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TOUCHLESS FOOD DISPENSER

Abstract

A touchless food dispenser. The touchless food dispenser includes one or more types of food stored therein, one or more removable nozzles, and one or more nozzle replacement mechanisms. The touchless food dispenser is configured to dispense the food through the one or more removable nozzles. The one or more nozzle replacement mechanisms are configured to remove the one or more removable nozzles and replaces the one or more removable nozzles with a different removable nozzle.

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Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS [0001] This application is a continuation of U.S. patent application Ser. No. 18/421,630, filed Jan. 24, 2024, which is a continuation of U.S. patent application Ser. No. 18/148,596, filed Dec. 30, 2022, issued as U.S. Pat. No. 11,918,152, which claims priority to U.S. Provisional Patent Application No. 63/398,125, filed Aug. 15, 2022, the entire contents of which are hereby incorporated by reference in their entirety. The present application is related to co-pending U.S. patent application Ser. No. 18/148,555, filed Dec. 30, 2022, issued as U.S. Pat. No. 11,935,352, the entire content of which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD
[0002] The present disclosure relates to a touchless food dispenser.
BACKGROUND
[0003] Food, such as, condiments, spices, etc., is provided by many different types of food vendors, such as restaurants, concessions, food courts, food trucks, etc. Such food can be provided in packets (e.g., packets of condiments, packets of spices, etc.), and/or can be provided in a dispenser such that the food is dispensed from the dispenser.
BRIEF SUMMARY
[0004] According to an embodiment, a touchless food dispenser includes one or more types of food stored therein, one or more removable nozzles, wherein the touchless food dispenser is configured to dispense the food through the one or more removable nozzles, and one or more nozzle replacement mechanisms that are configured to remove the one or more removable nozzles and replace the one or more removable nozzles with a different removable nozzle.
[0005] According to an embodiment, a method of dispensing food from a touchless food dispenser includes receiving a selected type of food to dispense from a touchless food dispenser, the touchless food dispenser storing one or more types of food therein, dispensing the selected type of food through one or more removable nozzles from the touchless food dispenser with, and removing, with one or more nozzle replacement mechanisms, the one or more removable nozzles and replacing, with the one or more nozzle replacement mechanisms, the one or more removable nozzles with a different removable nozzle.
[0006] According to an embodiment, a touchless food dispenser control system includes a touchless food dispenser comprising one or more types of food stored therein and one or more removable nozzles and a controller configured to control the touchless food dispenser to dispense the food through the one or more removable nozzles, and to remove, with one or more nozzle replacement mechanisms, the one or more removable nozzles and replace, with the one or more nozzle replacement mechanisms, the one or more removable nozzles with a different removable nozzle.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
[0007] The foregoing and other features and advantages will be apparent from the following, more particular, description of various exemplary embodiments, as illustrated in the accompanying drawings, wherein like reference numbers generally indicate identical, functionally similar, and/or

structurally similar elements.
[0008] FIG. **1** illustrates a schematic, front perspective view of a touchless food dispenser, according to an embodiment of the present disclosure.
[0009] FIG. **2**A illustrates a schematic, front perspective view of a touchless food dispenser, according to another embodiment of the present disclosure.
[0010] FIG. **2**B illustrates a schematic, front cutaway view of the touchless food dispenser of FIG. **2**A, according to the present disclosure.
[0011] FIG. **2**C illustrates a schematic, side cutaway view of the touchless food dispenser of FIG. **2**A, according to the present disclosure.
[0012] FIG. **3** is a schematic, side cutaway view of a touchless food dispenser, according to another embodiment.
[0013] FIG. **4** is a schematic, side cutaway view of a touchless food dispenser, according to another embodiment.
[0014] FIG. **5** is a block diagram of a touchless food dispenser control system, according to an embodiment of the present disclosure.
[0015] FIG. **6** is a flow diagram of a method of dispensing food from a touchless food dispenser, according to an embodiment of the present disclosure.
[0016] FIG. **7**A illustrates a schematic, front perspective view of a touchless food dispenser, according to another embodiment of the present disclosure.
[0017] FIG. **7**B illustrates a schematic, front cutaway view of the touchless food dispenser of FIG. **7**A, according to the present disclosure.
[0018] FIG. **7**C is a schematic, front cutaway view of the touchless food dispenser of FIG. **7**A, according to the present disclosure.
[0019] FIG. **8** is a block diagram of a touchless food dispenser control system, according to another embodiment of the present disclosure.
[0020] FIG. **9** is a flow diagram of a method of dispensing food from a touchless food dispenser, according to another embodiment of the present disclosure.
[0021] FIG. **10** illustrates a computer system, according to an embodiment of the present disclosure.

DETAILED DESCRIPTION

[0022] Various embodiments are discussed in detail below. While specific embodiments are discussed, this is done for illustration purposes only. A person skilled in the relevant art will recognize that other components and configurations may be used without departing from the spirit and scope of the present disclosure.
[0023] As used herein, the terms “first,” “second,” “third,” “fourth,” etc., may be used interchangeably to distinguish one component from another and are not intended to signify location or importance of the individual components.
[0024] The terms “front,” “rear,” “top,” “bottom,” “right side,” and “left side” refer to relative positions of the touchless food dispenser based on the orientation shown in FIGS. **1**, **2**A, and **5**A.
[0025] The terms “coupled,” “fixed,” “attached,” “connected,” and the like, refer to both direct coupling, fixing, attaching, or connecting as well as indirect coupling, fixing, attaching, or connecting through one or more intermediate components or features, unless otherwise specified herein.
[0026] The singular forms “a,” “an,” and “the” include plural references unless the context clearly dictates otherwise.
[0027] As used herein, “automated” or “automatic,” or the like, are used to describe functions that are done without user intervention (e.g., by a controller).
[0028] As used herein, “touchless” refers to an apparatus that is operated by means of gestures from a user rather than by touching a control or interface on the apparatus. For example, the touchless food dispensers disclosed herein dispense a food item (e.g., condiments, spices, chopped

