CLAIMS

1. A method of encoding a point cloud into a bitstream of encoded point cloud data representing a physical object, each point of the point cloud being associated with spherical coordinates representing an azimuthal angle responsive to a capture angle of a sensor that captured the point and a radius responsive of a distance of the point from a referential, wherein the method comprises:
adaptive quantizing a residual error azimuthal angle, derived from the azimuthal angle, based on the radius;
signaling the quantized residual error azimuthal angle in the bitstream to inform a decoder of a decoding mode on the bitstream; and
transmitting the bitstream.

2. The method of claim 1, wherein the radius is adaptively quantized based on prediction of the azimuthal angle (ϕ_{pred}) and the azimuthal angle is adaptively quantized based on a reconstructed radius obtained from adaptive inverse quantizing the adaptive quantized radius.

3. A method of decoding, a point cloud from a bitstream of encoded point cloud data representing a physical object, each point of the point cloud being associated with spherical coordinates representing an azimuthal angle responsive to a capture angle of a sensor that captured the point and a radius responsive of a distance of the point from a referential, a quantized residual error azimuthal angle being signaled in the bitstream, wherein the method comprises:
adaptive inverse quantizing the quantized residual error azimuthal angle based on the radius; and
decoding the bitstream based on the residual error azimuthal angle.

4. The method of claim 3, wherein adaptive inverse quantizing the quantized residual error azimuthal angle is based on an arc length quantization step (($\Delta\phi_{arc}$)).

5. The method of claim 3, wherein adaptive inverse quantizing the quantized residual error azimuthal angle comprises a first multiplication by the radius and a second multiplication by 2*π, the second multiplication by 2*π being approximated by operations having equivalent result as a multiplication by 8.

6. The method of claim 3, wherein the radius is adaptively inverse quantized based on prediction of the azimuthal angle (ϕ_{pred}) and the azimuthal angle is adaptively inverse quantized based on a reconstructed radius obtained from adaptive inverse quantizing an adaptive quantized residual error radius.

7. The method of claim 6, wherein adaptive inverse quantizing the radius uses a quantization step Δr_{2D} given by:

$$\Delta r_{2D} = \Delta / f(\phi_{pred}),$$

with ϕ_{pred} a prediction of the azimuthal angle ϕ and $f(\phi_{pred})$ a mathematical function having ϕ_{pred} as parameter;

and adaptive inverse quantizing the residual error azimuthal angle uses a quantization step $\Delta\phi$ given by:

$$\Delta\phi = \Delta r_{2D} / r_{2Drec}.$$

where r_{2Drec} is the reconstructed radius.

8. The method of claim 7, wherein the mathematical function $f(\phi_{pred})$ depends on the quantity $|\sin(\phi_{pred})|+|\cos(\phi_{pred})|$ and is given by:

$$f(\phi_{pred}) = g(|\sin(\phi_{pred})|+|\cos(\phi_{pred})|)$$

9. The method of claim 7, wherein the mathematical function $f(\phi_{pred})$ is given by:

$$f(\phi_{pred}) = 1 + \alpha(|\sin(\phi)|+|\cos(\phi)| - 1)$$

10. An apparatus of encoding a point cloud into a bitstream of encoded point cloud data representing a physical object, each point of the point cloud being associated with spherical coordinates representing an azimuthal angle responsive to a capture angle of a sensor that captured the point and a radius responsive of a distance of the point from a referential, wherein the apparatus comprises one or more processors configured to adaptive quantize a residual error azimuthal angle, derived from the azimuthal angle, based on the radius; signal the quantized residual error azimuthal angle in the bitstream to inform a decoder of a decoding mode on the bitstream; and transmit the bitstream.

11. An apparatus of decoding, a point cloud from a bitstream of encoded point cloud data representing a physical object, each point of the point cloud being associated with spherical coordinates representing

an azimuthal angle responsive to a capture angle of a sensor that captured the point and a radius responsive of a distance of the point from a referential, a quantized residual error azimuthal angle being signaled in the bitstream, wherein the apparatus comprises one or more processors configured to adaptive inverse quantizing the quantized residual error azimuthal angle based on the radius and decode the bitstream based on the residual error azimuthal angle.

