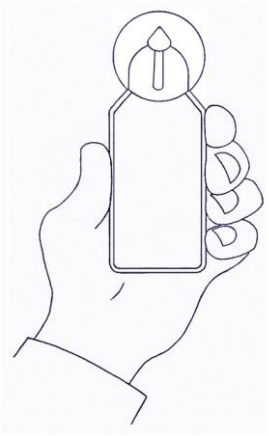
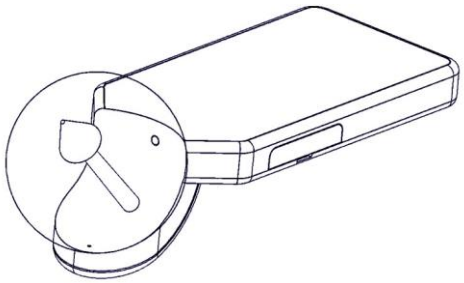
The 3D Pointer

Making 3D position information more easily accessible and useful.

Introducing the 3D Pointer





The 3D Pointer is the first electronic device that can *auto-display** any three-dimensional direction for casual viewing. With its computer controlled three-dimensional arrow in a sphere, the device vastly extends the range of uses of a point, and gets you orientated to the world and universe around you like never before.

By overcoming the limitations of a screen in indicating three dimensional directions, the 3D Pointer opens up a new field of development relating to three-dimensional directionality that would not be feasible with any other device.

Humans have been communicating directions by pointing with their finger for thousands of years. We have harnessed other forms of communication electronically, so why not the human point?

The 3D Pointer is the device that harnesses it.

**Auto-display – meaning to display by itself without the need to move the device to find a direction or to occupy a restricted viewing position.*

Contents

Outline Description of the Device

Essentially the 3D Pointer comprises a unit with a hollow transparent sphere containing an arrow. In one handheld design the sphere is 4cm in diameter. Other sizes are possible including much larger for public display purposes.

The arrow is moved magnetically to point in any three-dimensional direction and is lit from within the device in low light conditions and for special lighting effects of the arrow.

The sphere has touch-feedback properties that add a tactile component to how the product can be used.

The device includes a screen for relevant information such as the distance of what the arrow is pointing at, and all manner of supportive imagery.

There are designs for special uses, but as a mobile device it has wide ranging applications for both handheld and standalone uses.

The device isn't intended to be used like a phone and carried everywhere; it's used for the things it can do that are not feasible otherwise. It may be used in the home or taken outside, and it can be used as a self-sufficient device with many applications, or sometimes alongside or supplementary to a phone, laptop, or other computer device.

The arrow/sphere configuration

This represents a new functionality for a device. The sphere looks very different from what you would expect from a transparent sphere with its ultra-low reflectivity, which comes from moth-eye anti-reflection technology that currently gets reflection down to 0.4%.

It gives the sphere a very unusual ethereal quality, with the arrow very clearly visible within it.

Move the device around in your hand in any way you like, and the arrow will maintain the direction you selected for it independently of the position you are holding the device.

When you are familiar with the unique range of uses of the device, you won't just see an arrow, you'll see a very special arrow indeed. This is the one that can vastly expand your 3D spatial awareness of the world and universe around you.

Limitations of a screen

The advantages of the three dimensional arrow over an image of an arrow on a screen is illustrated with reference to images 1 - 4 below (a handheld design for the device).

The sequence of images show that the arrow on the screen of the device (which would also apply to the screen of a phone) loses three-dimensional accuracy when viewed from different angles.

Image 1 represents a viewing position of the device from which the arrow in the sphere at the top of the image appears to point in the same direction as the arrow on the screen below it. (Although in a solid model of the device only the sphere-arrow will be stereoscopic. The screen-arrow will have perspective but not stereoscopy.)