food, or the like) without a user touching the touchless food dispenser to control the dispensing.
[0029] As used herein, a “condiment” is a supplemental food that is added to food to impart or enhance its flavor. For example, a “condiment” includes food sauces (e.g., ketchup, mustard, relish, mayonnaise, BBQ, sauces, fruit sauces, tomato sauces, etc.), desert sauces and toppings (e.g., chocolate, strawberry, sprinkles, etc.), and prepared sauces such as Hollandaise sauces, salad dressings, liquids (e.g., oil, vinegar, etc.), syrups, etc.
[0030] As used herein, a “spice” is a seed, a fruit, a root, bark, or other plant substance primarily used for flavoring or coloring food. For example, spices (e.g., salt, pepper, oregano, cumin, etc.) have a definite flavor, aroma, intensity, and color to be used for enhancing the flavor and aroma of foods.
[0031] As used herein, a “packet” or a “pouch” is a package or container that contains a single-serving of food therein. Such packets can be made of paper, foil, plastic, or any other type of packing material. The single-serving can include any size, any amount, and/or any weight of food based on the type of food that the packet contains. For example, a single-serving of mayonnaise can be larger than a single-serving of ketchup, or vice-versa. A packet of a food can be, for example, less than one half ounce (0.5 oz), less than one ounce (1 oz), less than two ounces (2 oz), less than three ounces (3 oz), or any size containing a single-serving of the food. In preferred embodiments, a packet of food is less than one ounce (1 oz) or less than one half ounce (0.5 oz).
[0032] As used herein, the term “perforation” refers to the point of separation between individual packets of food and can be defined by a score, an opening, or a row of openings formed in the packets such that an individual packet can be separated from the other packets within a roll of packets.
[0033] Food, such as, condiments, spices, solid food, liquid foods (e.g., syrup, vinegar, oil), etc., is provided by many different types of food vendors, such as restaurants, supermarkets, concessions, food courts, food trucks, airports, ski lodges, etc. Such food can be provided in packets (e.g., packets of condiments, packets of spices, etc.), and/or can be provided in a dispenser such that the food is dispensed from the dispenser. In either method of providing the food, a user, such as a customer or an employee, needs to physically touch the packets or the dispenser (e.g., a handle of the dispenser that the user pushes to dispense the food). The packets, the dispensers, or the food itself, collects bacteria or viruses since multiple users touch the packets, the dispensers, and/or the food. Thus, providing food in such a way is unsanitary and can lead to cross-contamination on the packets, the dispenser, and the food. Further, some dispensers may include nozzles or the like that can be removed from the dispenser, cleaned, and replaced into the dispenser. Such nozzles are supposed to be cleaned daily to insure cleanliness of the nozzles. However, often the nozzles are not cleaned as much as required, and/or the nozzles are not properly or entirely cleaned. Accordingly, such nozzles are also unsanitary.
[0034] Another problem with providing food in such ways is that the amount of food dispensed or provided is inconsistent. For example, an employee may provide more packets to a customer than the customer actually uses, or the customer may dispense more food than they actually use. Further, the amount of food dispensed from the dispenser is unregulated and is dependent on how the user pushes down on the handle to pump the food from the dispenser. The excess packets or the excess food that is dispensed is often disposed of when the user does not use the excess food. Accordingly, by providing the food in such ways is wasteful and creates unnecessary costs for the business owner supplying the food.
[0035] Further, such methods of providing the food can be difficult or tedious for the employee or for the customer. For example, the packets of food (e.g., condiment packets) are difficult and time-consuming to manually open one by one. Often, the dispensers are manual dispensers that the user needs to manually push the handle to dispense the food. In some instances, the dispenser can include a machine that dispenses the food when the user pushes and holds a button. In such instance, the user still needs to physically touch the dispenser to dispense the food.

[0036] Therefore, there is a need for a touchless food dispenser, as disclosed herein. The touchless food dispensers of the present disclosure provide for an apparatus that automatically dispenses food without the user having to physically touch the touchless food dispenser. The food can include condiments, spices, chopped or sliced food (e.g., lettuce, onions, tomatoes, etc.), or any type of dispensable food. The touchless food dispenser can dispense the food, for example, onto another food item (e.g., onto a hamburger), into a receptacle (e.g., a condiment cup), onto a plate, into the user's hand (e.g., a condiment packet), or otherwise can dispense food from the touchless food dispenser. The touchless food dispensers can store various types of food for dispensing. For example, the touchless food dispensers can store different types of condiments, different types of spices, different types of chopped food, or combinations thereof (e.g., can store condiments, spices, and chopped food together).

[0037] The user can use gestures (e.g., moving a hand in front of the dispenser) to automatically dispense the desired food. In this way, the touchless food dispensers disclosed herein can dispense food without the user physically touching the food. The touchless food dispensers of the present disclosure can be configured for use by employees (e.g., back of the house), for use by customers (e.g., back of the house), or for use by any type of user. The touchless food dispensers can dispense a predetermined amount of food therein. For example, an operator, such as a business owner, can configure or otherwise program the touchless food dispenser with the predetermined amount of food to dispense every time a user gestures to dispense food. The predetermined amount of food can be measured by weight (e.g., ounces), by volume (e.g., fluid ounces, milliliters, etc.), or the like. In some embodiments, the user can input a desired an amount of food to dispense. For example, the user can input a number of servings to dispense. The servings can include a predetermined serving size (e.g., 1 serving equal to 1 fluid ounce of food, or 1 serving equal to 1 packet of food, etc.). The user can use a smartphone or the like to input the desired amount of servings to dispense. A mobile application can store the user's preferences or the like such that the user can dispense the same amount of food (e.g., by scanning a barcode, a QR code, or the like) from the touchless food dispenser.

