embodiments may be realized. For example, coding may consider other features, such as particle **1150** size in association with a color. Coding therefore incorporates or provides for use of logic analysis in the verification process. Therefore, although these examples discuss authentication tests involving a color, these tests may be applied to morphological aspects of the security features as well.

[0135] In some embodiments, a device **5** is programmed and trained to identify a single code. In other embodiments, the device **5** may be programmed and trained to recognize a number of codes. This latter embodiment may be particularly useful in situations, such as where the device **5** is used to authenticate multiple denominations of currency **200**, each one having a distinct code.

[0136] Code recognition is achieved through a logic template that is preprogrammed into software **15**A. The logic template may provide AND, OR, and NOR selection based on color, count and size. Using appropriate software **15**A, the device **5** provides an ability to recognize various colors and to selectively resolve an outcome. For example, if the device **5** was programmed to evaluate a substrate containing only blue and green, when blue, green and yellow are detected, the result will be rejected, and the user will be notified of a suspect document **200**.

[0137] **FIG. 13** presents a flow chart **1275** depicting one embodiment of the process disclosed herein for authenticating a substrate **200**. In the flow chart **1275**, a first step **1261** includes orienting the substrate **200** for authentication. In a second step **1262**, an image **404** of the substrate **200** is produced. In a third step **1263**, an average gray level is determined. As previously discussed, this average gray level may be for selected portions of the image **404**, or over the entire image **404**. In a fourth step **1264**, the CMS **15**A compares the gray level of individual pixels **1110** to the average gray level. In a fifth step **1265**, the CMS **15**A determines the color coordinates for each bright pixel **1110** identified. In a sixth step, the color coordinates for the bright pixels **1110** are compared to authentication information for determination of whether the color present in the image **404** is an authentic color. In a seventh step **1267**, once a authentically colored pixel has been identified, a geometric aspect, such as size or shape, is determined. In a eighth step **1268**, the geometric aspect is compared to appropriate authentication information. In a ninth step **1269**, the CMS **15**A determines the presence of a code. In a tenth step **1270**, the CMS **15**A declares the substrate **200** as authentic, or a forgery.

[0138] One skilled in the art will recognize that the steps in the flow chart **1275** may be rearranged, at least partially, to provide for authentication. For example, the CMS **15**A may reject a substrate **200** as a forgery before the determination of geometric aspects. The CMS **15**A may operate to "scan" an image **404** so as to produce color coordinates for all security features in a substrate **200**, before commencing geometric analysis. In an alternative embodiment, the CMS **15**A commences geometric analysis as soon as a authentic color is identified.

[0139] Aspects of the process may be adjusted as need be to account for various known conditions, such as the circulation of forgeries having recognizable color coordinates that may be distinguished from an authentic copy **200**. In this case, the device **5** may include authentication information that is actually used to authentic one of an authentic version or a copy. In this embodiment, aspects of known forgeries may be included in the authentication information to reduce processing time and/or increase device **5** accuracy.

[0140] Further Aspects of the System

[0141] In one embodiment, the device **5** is used in a specific relation to the color target **200** in order to perform a color measurement. The specific relation is the same relationship used to train the device **5** to a standard. In another embodiment, the device **5** is used as a hand-held device **5**, where a user operates the device **5** following certain guidelines. For example, the guidelines provided may require the user to place a substrate **200** on a flat surface, to hold the device 6 to 8 inches over the substrate **200**, and to image the substrate **200** using the illumination source **30**.

[0142] In one embodiment, the CPU **10** executes CMS **15**A that is suitable for combining data from the color target **200**, obtained through the lens/CCD system **20**, with CCA **18**A information, in order to provide the color coordinates of the color target **200**.

[0143] In another embodiment, the CPU **10** stores the color data generated by the CMS **15**A. The data may be stored in a compressed format according to a storage algorithm retrieved from memory **15** or storage **18**, as an array corresponding to the CCD architecture, or through another means. The color data may be communicated in real time, or subsequent to the measurement processes, to a remote system for analysis, or in another suitable manner.

[0144] It is within the scope of these teachings to include some type of location determining system within the device **5**, such as one based on the Global Positioning System (GPS) **70**. In this case the location of the device **5**, and hence the location of the color target **200**, can be transferred to the remote data processor(s) **115**.

[0145] System Performance

[0146] In one examination of device **5** performance, different loadings of security particles **1150** onto 24 pound paper were assembled. This examination considered the stability of variations among a series of devices **5**. Results of the examination are depicted in **FIG. 14**. The data presented show that the device **5** can distinguish between different loading concentrations and configurations. Further data is presented in the following tables.

	Device No.:				
	1	2	3	4	Grand Avg.
	First Data Set				
Device Avg. G	41	46	47	39	43
Device Avg. B	19	27	31	18	24
Device Avg. Y	53	69	50	59	58
	Second Data Set				
Device Avg. G	58	65	66	45	58
Device Avg. B	53	64	63	33	53
Device Avg. Y	19	28	38	16	25