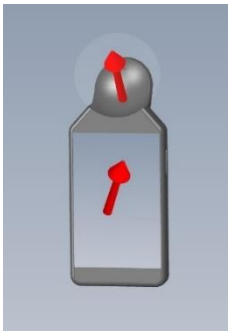


Image 2 shows the device as viewed from further to the right. Both arrows are unchanged, but while the arrow in the sphere remains three dimensionally accurate from the new viewing position, the 2D arrow on the screen has become innacurate (now pointing in the wrong direction) as seen from the new position.

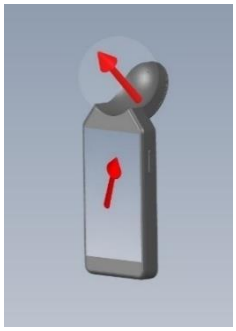


Image 3 represents a view of the device that is yet further to the right.

Image 4 shows that in addition to loss of accuracy of the screen-arrow, the apparent narrowing of the screen as seen from oblique angles can greatly restrict the view of the arrow; an effect that doesn't apply to the sphere-arrow.

A phone could have an eye-tracking app that changes the image on the screen to suit the viewing position. But this would be confined to one person at a time viewing the device, would be limited in its distance and lateral viewing range and would not be stereoscopic.

The stereoscopy of the arrow that matches the 3D reality around it, its accuracy from such a wide range of viewing angles and distances, and

its ability to be viewed by several people at the same time are important requirements for the types of program that the 3D Pointer makes possible.

Applicable for different contexts of use

There are different contexts of use for the product and different settings within each context. It's not a system for solving a particular problem in a narrow sense. It therefore doesn't stand or fall on a specific application - it's for any situation where an easily accessed three-dimensional direction can be helpful.

The invention is simply taking the directional arrow or pointer and providing a computer controlled one that can point in any direction. The provision of that computer-controlled arrow is the resource that the 3D Pointer is making available for any required use.

Adding computer technology to an already popular and successful thing is always a good idea because it enables you to extend the capabilities of the successful thing. Take the airplane, the TV, the phone etc. The 3D Pointer is doing just that with the arrow – giving it the benefit of computer-control which extends its use in ways that would be difficult or impossible otherwise.

It's got uses in many different environments because 3D positional reality is everywhere, and the 3D Pointer perfectly matches that reality. It's the go-to device for an accurate and easily accessed indication of a 3D direction in widely diverse situations and environments.

Handsfree for casual viewing

An important feature of the 3D Pointer, and the basis of many of its apps, is in how it brings the convenience of handsfree to the display of three-dimensional directions.

Because it enables a type of program that can continuously update a changing three-dimensional direction – for the casual observer who may check the device from random viewing positions.

You get this ease of access with other types of information, simply with the use of a screen. But the screen can't do it for three-dimensional directions because of the 2D limitations of the flat screen. If you want a three-dimensional direction with a phone, you are very physically tied to the device with the need to move it to find each direction.

By freeing you from confinement to the device, the 3D Pointer greatly extends the range of possible applications for the indication of three-dimensional directions; especially in programs that are designed to provide continuous updating of three-dimensional directions for the casual observer. See examples below.

The map comparison

Maps are very helpful for finding your way around, but a map just gives you a *representation* of places; a diagram from which you can work out your position in relation to other places on the map. The 3D Pointer on the other hand doesn't *represent* a place - it gives you *the place itself* in the way that it points to where it actually is in three-dimensional space.

The map and the 3D Pointer can be used differently to fulfil different requirements, but they can be used to complement one another as well.

Maps are fantastic for providing visual representations of where things are in relation to other places. The 3D Pointer is amazing for anchoring you to a particular location when you are on the move, or for when you just want to feel 3D connected, or when you need continuous updating of a 3D direction, or for any of the uses specified in this document.

APPLICATIONS:

Space Traveller

Here's a program that gets you 3D-aware of your journey through space – as the space traveller you really are.

You already know that you are on a planet in orbit around the sun – but are you spatially aware of it? With *Space Traveller*, you become aware of your room moving through space around the sun - which it's doing with you in it at a cool 67,000 miles an hour.