[0038] In some embodiments, the touchless food dispenser can dispense packets of food (e.g., packets of condiments, packets of spices, etc.). The packets can be coupled together and bundled into a roll. As the packets are dispensed from the touchless food dispenser, the roll can unwind. When the roll is depleted of packets, the roll can be removed from the touchless food dispenser and replaced with a new roll of packets. The touchless food dispenser can automatically open the packets as the packets are being dispensed. In some embodiments, the touchless food dispenser can dispense the food from the packets.

[0039] In another embodiment, the touchless food dispenser stores the food therein and dispenses the food directly, rather than dispensing packets. For example, the touchless food dispenser can store various types of food in different vats, reservoirs, bags, or the like. The touchless food dispenser can pump or otherwise force the food out of the touchless food dispenser when the user gestures in front of the touchless food dispenser. The touchless food dispenser includes removable nozzles through which the food is dispensed. The removable nozzles include single-use nozzles that are removed from the touchless food dispenser after food has been dispensed through the nozzle. The removable nozzles can be removed and replaced with a new removable nozzle each time food has been dispensed. In some embodiments, the removable nozzles define a receptacle for receiving the food therein. The food can be dispensed into the removable nozzle and the user can take the removable nozzle with the food therein. In some embodiments, the touchless food dispenser can automatically remove and replace the removable nozzles.

[0040] Thus, the touchless food dispensers disclosed herein provide for dispensers that do not require users to physically touch the dispenser to cause the dispenser to dispense the food. The amount of food dispensed can be controlled, as detailed above, such that wasted food is reduced. Accordingly, the touchless food dispensers disclosed herein provide for various embodiments of a

sanitary and portion-regulated apparatus to solve the problems detailed above.

[0041] Referring now to the drawings, FIG. **1** illustrates a schematic, front perspective view of a touchless food dispenser **10**, according to an embodiment of the present disclosure. The arrangement of the components of the touchless food dispenser **10** shown in FIG. **1** are exemplary only, and the components may be arranged in any configuration, as desired, without deviating from the present disclosure. The touchless food dispenser **10** includes a casing **12** that defines a front side **14**, a rear side **16**, a left side **18**, a right side **20**, a bottom side **22**, and a top side **24**, per the orientation of the touchless food dispenser **10** shown in FIG. **1**. While the exemplary embodiment shows the casing **12** having a generally rectangular configuration, the casing **12** of the touchless food dispenser **10** can have any configuration, shape, and/or size, as desired. The touchless food dispenser **10** can store one or more types of food within the casing **12** for being dispensed from the touchless food dispenser **10** (e.g., out of the casing **12**), as detailed further below. For example, the touchless food dispenser **10** can store condiments, spices, chopped foods (e.g., onions, lettuce, tomatoes, etc.), or the like for being dispensed from the touchless food dispenser **10** into a receptacle (e.g., a condiment cup), onto a food item (e.g., onto a hamburger), or otherwise dispensed out of the touchless food dispenser **10**. In some embodiments, the touchless food dispenser **10** can dispense out packets of food (e.g., a packet of ketchup) such that a user can grab or otherwise take the dispensed packets of food from the touchless food dispenser **10**, as detailed further below.

[0042] The touchless food dispenser **10** includes one or more dispensing mechanisms **30** for dispensing one or more types of food, such as one or more condiments, from the touchless food dispenser **10**. The one or more dispensing mechanisms **30** can include slots, nozzles, apertures, or any other dispensing mechanisms. In the exemplary embodiment, the one or more dispensing mechanisms **30** include three such dispensing mechanisms **30** including as a first dispensing mechanism **30***a*, a second dispensing mechanism **30***b*, and a third dispensing mechanism **30***c*. The one or more dispensing mechanisms **30** may include any number of dispensing mechanisms **30** for dispensing any number of types of food, as desired. The touchless food dispenser **10** includes a dispensing area **32** in which the one or more dispensing mechanisms **30** are oriented to dispense the food.

[0043] The touchless food dispenser **10** also includes one or more user proximity sensors **40** and one or more dispenser proximity sensors **42**. The one or more user proximity sensors **40** are positioned and oriented to detect a user in front of, or otherwise near or proximate, the touchless food dispenser **10**. The one or more user proximity sensors **40** produce signals indicative of when something (e.g., a user) is positioned in front of the touchless food dispenser **10**. The signals from the one or more user proximity sensors **40** may be used to control the dispensing of the food from the touchless food dispenser **10**, as detailed further below. For example, the signals from the one or more user proximity sensors **40** may be used to prevent dispensing of the food from the touchless food dispenser **10** when no signal is generated (e.g., there is no user in front of the touchless food dispenser **10**). The one or more user proximity sensors **40** can include any type of proximity sensor for detecting the presence of nearby objects without any physical contact. For example, the proximity sensors can include a capacitive proximity sensor, a photoelectric proximity sensor, an optical proximity sensor, or the like. The proximity sensors can include any type of sensor for detecting an object, such as cameras, sonar, lidar, etc.

