CLAIMS

1. A computer-implemented method for hiding copyright information in printable materials, the method comprising:

generating, by a computing device, a unique identifier (ID) based on copyright information associated with digital content, wherein the copyright information and the digital content are recorded on a blockchain of a blockchain network;

determining, by the computing device, one or more features associated with one or more printable materials;

converting, by the computing device, the unique ID to a digital watermark based on the one or more features, wherein the digital watermark comprises a unique mesh pattern; and

superimposing the unique mesh pattern as a document background of the digital content, wherein the digital watermark including the unique mesh pattern, when printed on the one or more printable materials, enables retrieval of the copyright information from the blockchain based on the unique ID, wherein the unique ID encodes a timeline of updates to the digital content.

2. The computer-implemented method of claim 1, further comprising:

before generating the unique ID, authenticating, by the computing device, that a copyright holder holds a copyright of the digital content based on a blockchain transaction ID associated with a transaction that recorded the digital content in the blockchain.

3. The computer-implemented method of any one of the preceding claims, further comprising:

after converting the unique ID to the digital watermark, printing the digital content having the unique mesh pattern as the document background to the one or more printable materials to provide printed content, wherein the one or more features are identifiable from reproduction of the printed content after the digital watermark is printed.

4. The computer-implemented method of claim 3, wherein the reproduction of the printed content includes one or more of copying, scanning, and taking pictures of the printed content.

5. The computer-implemented method of claim 1, wherein the one or more printable materials include paper.

6. The computer-implemented method of claim 5, wherein the one or more features include one or more of texture, hue, deformation, ruggedness, and ink attributes associated with the paper.

7. The computer-implemented method of any one of the preceding claims, wherein the copyright information includes one or more of at least a portion of the digital content or identity information of a copyright holder of the digital content.

8. The computer-implemented method of claim 7, wherein the digital content is recorded on the blockchain as a first transaction associated with a first blockchain transaction ID and the identity information is associated with a second transaction associated with a second blockchain transaction ID, and wherein the first blockchain transaction ID or the second blockchain transaction ID is associated with one or more transaction records associated with the digital content.

9. The computer-implemented method of claim 8, wherein the one or more transaction records include one or more of creatorship, copyright ownership, update history, a timestamp, a location, or a license associated with the digital content.

10. The computer-implemented method of any one of the preceding claims, further comprising digitally signing the unique ID using a private key assigned to a copyright holder of the digital content.

11. The computer-implemented method of any one of the preceding claims, wherein the unique ID is generated based on one of hashing the copyright information using a hash function or encrypting the copyright information using a public key assigned to the copyright holder.

12. The computer-implemented method of any one of the preceding claims, wherein the unique ID is further generated based on one or more of a timestamp or an address associated with the copyright information.

13. The computer-implemented method of any one of the preceding claims, wherein converting the unique ID to the digital watermark is performed based on one or more of a discrete wavelet transform, a discrete cosine transform, a singular value decomposition, a least significant bit, or undetectable steganography.

14. The computer-implemented method of any one of the preceding claims, wherein the unique ID includes a timestamp.

15. The computer-implemented method of any one of the preceding claims, wherein the digital watermark encodes multiple unique IDs, each unique ID corresponding to a respective update to the digital content.

16. A system for hiding copyright information in printable materials, comprising:

one or more processors; and

one or more computer-readable memories coupled to the one or more processors and having instructions stored thereon which are executable by the one or more processors to perform the method of any one of claims 1-15.

17. An apparatus for hiding copyright information in printable materials, the apparatus comprising a plurality of modules for performing the method of any one of claims 1-15.