12. A computer program product including instructions which, when the program is executed by one or more processors, causes the one or more processors to carry out a method of encoding a point cloud into a bitstream of encoded point cloud data representing a physical object, each point of the point cloud being associated with spherical coordinates representing an azimuthal angle responsive to a capture angle of a sensor that captured the point and a radius responsive of a distance of the point from a referential, the method comprising adaptive quantizing a residual error azimuthal angle, derived from the azimuthal angle, based on the radius; signaling the quantized residual error azimuthal angle in the bitstream to inform a decoder of a decoding mode on the bitstream; and transmitting the bitstream.

13. A non-transitory storage medium carrying instructions of program code for executing a method of encoding a point cloud into a bitstream of encoded point cloud data representing a physical object, each point of the point cloud being associated with spherical coordinates representing an azimuthal angle responsive to a capture angle of a sensor that captured the point and a radius responsive of a distance of the point from a referential, the method comprising adaptive quantizing a residual error azimuthal angle, derived from the azimuthal angle, based on the radius; signaling the quantized residual error azimuthal angle in the bitstream to inform a decoder of a decoding mode on the bitstream; and transmitting the bitstream.

14. A computer program product including instructions which, when the program is executed by one or more processors, causes the one or more processors to carry out a method of decoding, a point cloud from a bitstream of encoded point cloud data representing a physical object, each point of the point cloud being associated with spherical coordinates representing an azimuthal angle responsive to a capture angle of a sensor that captured the point and a radius responsive of a distance of the point from a referential, a quantized residual error azimuthal angle being signaled in the bitstream, the method comprising adaptive inverse quantizing the quantized residual error azimuthal angle based on the radius; and decoding the bitstream based on the residual error azimuthal angle.

15. A non-transitory storage medium carrying instructions of program code for executing a method of decoding, a point cloud from a bitstream of encoded point cloud data representing a physical object, each point of the point cloud being associated with spherical coordinates representing an azimuthal angle responsive to a capture angle of a sensor that captured the point and a radius responsive of a distance of the point from a referential, a quantized residual error azimuthal angle being signaled in the bitstream, the method comprising adaptive inverse quantizing the quantized residual error azimuthal angle; and decoding the bitstream based on the residual error azimuthal angle.

16. An electronic device, comprising:

a processor; and

a memory for storing instructions executable by the processor;

wherein the processor is configured to encode a point cloud into a bitstream of encoded point cloud data representing a physical object, each point of the point cloud being associated with spherical coordinates representing an azimuthal angle responsive to a capture angle of a sensor that captured the point and a radius responsive of a distance of the point from a referential, wherein the processor is configured to:

adaptively quantize a residual error azimuthal angle, derived from the azimuthal angle, based on the radius;

signal the quantized residual error azimuthal angle in the bitstream to inform a decoder of a decoding mode on the bitstream; and

transmit the bitstream.

17. The electronic device of claim 16, wherein the radius is adaptively quantized based on prediction of the azimuthal angle (ϕ_{pred}) and the azimuthal angle is adaptively quantized based on a reconstructed radius obtained from adaptive inverse quantizing the adaptive quantized radius.

18. An electronic device, comprising:

a processor; and

a memory for storing instructions executable by the processor;

wherein the processor is configured to decode, a point cloud from a bitstream of encoded point cloud data representing a physical object, each point of the point cloud being associated with spherical coordinates representing an azimuthal angle responsive to a capture angle of a sensor that captured the point and a radius responsive of a distance of the point from a referential, a quantized residual error azimuthal angle being signaled in the bitstream, wherein the processor is configured to:

adaptive inverse quantize the quantized residual error azimuthal angle based on the radius; and

decode the bitstream based on the residual error azimuthal angle.

19. The electronic device of claim 18, wherein adaptive inverse quantizing the quantized residual error azimuthal angle is based on an arc length quantization step (($\Delta\phi_{arc}$)).

20. The electronic device of claim 18, wherein adaptive inverse quantizing the quantized residual error azimuthal angle comprises a first multiplication by the radius and a second multiplication by 2*π, the second multiplication by 2*π being approximated by operations having equivalent result as a multiplication by 8.