[0044] The one or more dispenser proximity sensors **42** are positioned and oriented to detect an object, such as a receptacle for receiving the dispensed food, a food item, a user's hand, etc., in front of, or below, a respective dispensing mechanism **30**. The one or more dispenser proximity sensors **42** include a proximity sensor associated with each of the one or more dispensing mechanisms **30**. For example, the one or more dispenser proximity sensors **42** include one or more first dispenser proximity sensors **42***a* associated with the first dispensing mechanism **30***a*, one or more second dispenser proximity sensors **42***b* associated with the second dispensing mechanism

30*b*, and one or more third dispenser proximity sensors **42***c* associated with the third dispensing mechanism **30***c*. The one or more dispenser proximity sensors **42** produce signals indicative of when something (e.g., a receptacle, a food item, a user's hand, etc.) is positioned below or in front of a respective dispensing mechanism **30**. The signals from the one or more dispenser proximity sensors **42** may be used to control the dispensing of the food from the touchless food dispenser **10**, as detailed further below. For example, the signals from the one or more dispenser proximity sensors **42** may be used to prevent dispensing of the food from the touchless food dispenser **10** when no signal is generated (e.g., there is no receptacle, no food item, no hand, etc. in front of, or below, a respective dispensing mechanisms **30**). The one or more dispenser proximity sensors **42** can include any type of proximity sensor for detecting the presence of nearby objects without any physical contact. For example, the proximity sensors can include a capacitive proximity sensor, a photoelectric proximity sensor, an optical proximity sensor, or the like. The proximity sensors can include any type of sensor for detecting an object, such as cameras, sonar, lidar, etc.

[0045] In some embodiments, the touchless food dispenser **10** includes a display **50**. The display **50** can display the various types of food that are available in the touchless food dispenser **10** for dispensing, can display a selected type of food for dispensing from the touchless food dispenser **10**, can display an amount of food being dispensed, and/or can display advertisements, pictures, video or text. In some embodiments, the display **50** can function as a user input device to configure aspects of the touchless food dispenser **10**. For example, the display **50** can display a graphical user interface configured to receive input from a user. In this way, the display **50** can include a touch screen display. In some embodiments, other forms of user interfaces may be utilized, such as physical keyboards, a computer mouse, gestures, or wireless communications for receiving input from a computing device, such as a mobile phone or the like, as detailed further below. In some embodiments, the display **50** may receive user input to configure a predetermined amount of food to dispense, to receive a selection of a type of food to dispense, or to configure other aspects of the touchless food dispenser **10**.

[0046] In operation, the touchless food dispenser **10** can detect a user is in proximity of the touchless food dispenser **10** (e.g., by receiving the signal from the one or more user proximity sensors **40**). When the user is in proximity to the touchless food dispenser **10**, the user can select a particular type of food to dispense from the touchless food dispenser **10**. For example, the user can gesture (e.g., with the user's hand) in front of, or below, a particular dispensing mechanism **30**. The touchless food dispenser **10** can detect the user is in proximity to the particular dispensing mechanism **30** based on a signal received from the dispenser proximity sensor **42** associated with the particular dispensing mechanism **30**. Based on the signal received from the dispenser proximity sensor **42**, the touchless food dispenser **10** then dispenses a portion of the food from the dispensing mechanism **30**. Thus, the touchless food dispenser **10** dispenses food without the user having to physically touch the touchless food dispenser **10** to cause the touchless food dispenser **10** to dispense the food.

[0047] In some embodiments, the touchless food dispenser **10** dispenses a predetermined amount of food every time a user gestures in front of, or below, a particular dispensing mechanism **30**. For example, the touchless food dispenser **10** can be programmed or can otherwise store a predetermined amount of food (e.g., fluid ounces, milliliters, etc.) for dispensing. When the user gestures in front of, or below, the particular dispensing mechanism **30**, the touchless food dispenser **10** dispenses the predetermined amount of food and then stops dispensing food until the user or another user gestures in front of, or below, the particular dispensing mechanism **30** again. In some embodiments, the touchless food dispenser **10** can dispense the food for as long as the user is gesturing in front of, or below, the particular dispensing mechanism **30**. In some embodiments, the user can input a selection of a type of food to dispense and/or an amount of food to dispense via, for example, the display **50**, a computing device (e.g., a smartphone), or the like. The user can then gesture in front of, or below, the particular dispensing mechanism **30** and the touchless food

dispenser **10** will dispense the selected type of food and/or the selected amount of food when the user gestures in front of, or below, a particular dispensing mechanism **30**.

[0048] Additional features and aspects of the present disclosure will become apparent as detailed below with respect to FIGS. **2**A to **8**.

[0049] FIGS. **2**A to **2**C illustrate various views of a touchless food dispenser **210**, according to another embodiment. FIG. **2**A illustrates a schematic, front perspective view of the touchless food dispenser **210**, FIG. **2**B illustrates a schematic, front cutaway view of the touchless food dispenser **210** with a front portion of the touchless food dispenser **210** removed such that an inner portion **211** of the touchless food dispenser **210** is shown, and FIG. **2**C illustrates a schematic right side cutaway view of the touchless food dispenser **210** with a side of the touchless food dispenser **210** removed such that the inner portion **211** of the touchless food dispenser **210** is shown. The touchless food dispenser **210** can be utilized as the touchless food dispenser **10**, shown and described with respect to FIG. **1**. The arrangement of the components of the touchless food dispenser **210** shown in FIGS. **2**A to **2**C are exemplary only, and the components may be arranged in any configuration, as desired, without deviating from the present disclosure.

