(*Step 2A: YES*). Similarly, the claim recites the same additional elements of comparing the blue noise mask to a gray scale image to transform the gray scale image to a binary image array and converting the binary image array into a halftoned image. These additional elements add significantly more to the abstract idea as evidenced by the improved functioning of the computer in halftoning a gray scale image and the improved digital image processing. For the same reasons set forth above, taking all the additional claim elements individually, and in combination, the claim as a whole amounts to significantly more than the abstract idea of generating a blue noise mask (*Step 2B: YES*). The claim recites patent eligible subject matter.

Claim 3: Eligible.

The claim recites a system comprising a processor, a first memory and a second memory. The claim is directed to statutory category of invention, *i.e.* a machine (a combination of devices) (*Step 1: YES*).

The claim recites the same abstract idea as identified with regard to claim 1, which is the mathematical operation of generating a blue noise mask, and thus is directed to the abstract idea (*Step 2A: YES*). Similarly, the claim recites the same additional elements that compare the blue noise mask to a gray scale image to transform the gray scale image to a binary image array and convert the binary image array into a halftoned image that add significantly more to the abstract idea. For the same reasons set forth above, taking all the additional claim elements individually, and in combination, the claim as a whole amounts to significantly more than the abstract idea of generating a blue noise mask (*Step 2B: YES*). The claim recites patent eligible subject matter.

4. Global Positioning System

The following hypothetical claims are modeled after the technology in SiRF Technology Inc. v. International Trade Commission, 601 F.3d 1319 (Fed. Cir. 2010) (SiRF Tech). The patent at issue was U.S. Patent No. 6,417,801. Hypothetical claims 1 and 2 are directed to an abstract idea and have additional elements that amount to significantly more than the abstract idea because they show an improvement to another technology or technical field.

Background

Global Positioning Systems (GPS) use signals from multiple satellites to calculate the position of a mobile GPS receiver on Earth. Each satellite transmits a signal containing unique pseudo-random noise (PN) codes, satellite positioning data and absolute time information. A mobile GPS receiver generally determines its position using the PN codes, satellite positioning data and the absolute time information from multiple satellite signals. In areas where signal levels are low, it is possible for the mobile GPS receiver to detect the PN codes, but is difficult to obtain the satellite positioning data and absolute time information from the satellite signals.

This application describes systems and methods in which a server wirelessly coupled to a mobile GPS receiver uses a mathematical model to solve for the mobile receiver position without receiving satellite positioning data or absolute time information from a satellite. These systems and methods improve GPS techniques by enabling the mobile GPS receiver to determine its position more accurately and improve its signal-acquisition sensitivity to operate even in weak-signal environments. In particular, the mobile GPS receiver is a mobile device that includes a

GPS antenna, a GPS receiver, a microprocessor, a display, and a wireless communication transceiver. Using mathematical formulas, the device calculates pseudo-ranges (estimated ranges from the GPS receiver to each satellite in view) based on PN codes received from the satellites, and the transceiver sends the pseudo-ranges to the server.

The server is a computer that uses the pseudo-ranges, along with an estimated position based on a known location of a wireless tower and time data from the server's own clock, in mathematical formulas to calculate the absolute time that the GPS receiver received the signals from the satellites. The server then creates a mathematical model that uses the pseudo-ranges and the calculated absolute time to solve for the mobile receiver position, which is transmitted to the mobile device for visual representation on a display. The components of the mobile device and the server (*e.g.*, central processing unit (CPU), clock, wireless tower location database, circuitry, and memory) are all well-known and routine computer components.

Claims

1. A system for calculating an absolute position of a GPS receiver and an absolute time of reception of satellite signals comprising:

a mobile device comprising a GPS receiver, a display, a microprocessor and a wireless communication transceiver coupled to the GPS receiver, the mobile device programmed to receive PN codes sent by a plurality of GPS satellites, calculate pseudo-ranges to the plurality of GPS satellites by averaging the received PN codes, and transmit the pseudo-ranges, and

a server comprising a central processing unit, a memory, a clock, and a server communication transceiver that receives pseudo-ranges from the wireless communication transceiver of the mobile device, the memory having location data stored therein for a plurality of wireless towers, and the central processing unit programmed to:

estimate a position of the GPS receiver based on location data for a wireless tower from the memory and time data from the clock,

calculate absolute time that the signals were sent from the GPS satellites using the pseudo-ranges from the mobile device and the position estimate,

create a mathematical model to calculate absolute position of the GPS receiver based on the pseudo-ranges and calculated absolute time,

calculate the absolute position of the GPS receiver using the mathematical model, and

transmit the absolute position of the GPS receiver to the mobile device, via the server communication transceiver, for visual representation on the display.