Normally you wouldn't know which direction your room was going, but with the 3D Pointer you find out exactly. And as the day progresses, you'll see the arrow gradually change direction in relation to the room. This is due to the *rotation* of the Earth - and so you will sometimes see that your room is going at an upward angle and at other times it's a downward angle.

A milometer on the unit screen shows the number of miles you have done from zero hours January 1. You see the end digits whizzing round very quickly reminding you of your high speed - and you hear a little chime for every million miles that you pass.

You can also get the real-time direction of stars, planets, and other celestial bodies, and on the screen, you will see their current rapidly changing distances in relation to you. And you can customise which celestial bodies you would like to follow.

With the 3D Pointer in your room, you get a great feeling of the ever-changing cosmos all around you, and of moving through space in your orbit around a star.

Space Traveller is an example of a handsfree use of the 3D Pointer that couldn't realistically be provided by any other device, because for the app to work it needs to be accurate from different viewing positions within the room, which isn't possible with the use of a screen.

3D-connect with your friend

The greatly extended spatial awareness that you can get from the device can include people of course, and so when you call your friend it will indicate a straight line from you to them at the other end - which could easily be somewhere below you if they are in another country. It gives you a sense of their physical presence in the three-dimensional space you both already share, albeit at a distance.

If they have a 3D Pointer too, theirs will point to you. And with the touch-feedback properties of the sphere you can touch-interact with them seemingly along that straight line between you. It's like a signal going along it. Give the sphere a tap and they will feel the tap at their end. When they tap back, you not only feel it with your finger but see it in the way the arrow shimmers - as if picking up the vibration of their tap that travelled along that straight line.

It's only in relatively recent history that we have been able to speak to someone many miles away. Prior to that, you would always know the direction of the person you were talking to. And so, knowing the direction of someone you are speaking to still feels good even if that person is a long way away. It's because the habits of our mind are fashioned by millions of years of evolution prior to modern technology.

Yes, we can manage without knowing the three-dimensional direction of the friend we are talking to on the phone, but if we know it, we like it!

3D-connect while driving

Your car is a very 3D thing, and the road can traverse hills and valleys and the vehicle itself changes in its three-dimensional angle - as in going up hills or banking to one side. Why not have an indicator that is 100% up to the job in responding to all these 3D things? It's cool to have the best!

You are of course aware of the car in a three-dimensional way already. The 3D Pointer supports the three-dimensional awareness of your car and the surrounding area that is already natural to you. And of course, the 3D arrow is accurate for all viewing positions within the car.

You don’t always want turn-by-turn directions. Use the 3D Pointer to keep you anchored to the destination of your journey, while allowing you to be creative in which way you go. You can use it for 3D anchorage to a major landmark as you drive around the city - or to someone special you just like to feel 3D connected to (along that straight line between you) as you drive.

Have you ever found yourself running along holding the hand of someone you love? It’s a bit like that!

Or it could 3D-connect you to a place of special significance to you. It could be a place of religious significance – maybe Mecca if you are a Muslim. Whatever direction you set for the arrow; its directional stability gives you excellent background anchorage for your sense of direction as you drive around.

The device uses a windscreen mount in cars and a connector for bikes, and there is a proposed built-in system that reflects in the windscreen in some makes of car, that gives you an arrow that appears suspended outside the car in front of the windscreen.

3D indicating a horizontal direction

The three-dimensional reality of the arrow makes every direction it points to a three-dimensional direction, and a particular horizontal direction is just one of any number of three-dimensional directions that are possible for it.

So, even if you mainly want just horizontal directions, the three-dimensional arrow that is accurate from any 3D viewing angle is still pointing three dimensionally.

And you need the true 3D arrow that matches the 3D reality around it for that feeling of connecting with what it is pointing to. It’s because the directional line of the arrow corresponds perfectly with the three-dimensional line in space that it is indicating.