[0050] Referring to FIG. **2**A, the touchless food dispenser **210** includes a casing **212** that defines a front side **214**, a rear side **216**, a left side **218**, a right side **220**, a bottom side **222**, and a top side **224**, per the orientation of the touchless food dispenser **210** shown in FIG. **2**A. While the exemplary embodiment shows the casing **212** having a generally rectangular configuration, the casing **212** of the touchless food dispenser **210** can have any configuration, shape, and/or size, as desired. The touchless food dispenser **210** can store one or more types of food within the casing **212** for being dispensed from the touchless food dispenser **210**, as detailed further below. For example, the touchless food dispenser **210** can store packets **260** of condiments, spices, chopped foods (e.g., onions, lettuce, tomatoes, etc.), or the like for being dispensed from the touchless food dispenser **210** (e.g., out of the casing **212**) into a receptacle (e.g., a condiment cup), onto a food item (e.g., onto a hamburger), or otherwise dispensed out of the touchless food dispenser **210**. The packets **260** can be bundled together in a roll and dispensed from the touchless food dispenser **210**, as detailed further below.

[0051] The touchless food dispenser **210** includes one or more dispensing mechanisms, such as one or more apertures **230** for dispensing one or more types of food from the touchless food dispenser **210**. The one or more apertures **230** can include holes or slots for dispensing the food or packets **260** of the food from the touchless food dispenser **210**. In the exemplary embodiment, the one or more apertures **230** include four such apertures **230** including as a first aperture **230***a*, a second aperture **230***b*, a third aperture **230***c*, and a fourth aperture **230***d*. The one or more apertures **230** may include any number of apertures **230** for dispensing any number of types of food, as desired, and may be sized and shaped for dispensing food from the packets **260** or for dispensing the packets directly from the touchless food dispenser **210**. The touchless food dispenser **210** includes a dispensing area **232** in which the one or more apertures **230** are oriented to dispense the food or the packets **260** of food from the touchless food dispenser **210**.

[0052] The touchless food dispenser **210** also includes one or more user proximity sensors **240** and one or more dispenser proximity sensors **242**. The one or more user proximity sensors **240** are positioned and oriented to detect a user in front of, or otherwise near or proximate, the touchless food dispenser **210**, as detailed above with respect to the user proximity sensors **40** of FIG. **1**. The one or more dispenser proximity sensors **242** are positioned and oriented to detect an object, such as a receptacle for receiving the dispensed food, a food item, a user's hand, etc., in front of, or below, a respective apertures **230**, as detailed above with respect to the dispenser proximity sensors **42** of FIG. **1**. The one or more dispenser proximity sensors **242** include a proximity sensor associated with each of the one or more apertures **230**. For example, the one or more dispenser proximity sensors **242** include one or more first dispenser proximity sensors **242***a* associated with the first aperture **230***a*, one or more second dispenser proximity sensors **242***b* associated with the

second aperture **230***b*, one or more third dispenser proximity sensors **242***c* associated with the third aperture **230***c*, and one or more fourth dispenser proximity sensors **242***d* associated with the fourth aperture **230***d*.

[0053] In some embodiments, the touchless food dispenser **210** includes a display **250**. The display **250** can display the various types of food that are available in the touchless food dispenser **210** for dispensing, can display a selected type of food for dispensing from the touchless food dispenser **210**, can display an amount of food being dispensed, and/or can display advertisements, pictures, video or text, as detailed above with respect to the display **50** of FIG. **1**.

[0054] FIG. **2**B shows the front side **214** of the inner portion **211** of the touchless food dispenser **210**. As shown in FIG. **2**B, the touchless food dispenser **210** includes one or more rolls **262** of packets **260**. In the exemplary embodiment, the one or more rolls **262** of packets **260** include a first roll **262***a* of first packets **260***a* of food, a second roll **262***b* of second packets **260***b* of food, a third roll **262***c* of third packets **260***c* of food, and a fourth roll **262***d* of fourth packets **260***d* of food. Each roll **262** of packets **260** can include a different type of food. For example, the first packets **260***a* include a first type of food (e.g., ketchup), the second packets **260***b* include a second type of food (e.g., mustard), the third packets **260***c* include a third type of food (e.g., relish), and the fourth packets **260***d* include a fourth type of food (e.g., mayonnaise). The rolls **262** of packets **260** may include any number of rolls with any number of different types of food. The packets **260** of a respective roll **262** are coupled or otherwise connected together to form the respective roll **262**. An individual packet **260** can be separated from the other packets **260** of the roll **262** when the individual packet **260** is dispensed from the touchless food dispenser **210**, as detailed further below. In some embodiments, the rolls **262** can include a single packet **260** of food without perforations or other separations. In such embodiments, the touchless food dispenser **210** can dispense the food from the packet **260** out of the touchless food dispenser **210** without dispensing individual packets **260**.

[0055] The packets **260** of food can include one or more perforations **261** (only one of which is labeled in FIG. **2**B for clarity) that separate each packet **260** of a respective roll **262**. Perforations refers to the point of separation between individual packets **260** of food and can be defined by a score, an opening, or a row of openings formed in the packets **260** such that an individual packet **260** can be separated from the other packets **260** of the respective roll **262**. The perforations **261** are dimensioned to define an edge of an individual packet **260** and to assist in separation of individual packets **260** from the respective roll **262**. Each roll **262** includes many perforations **261** separating the many different packets **260** on the respective roll **262**. Each roll **262** can include any number of packets **260** as desired.

