre. In addition to the GPS or other receiver, the vehicle may also have an accelerometer. In some cases, the accelerometer may be a component of the tracking device.

Data from an accelerometer can be used for various purposes, for example to provide information on driving style or to detect when a vehicle is in a collision. However, the accelerometer axes are very unlikely to be aligned with the axes of the vehicle. For example, to simplify installation an accelerometer, or a tracking device including an accelerometer, can be installed in a variety of positions and orientations with respect to a vehicle with little or no regard to the orientation of the accelerometer relative to the vehicle.

It would be desirable for the accelerometer data to be expressed in terms of the vehicle frame of reference, rather than the accelerometer axes (which relate to the orientation of the accelerometer).

US2009/051510A1 relates to a system and method for detecting and reporting vehicle damage. A monitoring unit can include an accelerometer module with a tri-axial accelerometer. A self-orienting application is started after installation to determine the mounting position of the unit and how to compensate for it. First a gravity vector is determined by observing the forces on the accelerometers due to gravity when the vehicle is stopped. US2009/051510A1 then assumes that when a vehicle begins to move or is braking the vehicle is usually travelling in a straight line along the centre line of the vehicle. By measuring acceleration or braking, a centre line orientation can be determined.

Summary

According to a first embodiment, there is provided a method for determining the orientation, relative to a vehicle, of an apparatus attached to the vehicle. The method comprises: periodically recording

acceleration data of the apparatus along three mutually orthogonal axes at a first time interval; periodically recording speed and heading data of the apparatus at a second time interval; determining a first vector which corresponds to the direction of gravity using the acceleration data; identifying one or more periods of acceleration in a substantially straight line using the speed and heading data; selecting acceleration data corresponding to the identified one or more periods of acceleration in a substantially straight line; and determining a second vector which is orthogonal to the first vector and which corresponds to a forward direction of the vehicle using the selected acceleration data.

According to another embodiment, there is provided a system for determining the orientation, relative to a vehicle, of an apparatus attached to the vehicle. The system comprises a processing system configured to: store periodic acceleration data of the apparatus along three mutually orthogonal axes at a first time interval; store periodic speed and heading data of the apparatus at a second time interval; determine a first vector which corresponds to the direction of gravity using the acceleration data; identify one or more periods of acceleration in a substantially straight line using the speed and heading data; select acceleration data corresponding to the identified one or more periods of acceleration in a substantially straight line; and determine a second vector which is orthogonal to the first vector and which corresponds to a forward direction of the vehicle using the selected acceleration data.

In another embodiment, there is provided an apparatus for attachment to a vehicle. The apparatus comprises: an accelerometer interface for acceleration data from an accelerometer; a positioning and heading interface for speed and heading data; a transmitter for transmission of the acceleration data and the speed and heading data; a receiver for reception of orientation data of the accelerometer relative to the vehicle; non-volatile storage configured to store the orientation data; and a processing system configured to use stored orientation data in the nonvolatile storage to convert the acceleration data into a reference frame of the vehicle.

According to another embodiment, there is provided a computer program comprising instructions such that when the computer program is executed on a computing device, the computing device is arranged to determine the orientation, relative to a vehicle, of an apparatus attached to the vehicle using the method of the above described first embodiment.

Further features and advantages of the invention will become apparent from the following description of preferred embodiments of the invention, given by way of example only, which is made with reference to the accompanying drawings.

Brief Description of the Drawings

Figure 1 shows a diagrammatic representation of a schematic diagram of a monitoring apparatus for attachment to a vehicle;

Figure 2 shows a diagrammatic representation of an external view of accelerometer axes in the frame of reference of the vehicle;

Figure 3 is a flow chart of processing which can be carried out in one embodiment to determine the orientation of a monitoring apparatus relative to a vehicle;

Figure 4 depicts the concept of projecting vectors onto a plane;

Figure 5 is a diagrammatic representation of the results of principal components analysis for vectors projected onto a plane;

Figure 6 shows a diagrammatic representation of a system for determining the orientation of a monitoring apparatus relative to a vehicle; and

Figure 7 is a signal flow diagram for the processing of one embodiment using the system of Figure 6.

The same reference number indicates the same element throughout the drawings.

Detailed Description

**Please now answer SAQ 4.1, SAQ 4.2, SAQ 4.3, and SAQ 4.4
(These can also be found in Module 5)**

4.10 PREPARING TO DRAFT AN APPLICATION

4.10.1 Where should I apply for protection?

You've had an idea, you've built a model, prepared a compound or successfully carried out a process; and now you are ready to protect your invention, ***which of course you haven't disclosed publically!*** (unless you are only applying in countries that have a grace period).

An important question to ask yourself at the outset is: in which countries or regions should I protect my invention?

Remember patenting can be an expensive business. If you're just thinking of making or selling locally, you might just apply for protection in your own country. If you are more ambitious, you might seek overseas partners to help develop and market your invention, and look for patents over a wider region. (In the latter case applying by way of, for instance, the *Patent Cooperation Treaty* will give you time after filing before you have to reach a firm decision on which countries to go for).

4.10.2 What is the prior art?

You need to be aware of what has been done before in the field you're working in ie what is the prior art, and draft your claims accordingly? You'll probably be aware of what's available on the market, but it's also a good idea to do a search yourself in one of the free online patent databases. Your search won't be as thorough as the search the Patent Office will carry out, but if you do find out that your invention is known or looks to be obvious, you will save yourself time and money. (In fact, it's a very good idea to carry out a search *before you even start work on your invention*. Huge sums of money are wasted every year in researching and developing ideas that have already been published in patents).

And even if you do discover that your idea in general terms is known, you may still be able to obtain protection for your particular way of carrying it out, if that is new

4.10.3 Start with the claims

When you at last you put pen to paper, it's a good idea to *start with the claims*, since this concentrates the mind as to what is the actual invention. We have seen already that it's very easy to put loads of features into claim 1 without pausing to ask: What are the essential technical features? What are the alternative features? In what other technical fields could this idea be used?

Once you have a clear idea of what the invention actually is, drafting the rest of the application should flow naturally.

Please now answer SAQ 4.5

Note For references to consult for help and for further reading, see **Module 3, Section 3.10**

END OF MODULE 4