Hilly Terrain

When you are out in the open, a friend can indicate a certain direction very easily by just pointing. The 3D Pointer is for when you want a quick and easy indication of a direction like that. It's the device that gives you that 100% direction pointing capability, that humans can do naturally.

The device can be used as a wearable in hilly or mountainous terrain where it's supportive of your own three-dimensional awareness of where you are. It can for example give you the 3D direction of a fellow climber who may be out of sight.

You can't always see the destination of your expedition, due to changing contours of the land and trees obscuring the view, but the 3D Pointer will keep you focussed on where you are aiming for at that higher level. You don't use it continuously; it's just there for you to check whenever you want a boost to your 3D situational awareness.

Then when you stop to rest, you may like to get 3D orientated to places further away than the hill you are climbing - and to find out where you are in the universe too!

It remembers your route and 3D indicates your way down.

Geological Survey

On an archaeological expedition the 3D Pointer can be used to indicate a position deep within rock or below ground, giving you a direct 3D line plus distance from wherever you are standing. You can 3D triangulate using the one device and moving to different vantage points - or with two devices.

3D Attitude Indicator for Light Aircraft

A version of the system works as a 3D attitude indicator for light aircraft and helicopters that provides a three-dimensional horizontal reference throughout the flight. The horizontal level comes in the form of a circular platform in the sphere against which you as pilot can easily sense the attitude of the aircraft at all times.

It's very intuitive and more like a sighting of the natural horizon or the ground than the standard attitude indicator. The unit is best positioned lower than your eye level - so you are looking down on it to some degree. It can be used as a secondary reference of the attitude of the aircraft with its intuitive 3D properties.

An arrow in a sphere can also be provided that points to a position on the ground or in the air (for example the direction of the nearest other aircraft). The two types of unit can be present as a pair, in which the horizontal platform version and the directional arrow version are positioned side by side.

3D Orientation Underwater

Underwater is a very three-dimensional place and as a diver you can get disorientated in very low visibility, especially during a storm. Utilising an acoustic positioning system, the 3D Pointer maximizes your 3D situational awareness underwater by giving you an instant three-dimensional indication of useful 3D directions. For example, the direction of the support vessel, a position on the seabed or which way is up.

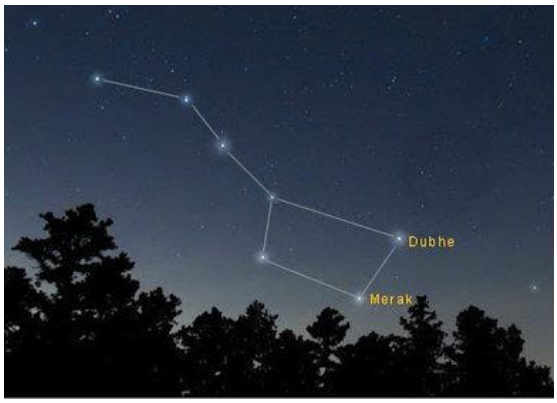
Fitting Google's Objective

Access to information is central to the internet, which Google continuously expands and improves with its stated objective of making the worlds information universally accessible and useful.

The simple direction from you to any other position in space is INFORMATION. We all require this information just about all the time, which we obtain by just looking around.

The 3D Pointer is a step change in the ways it makes that form of information more easily accessible and useful electronically and through the internet.

Exploring the Night Sky



When you are out in the country with friends or family and it's a clear starry night, you can use your 3D Pointer with a laptop or tablet to explore those stars!

You can get apps for viewing the night sky with a phone but there's a limit to how long you can hold your arm up in the air.

The 3D Pointer gives you the easier and more relaxed option, and it's more sociable too. It can be used entirely without the phone but can include the phone with less dependency on it.

What you do is put your 3D pointer with a laptop or tablet on a raised surface. The illuminated arrow in the sphere indicates which area of the sky to look in, and it focuses you on about 10% to 15% of the sky.