[0056] The touchless food dispenser **210** includes one or more food storage containers **270** for storing one or more types of food. For example, the one or more rolls **262** of packets **260** are mounted and stored within a respective food storage container **270**. In the exemplary embodiment, the one or more food storage containers **270** include a first food storage container **270***a* that stores the first roll **262***a*, a second food storage container **270***b* that stores the second roll **262***b*, a third food storage container **270***c* that stores the third roll **262***c*, and a fourth food storage container **270***d* that stores the fourth roll **262***d*. The food storage containers **270** may include any number of food storage containers with any number of different types of food. In some embodiments, the touchless food dispenser **210** includes a single food storage container **270** that stores the various rolls **262**. Each food storage container **270** may include a door or the like for providing access to the food storage container **270**. In this way, an operator of the touchless food dispenser **210** can insert the rolls **262** into the food storage containers **270**. In some embodiments, the touchless food dispenser **210** includes a single door that opens all of the food storage containers **270** at once. In some embodiments, each food storage container **270** includes a separate door such that each food storage container **270** can be opened individually. Thus, the rolls **262** can be removed and replaced with new rolls **262** when the rolls **262** are empty (e.g., after all or nearly all of the packets **260** of a roll

262 have been dispensed).
[0057] The touchless food dispenser **210** also includes a power supply **280**, a refrigeration device **282**, and a controller **504**. The power supply **280** provides electric power to the various electronic components of the touchless food dispenser **210**. The power supply **280** can include, for example, a power chord that plugs into a corresponding power outlet, one or more batteries, or any other type of power supply. The refrigeration device **282** can control the climate (e.g., the temperature) within the touchless food dispenser **210** such as to control the temperature of the food that is stored within the touchless food dispenser **210**. In some embodiments, the touchless food dispenser includes a heating device to heat aspects of the touchless food dispenser **210**. In exemplary embodiments, the heating and/or refrigeration devices may heat or cool the touchless food dispenser **210** to a specified temperature or within a specified temperature range to heat or to cool the food stored within the touchless food dispenser **210**. The controller **504** can control aspects of the touchless food dispenser **210** to automatically dispense a portion of the food, as detailed further below.
[0058] FIG. **2**C shows the right side **220** of the inner portion **211** of the touchless food dispenser **210**. As shown in FIG. **2**C, the touchless food dispenser **210** includes one or more mounting rollers **264** for mounting a respective roll **262** of packets **260** thereon. In this way, the rolls **262** are mounted within the inner portion **211** of the touchless food dispenser **210**. The mounting rollers **264** can include a removable portion such that the rolls **262** can be removed and replaced with a new roll **262** when a respective roll **262** runs out or is otherwise low on packets **260**. The packets **260** are arranged to be fed through the respective apertures **230** when the touchless food dispenser **210** is controlled to dispense the packets **260**. For example, the apertures **230** are sized and shaped to receive the packets **260**.
[0059] The touchless food dispenser **210** includes a powered roller assembly **271**. The powered roller assembly **271** includes one or more drive rollers **272**, one or more sensor rollers **274**, and one or more electric motors **276**. The one or more drive rollers **272** are generally cylindrical, rotatable rollers. The one or more drive rollers **272** are mechanically connected to the electric motor **276** to drive the one or more drive rollers **272** via a transmission. The transmission includes one or more gears or the like, or may include a belt and pulley, wheels, or other such power transmitting devices to transmit power from the electric motor **276** to the one or more drive rollers **272** to drive (e.g., to rotate) the one or more drive rollers **272**. A belt **275** is looped about one of the driver rollers **272** and one of the sensor rollers **274**. When the roll **262** of packets **260** of food is mounted within the touchless food dispenser **210**, the packets **260** of the roll **262** are fed, or driven, by the belt **275** and towards the aperture **230** as the one or more drive rollers **272** rotate. As the packets **260** are driven between the one or more drive rollers **272**, the one or more driver rollers **272** pinch or otherwise squeeze the packets **260**. While the exemplary embodiment of FIG. **2**C shows two such drive rollers **272**, the touchless food dispenser **210** can include any number of drive rollers **272** as desired. For example, the packets **260** can be fed between a single drive roller **272** and a non-powered roller that is configured to be rotated by the drive roller **272**. In some embodiments, the packets **260** are fed towards the aperture **230** by means other than rollers and belts, such as, for example, a mechanical or spring-loaded arm mechanism, or any other type of device for feeding the packets **260** towards the aperture **230** to be dispensed out of the aperture **230**.
[0060] The one or more sensor rollers **274** are generally cylindrical, rotatable rollers. The one or more sensor rollers **274** are connectable to the electric motor **276** by a transmission, such as by gears, a belt and pulley, wheels, or the like. The one or more sensor rollers **274** are configured to be driven such that the one or more sensor rollers **274** have a slower surface speed than the one or more drive rollers **272**. In this way, tension is created in the roll **262** of packets **260** between the one or more sensor rollers **274** and the one or more drive rollers **272** such that the perforations **261** can be expanded. Alternatively, the one or more sensor rollers **274** are not attached to the electric motor **276** but are configured to be rotated by contact with the packets **260**.
[0061] The electric motor **276** is an electric machine that converts electrical energy into mechanical

energy. For example, the electric motor **276** receives electric power from the power supply **280** and transmits mechanical power to the one or more drive rollers **272** via the transmission. The electric motor **276** can include any type of electric motor, as desired, for providing mechanical power to the one or more drive rollers **272**.

[0062] The touchless food dispenser **210** also includes a packet sensor **277** for detecting the presence of a packet **260** as the packet **260** passes the packet sensor **277**. For example, the packet sensor **277** is configured to generate a signal (e.g., a packet signal) indicative of the presence of a packet **260**. The packet sensor **277** can sense the packets **260**, and the controller **504** can determine a number of packets **260** that are being fed towards the aperture **230**, perforations in the packets **260** as the packets **260** pass the packet sensor **277**, and/or a length of a packet **260** as the packet **260** passes the packet sensor **277**. The packet sensor **277** is a photo-electronic device or like device for detecting the presence of packets **260**. In some embodiments, the packet sensor **277** detects the presence of a perforation **261** in the packets **260**. In such embodiments, the packet sensor **277** includes a light source and a photo-conductive receiver operable to detect light from the light source. The sensor is configured to generate a signal when it receives the light from the light source. For example, the light source is normally blocked by the packets **260** between the light source and the photo-conductive receiver. However, if a perforation **261** is positioned between the light source and the photo-conductive receiver, then light passes through the perforation **261** to the receiver and the packet sensor **277** generates the perforation signal. The packet sensor **277** can include any type of sensor for detecting packets **260** and/or perforations **261** in the packets **260**. For example, the packet sensor **277** can be capacitive and use a capacitive coupled the packet sensor **277**. The packet sensor **277** can be based on mechanical detection, can be based on Hall effect, or can be based on a change in radio frequency, or any other method to detect individual packets **260** as the packets **260** move past the packet sensor **277**.

