CLAIMS

1. A location system for locating workers comprising:

a plurality of light detectors mounted at known locations and configured to detect light from one or more workers; and

wearable devices to be worn by one or more of the workers who are authorised, the wearable devices including wireless transceivers;

a plurality of wireless receivers mounted at known locations and configured to detect wireless signal transmissions from the wearable devices; and

a processing system configured to:

determine locations of the workers using the light detected by the light detectors;

determine locations of the authorised workers using the wireless signal transmissions from the wearable devices detected by the wireless receivers; and

identify as unauthorised workers any workers whose location is determined using the light detected by the light detectors who are not authorised workers whose location is determined using the wireless signal transmissions from the wearable device.

2. A location system according to claim 1, wherein the processing system is further configured to determine if the location of one or more of the workers is within a defined area and output a warning signal in response thereto.

3. A location system according to claim 1 or 2, wherein the processing system is further configured to control ~~the~~ activity of machinery based on the determined location of one or more of the workers.

4. A location system according to any one of the preceding claims, wherein the processing system is configured to determine the locations of the workers using the light detected by the light detectors by triangulation of light.

5. A location system according to any one of the preceding claims, wherein the light from the workers is light reflected from the workers.

6. A location system according to claim 5, wherein the location system further

comprises illuminating light sources adjacent to respective light detectors, the light reflected from the workers being light from the illuminating light sources.

7. A location system according to claim 6, wherein the illuminating light sources output modulated light.

8. A location system according to claim 7, wherein the illuminating light source is modulated in intensity over time.

9. A location system according to claim 8, wherein the light detectors are phase-locked to the illuminating light source.

10. A location system according to any one of claims 5 to 9, wherein the system further comprises ~~at least one~~ reflective element<u>s</u> to be mounted on respective workers, the light reflected from the workers being light reflected from the reflective element.

11. A location system according to claim 10, wherein the ~~at least one~~ reflective element<u>s</u> ~~is~~<u>are</u> incorporated into items of personal protective equipment to be worn by respective workers.

12. A location system according to claim 10, ~~further comprising a wearable device to be worn by respective workers,~~ <u>wherein</u> the ~~at least one~~ reflective element<u>s are</u> mounted on the wearable device<u>s</u>.

13. A location system according to any one of claims 10 to 12, wherein the at least one reflective element comprises a retroreflector.

14. A location system according to any one of claims 10 to 13, wherein the light reflected from the reflective elements mounted on the workers is modulated light.

15. A location system according to claim 14, wherein the modulated light is spatially modulated in intensity.

16. A location system according to claim ~~13 or 14~~14 or 15, wherein the modulated light ~~and~~ encodes unique identifiers.

17. A location system according to any one of ~~the preceding claims~~claims 1 to 4, ~~further comprising wearable devices to be worn by respective workers,~~ wherein the wearable devices each comprise a wearable device light source, the light from the workers being light from the wearable device light source.

18. A location system according to claim 17, wherein the wearable device light source~~s~~ output~~s~~ modulated light.

19. A location system according to claim 18 wherein the modulated light is modulated in intensity over time.

20. A location system according to claim 18 or 19, wherein the modulated light encodes a unique identifier.

21. A location system according to any one of claims 18 to 20, wherein the light detectors are phase-locked to the wearable device light source~~s~~.

22. A location system according to any one of the preceding claims, wherein the wireless signal transmissions comprise radio-frequency signal transmissions.

23. A location system according to claim 22, wherein the processing system is configured to determine the locations of the authorised workers using ultrawideband radio-frequency location.

24. A location system according to any one of the preceding claims, wherein the processing system is configured to determine the locations of the authorised workers using the wireless signal transmissions from the wearable device by triangulation of the wireless signal transmissions.

25. A location system according to any one of the preceding claims, wherein the

processing system is configured to determine locations of the authorised workers by combining the locations of the authorised workers determined using the light detected by the light detectors and the locations of the authorised workers determined using the wireless signal transmissions from the wearable device.

26. A location system according to any one of the preceding claims, wherein the processing system is configured to output a warning signal if the location of one or more of the workers identified as unauthorised workers is within a defined area.

27. A location system according to any one of the preceding claims, wherein the processing system is configured to control ~~the~~ activity of machinery based on the location of the workers identified as unauthorised workers.

28. A location system according to any one of the preceding claims, wherein the processing system is further configured to determine locations of machinery using light from the machinery detected by the light detectors.

29. A location system according to claim 28, wherein the light from the machinery is light reflected from the machinery.

30. A location system according to claim 29, wherein the system further comprises at least one reflective element to be mounted on the machinery, the light reflected from the machinery being light reflected from the reflective element.

31. A location system according to claim 30, wherein the at least one reflective element comprises a retroreflector.

32. A location system according to claim 30 or 31, wherein the light reflected from the reflective elements mounted on the machinery is modulated light.

33. A system according to claim 32, wherein the modulated light is spatially modulated in intensity.

34. A location system according to claim 32 or 33, wherein the modulated light encodes unique identifiers.

35. A location system according to ~~any one of claims 28 to 34~~claim 28, further comprising mountable devices to be mounted on respective machinery, wherein the mountable devices each comprise a mountable device light source, the light from the machinery being light from the mountable device light source.

36. A location system according to any one of claims 28 to 35, further comprising mountable devices to be mounted on machinery which is authorised, the mountable devices including wireless transceivers,

wherein

the plurality of wireless receivers are further configured to detect wireless signal transmissions from the mountable devices, and

the processing system is further configured to determine locations of the authorised machinery using the wireless signal transmissions from the mountable device detected by the wireless receivers.

37. A location system according to claim 36, wherein the processing system is further configured to identify as unauthorised machinery any machinery whose location is determined using the light detected by the light detectors which is not authorised machinery whose location is determined using the wireless signal transmissions from the mountable device.

38. A location system according to any one of claims 28 to 37, wherein the processing system is further configured to compare the determined locations of workers to the determined locations of machinery.

39. A location system according to claim 38, wherein the processing system is further configured to output a warning signal and/or control ~~the~~ activity of machinery based on the comparison of the locations of workers and the locations of machinery.