The surprising accuracy with which we can see the direction of the arrow comes from our innate understanding the direction of a point.

So, with the arrow you find the correct area of the sky to look in, and then on the larger screen you see the pattern of stars in that area - which is often a particular constellation. And the individual star or planet you want is indicated by the one that is pulsating on the screen.

This is great for when you are simply exploring the night sky for yourself, when perhaps you have a good idea as to what you are looking for. But if you literally want to be *shown around* - **Sky Tour** is what you need.

Sky Tour

Sky Tour is the perfect thing for when you and your friends are out in the open under a beautiful star strewn sky, and maybe you don't even know what to look for. It's streamed from the internet and tailored for your position on the planet.

Your Tour Guide appears on the tablet or laptop screen, and then entertainingly and interestingly takes you into the wonders of the cosmos you see above you.

It's a bit like what you get at a planetarium, only it's the real stars that are the subject of the show. You get the latest news - like when an interesting new exo-planet is discovered, and you find out its location in the sky. There is so much astronomical news coming through these days on almost a daily basis, and interest is huge worldwide.

You can use the phone with the program if you wish, and an app like Sky Map can easily synchronise with Sky Tour. So, as back-up you can hold your phone up at the sky, but you don't need to hold it up nearly so much or not at all when you have the 3D Pointer.

And so, if you are in the country with friends or family and it's a clear night with plenty of stars, you could all enthusiastically agree to set up your 3D Pointer for the *Sky Tour* experience. Some of you might like to use your phones as back-up, especially if the app is synchronised with Sky Tour. It all makes for an amazing experience.

The 3D arrow is a necessary requirement for the Sky Tour app because it directs an audience of several people standing in different positions to the correct area of the sky. Then the larger screen of another device provides closer focus by indicating which star is being indicated in that area of sky.

It's this formula of combining the 3D arrow that is accurate from different viewing positions, with a screen that narrows the focus to a specific celestial body or position in the sky that makes the Sky Tour app possible.

Sky Tour is for stargazers worldwide who may not be committed amateur astronomers but who would still love to be shown around a beautiful night sky from wherever they are in the world.

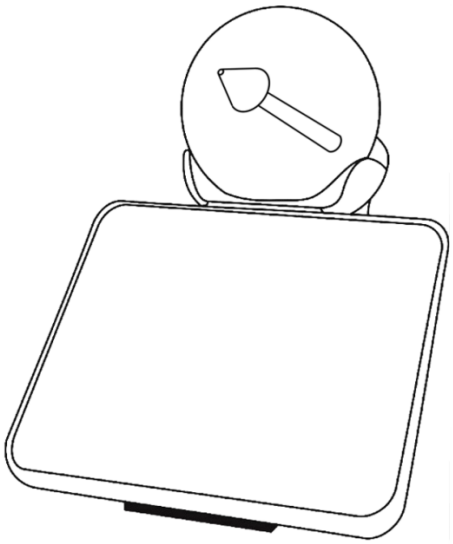
Games

A whole new category of use for the device is in games that are made possible by the sphere/arrow combination.

With the incorporation of a touch-feedback component using touch-screen technology applied to a sphere, a real ball experience is simulated using modified vibration methods that give you a sense of rolling a real ball with your finger. The effect is further enhanced by rolling sounds and the arrow moving with the apparent roll of the ball. (Apart from dynamically indicating the roll of the ball, the arrow can form a crucial part of some games.)

A ball is a very tactile thing, and we all like to play around with a real ball and associate it with enjoyable interaction with others, as in all the many ball games that are played worldwide. Why not have a "real ball" for the internet that can be used for online games - using a true sphere that a flat screen can't replicate.

With the unique sphere/arrow functionality, you get two vistas of experience from the one device - both of which can't be replicated with any other device. It makes the device doubly attractive as a product. You've got the spatial awareness aspect for directionality in the real world, and then its use in new kinds of games. It all makes for an exciting range of possibilities for the new product.