[0063] The touchless food dispenser **210** also includes a cutting mechanism **278** for cutting or otherwise opening the packets **260** prior to, or in parallel with, a respective packet **260** being dispensed through the aperture **230**. The cutting mechanism **278** includes a blade or the like for cutting or otherwise remove an individual packet **260** from the roll **262** such that the individual packet **260** can be removed from the touchless food dispenser **210**. For example, a user can remove the dispensed packet **260** by tearing the packet **260** at the perforation **261** on the cutting mechanism **278**. In some embodiments, cutting the packet **260** with the cutting mechanism **278** opens the packet **260** such that the user does not need to tear the packet **260** open after removing the packet **260** from the touchless food dispenser **210**.

[0064] In some embodiments, the cutting mechanism **278** is a powered cutting mechanism such that the cutting mechanism **278** can automatically cut, tear, or otherwise separate or open a respective packet **260** as the packet **260** is being dispensed through the aperture **230**. For example, the cutting mechanism **278** can include an actuator or other device for moving the blade such that the cutting mechanism **278** automatically cuts the packet **260** open or cuts the packets **260** at the perforation **261** to separate the packets **260** from the roll **262**. In this way, the cutting mechanism **278** can receive electric power from the power supply **280** and can be controlled by the controller **504** to perform a cutting action, as detailed further below.

[0065] The touchless food dispenser **210** can also be in communication with a computing device **290**, such as, for example, a smartphone, a table, a computer, a laptop, or the like. In some embodiments, the touchless food dispenser **210** can receive user input from the computing device **290**. In this way, the user can input commands to the controller **504**, to control aspects of the touchless food dispenser **210**, as detailed further below. For example, the computing device **290** can display a graphical user interface (e.g., via a mobile application) such that the user can input a selection of a type of food for dispensing from the touchless food dispenser **210**, a selection of an amount of the food to dispense, or any other user input can be input to the controller **504** from the computing device **290**. In this way, the user can control aspects of the touchless food dispenser **210**

without physically touching the touchless food dispenser **210**. In some embodiments, the mobile application can store user preferences including the amount of food to dispense. The user preferences can be sent to the touchless food dispenser **210** (e.g., via a numerical code, via a barcode, via a QR code, via wireless communication, or the like) and the touchless food dispenser **210** can automatically dispense the food based on the user preferences.

[0066] FIG. **3** is a schematic, side cutaway view of a touchless food dispenser **310**, according to another embodiment. The touchless food dispenser **310** is substantially similar to the touchless food dispenser **210** of FIGS. **2**A to **2**C. The touchless food dispenser **310**, however, includes a stack **362** of packets **360** rather than a roll of packets. The touchless food dispenser **310** includes one or more food storage containers **370** for storing the stack **362** of packets **360**. Each food storage container **370** can store packets **360** having a specific type of food, such as, for example, a stack of ketchup packets, a stack of mustard packets, a stack of relish packets, etc. The packets **360** of the stack **362** can be coupled together at one or more perforations or can be separate and individually placed in the stack **362** within a respective food storage container **370**.

[0067] The one or more food storage containers **370** can include a feed mechanism **373** for releasing an individual packet **360** from the respective food storage container **370** such that individual packet **360** is directed towards the aperture **230**. For example, the packets **360** can be deposited onto the belt **275** and directed towards the aperture **230**. The feed mechanism **373** is a mechanical arm or spring-loaded arm that is controlled to be actuated (e.g., by the controller **504**) to release an individual packet **360** from the food storage container **370** such that the packet **360** is directed towards the aperture **230** to be dispensed from the aperture **230**. The feed mechanism **373** can include any type of mechanism or device for releasing packets **360** from the one or more food storage containers **370**.

[0068] FIG. **4** is a schematic, side cutaway view of a touchless food dispenser **410**, according to another embodiment. The touchless food dispenser **410** is substantially similar to the touchless food dispenser **210** of FIGS. **2**A to **2**C. The touchless food dispenser **310**, however, includes a pile **462** of packets **460** rather than a roll of packets or a stack of packets. The touchless food dispenser **410** includes one or more food storage containers **470** for storing the pile **462** of packets **460**. Each food storage container **470** can store packets **460** having a specific type of food, such as, for example, a stack of ketchup packets, a stack of mustard packets, a stack of relish packets, etc. The packets **460** of the pile **462** can be coupled together at one or more perforations or can be separate and individually placed in the pile **462** within a respective food storage container **470**. In this way, a person can pour or otherwise place the packets **460** into the food storage container **470** in order to fill the food storage container **470** with packets **460**.

[0069] The one or more food storage containers **470** can include a feed mechanism **473** for releasing an individual packet **460** from the respective food storage container **470** such that individual packet **460** is directed towards the aperture **230**. For example, the packets **460** can be deposited onto the belt **275** and directed towards the aperture **230**. The feed mechanism **473** is a mechanical arm or spring-loaded arm that is controlled to be actuated (e.g., by the controller **504**) to release an individual packet **460** from the food storage container **470** such that the packet **460** is directed towards the aperture **230** to be dispensed from the aperture **230**. The feed mechanism **473** can include any type of mechanism or device for releasing packets **460** from the one or more food storage containers **470**.