2. A method for calculating an absolute position of a GPS receiver and an absolute time of reception of satellite signals comprising:

calculating pseudo-ranges, at a mobile device comprising a GPS receiver, a microprocessor, a display, and a wireless communication transceiver, by averaging PN codes received by the GPS receiver from a plurality of GPS satellites;

wirelessly transmitting the calculated pseudo-ranges from the mobile device to a server, wherein the server comprises a central processing unit (CPU);

calculating, by the server CPU, absolute time that the PN codes were sent from the GPS satellites to the GPS receiver using the pseudo-ranges and an estimated position of the GPS receiver;

using a mathematical model to calculate, by the server CPU, absolute position of the GPS receiver based on the pseudo-ranges and calculated absolute time;

transmitting the absolute position from the server to the mobile device; and

displaying a visual representation of the absolute position on the display of the mobile device.

Analysis

Claim 1: Eligible.

The claim is directed to a statutory category, because a system including a mobile device and a server satisfies the requirements of a machine (as a combination of devices) (*Step 1: YES*).

The claim is then analyzed to determine whether it is directed to any judicial exception. The claim recites mathematical operations (*e.g.*, calculating pseudo-ranges and absolute times, and the mathematical model), which the courts have considered to fall within the judicial exceptions, e.g., as abstract ideas. Because these mathematical operations are recited in the claim, the claim is directed to a judicial exception (*Step 2A: YES*).

Next, the claim as a whole is analyzed to determine whether any element, or combination of elements, is sufficient to ensure that the claim amounts to significantly more than the exception. First, the claim recites using a central processing unit (CPU) for performing the mathematical operations of estimating position, calculating absolute time, and calculating absolute position using a mathematical model. The claim also recites using location data stored in a memory, and time data from a clock. These computer components are recited at a high level of generality and add no more to the claimed invention than the components that perform basic mathematical calculation functions routinely provided by a general purpose computer. Limiting performance of the mathematical calculations to a general purpose CPU, absent more, is not sufficient to transform the recited judicial exception into a patent-eligible invention.

However, the claim is further limited to a mobile device comprising a GPS receiver, microprocessor, wireless communication transceiver and a display that receives satellite data, calculates pseudo-ranges, wirelessly transmits the calculated pseudo-ranges to the server, receives location data from the server, and displays a visual representation of the received calculated absolute position from the server. The programmed CPU acts in concert with the recited features of the mobile device to enable the mobile device to determine and display its absolute position through interaction with a remote server and multiple remote satellites. The meaningful limitations placed upon the application of the claimed mathematical operations show that the claim is not directed to performing mathematical operations on a computer alone. Rather, the combination of elements impose meaningful limits in that the mathematical operations are applied to improve an existing technology (global positioning) by improving the signal-acquisition sensitivity of the receiver to extend the usefulness of the technology into

weak-signal environments and providing the location information for display on the mobile device. All of these features, especially when viewed in combination, amount to significantly more than the judicial exception (*Step 2B: YES*). The claim is eligible.

Claim 2: Eligible.

The claim is directed to a statutory category, because a series of steps including calculating pseudo-ranges and wirelessly transmitting those pseudo-ranges satisfies the requirements of a process (a series of acts) (*Step 1: YES*).

The claim recites the same abstract ideas identified with regard to claim 1, which are the mathematical operations of, *e.g.*, calculating pseudo-ranges and absolute times, and the mathematical model. Thus, this claim is also directed to a judicial exception (*Step 2A:* YES). Similarly, the claim recites the same additional elements of a server CPU estimating position, calculating absolute time, and calculating absolute position using a mathematical model, and a mobile device comprising a GPS receiver, microprocessor, wireless communication transceiver and a display receiving satellite data, calculating pseudo-ranges, wirelessly transmitting the calculated pseudo-ranges to the server, receiving a calculated absolute position from the server, and then displaying a visual representation of the received position. For the same reasons set forth above, taking all the additional claim elements individually, and in combination, the claim as a whole amounts to significantly more than the mathematical operations by themselves (*Step 2B: YES*). The claim is eligible.

Part Two

These examples show claims that were held **ineligible** by the Federal Circuit. The analysis sections are informed by the court decisions but offer exemplary hypothetical analyses under the 2014 Interim Eligibility Guidance.

5. Digital Image Processing

The following claim was found ineligible by the Federal Circuit in Digitech Image Tech., LLC v. Electronics for Imaging, Inc., 758 F.3d 1344 (Fed. Cir. 2014). The patent at issue was U.S. Patent No. 6,128,415. The claim is directed to an abstract idea and does not have any additional elements that could amount to more than the abstract idea itself.

Background

In general, digital image processing involves the acquisition of an image at a source device (*e.g.*, digital camera, camcorder, scanner, etc.), processing the image in a desired fashion and outputting the processed image at a destination device (*e.g.*, monitor, printer, computer memory, etc.). However, all image devices, whether source devices or destination devices, impose some level of distortion of an image's color and spatial properties. Some past solutions to address the distortion have used a "device profile," which describes the color properties of both the source and destination devices, to enable a more accurate translation of the image's pixel data into the independent color space across the source and destination devices. The inventor has expanded upon the prior device profile to capture both spatial as well as the color properties of the devices.