A standalone design for the device

Questions and Answers

Isn't an arrow on a screen sufficient for anything you might realistically want?

Arrows on screens have wide ranging uses, but by providing better access to three-dimensional directions in the ways that it does, the 3D Pointer provides many uses that only it can do properly – as in the examples given above.

Doesn't the sphere make the device too bulky?

The sphere enables the device to do something that phones don't even attempt – which is to auto-display 3D directions for casual viewing. It's for making this form of access to three dimensional directions easier and more convenient, and what makes something easier is a good thing!

There are many electronic devices that are not flat but are nonetheless perfectly suited for what they do. And so, whatever makes them bulkier than a phone is not a barrier to their use. The sphere/arrow combination of the 3D Pointer is like that; it's a positive feature of the device that is exactly what you want for the unique range of apps that you get from it.

Could an autostereoscopic screen produce the same effect?

The problem with autostereoscopic screen systems like lenticular arrays or parallax barrier systems is that they only work from limited viewing angles and distort from other angles or change back to a view at an earlier angle. To get an equivalent, the screen would have to provide for every viewing angle (horizontal and vertical) and for several people viewing simultaneously, which is not achievable with any known autostereoscopic screen technology.

Even if you could produce a stereoscopic 3D arrow on a screen that was accurate for changing horizontal and vertical viewing angles, the image would still become very limited with side-angle views of the screen. (See page 5 image 4.)

How easy is it to see the direction of the arrow?

It is very easy if you have stereoscopic vision, and as humans we are good at seeing the direction of a point. For people without stereoscopic vision, it can be a little less clear, but can still be clear enough. In this case the direction is seen from the perspective view of the arrow, and the use of parallax which gives a three-dimensional view with a small sideways movement of the head that people without stereoscopic vision do naturally for improved depth perception.

How challenging is the development of the product?

Development of any product involves effort, but the primary structural difference of the device is in the sphere/arrow combination, and the control of the arrow in this configuration is not hugely challenging. It's a case of using methods that are easy in principle and refining them for best results.

The device relies on complex three-dimensional positioning technologies that are already in use. E.g., in a phone that can know its position and orientation in space and the direction of other positions in space. The product uses algorithms for translating direction and position information from already established three-dimensional position technology - into the relatively easily achieved movement of the arrow.

Could the invention be superseded by another system?

There are many technological advances in so many fields taking place right now, but this doesn't mean that the range of things you get with the 3D Pointer will be on the trajectory of the development another system.

There are many inventions that stand the test of time in which the fundamental design isn't superseded. E.g., the bicycle with its arrangement of components (one wheel in front of the other, handlebars etc.) has remained essentially the same for a hundred years. The 3D Pointers' arrow/sphere configuration could be like that in remaining the best design for what it does despite advances in other technologies.

There are two basic ways of moving a three-dimensional pointer. You could put it on a post and move it mechanically, or you can contain it in a sphere and move it magnetically. For a mass-produced device, the latter is the only real option because it enables you to control the arrow in a non-mechanical, solid-state device.

It can't be assumed that there are other ways of doing it because you need a three-dimensional arrow to do the 3D pointing, and then a spherical containment of the arrow is required so that it can be controlled magnetically. It's down to the fundamentals of what is needed to achieve the result.

Ever-improving accuracy of 3D position technologies into the future should result in ever-increasing accuracy and range of uses of the 3D Pointer.

With the 3D arrow in the sphere, the 3D Pointer matches the 3D reality around it like no other device – helping us orientate better to the three-dimensional world and universe we live in.

Do you have any thoughts, suggestions, or criticisms on any aspect of the 3D Pointer? If so, we would love to hear from you as your viewpoint could be helpful in the development of the product. So, please let us have your thoughts through the message box on the home page of 3dpointer.com

If you think you may like to invest in the product or collaborate in its development (E.g., by contributing appropriate resources)– please email: michael@3dpointer.com