[0070] FIG. **5** is a block diagram of a touchless food dispenser control system **500**, for operation and control of at least portions of the touchless food dispenser **210** (FIGS. **2**A to **2**C). While the touchless food dispenser **210** is described herein, the touchless food dispenser control system **500** can be used to control the touchless food dispenser **310** of FIG. **3** and/or the touchless food dispenser **410** of FIG. **4**, respectively.

[0071] The touchless food dispenser control system **500** includes inputs **502**, the controller **504**, and outputs **506**. The inputs **502** include user input **510** from the display **250** and/or from the

computing device **290**, one or more user proximity sensor signals **512** from the one or more user proximity sensors **240**, one or more dispenser proximity sensor signals **514** from the one or more dispenser proximity sensors **242**, and one or more packet sensor signals **516** from the one or more packet sensors **277**. The outputs **506** include the electric motor **276**, the one or more drive rollers **272**, and the cutting mechanism **278**. The electric motor **276** output includes control of the electric motor **276** to control operation of the electric motor **276**. The drive rollers **272** output includes control of the drive rollers **272** to rotate the drive rollers **272**. The cutting mechanism **278** output includes control of the cutting mechanism **278** to cut, slice, or otherwise tear a respective packet **260**. The controller **504** receives the inputs **502**, implements a method of dispensing food from a touchless food dispenser **210**, and controls the outputs **506**, as detailed with reference to FIG. **6** below.

[0072] The controller **504** may be one or more standalone controllers. In this embodiment, the controller **504** includes a computing device having one or more processors **505** and a memory **507**. Accordingly, the controller **504** can be implemented as the computing device **1000** detailed below with respect to FIG. **10**.

[0073] FIG. **6** is a flow diagram of a method **600** of dispensing food from a touchless food dispenser, according to an embodiment of the present disclosure. Reference is made to the touchless food dispenser **210** of FIGS. **2**A-**2**C and to the touchless food dispenser control system **500** of FIG. **5** in the description of the method **600** below. The method **600** can also be utilized in controlling the touchless food dispenser **310** of FIG. **3** and the touchless food dispenser **410** of FIG. **4**.

[0074] In step **605**, the controller **504** receives user input **510**. For example, the controller **504** receives a selection of a type of food to dispense from the touchless food dispenser **210**, receives an amount of the food to dispense, receives a quantity of packets **260** to dispense, or the like. For example, the controller **504** can receive a selection of a type of condiment (e.g., ketchup, mustard, relish, etc.) to dispense, a type of spice (e.g., salt, pepper, oregano, etc.) to dispense, and/or a type of food (e.g., lettuce, onions, tomatoes, etc.) to dispense. The amount of food to dispense can include an amount by volume (e.g., fluid ounces, milliliters, etc.), an amount by weight (e.g., ounces), or the like. The quantity of packets **260** to dispense can include a number of packets **260** to dispense (e.g., 1 packet, 2 packets, 3 packets, 4 packets, etc.). The controller **504** can receive any type of user input for dispensing the food and/or the packets **260** from the touchless food dispenser **210** without the user having to physically touch the touchless food dispenser **210** to dispense the food or the packets **260**.

[0075] In step **610**, the controller **504** receives one or more proximity sensor signals. For example, the controller **504** receives the one or more user proximity sensor signals **512** from the one or more user proximity sensors **240** that indicate the user is proximate (e.g., standing in front of) the touchless food dispenser **210**. The controller **504** can also receive the one or more dispenser proximity sensor signals **514** from one or more of the dispenser proximity sensors **242** that indicate the user is gesturing in front of the respective aperture **230** of the selected type of food.

[0076] In step **615**, the controller **504** dispenses one or more packets **260** through the aperture **230**. In this way, the roll **262** can be unwound as the packets **260** are dispensed. For example, the controller **504** can dispense the selected quantity of packets **260** to dispense. To determine the quantity of packets **260** that have been dispensed, the controller **504** receives the packet sensor signals **516** from the one or more packet sensors **277**. The controller **504** can determine a number of packets **260** that are sensed by the packet sensor **277**. For example, the controller **504** can determine the number of packets **260** based on the number of perforations **261** that have passed the packet sensors **277**, based on the length of a packet **260** as the packet **260** passes the packet sensors **277**, or based on any other means for determining a number of packets **260** that have passed the packet sensors **277**.

[0077] Accordingly, the controller **504** can determine a quantity of packets **260** that have been

dispensed based on the number of packets **260** sensed by the packet sensors **277**. In this way, the controller **504** can determine when to stop dispensing the packets **260** from the touchless food dispenser **210**. For example, the controller **504** can automatically stop dispensing packets **260** from the touchless food dispenser **210** when the selected quantity of packets **260** has been dispensed.
[0078] To dispense the one or more packets **260**, in step **620**, the controller **504** controls the electric motor **276** to turn on the electric motor. In step **625**, the controller **504** controls the drive rollers **272** to rotate the drive rollers **272**. Rotation of the drive rollers **272** causes the packets **260** to cycle between the drive rollers **272**. For example, as the drive rollers **272** rotate, the drive rollers **272** pull the packets **260** towards and out of the aperture **230** such that the roll **262** unwinds. In step **630**, the controller **504** controls the cutting mechanism **278** to cut or otherwise tear a respective packet **260** to open the respective packet **260** prior to the packet **260** being dispensed from the aperture **230**. In this way, the controller **504** can automatically open the packets **260** as the packets **260** are being dispensed.
[0079] In some embodiments, the controller **504** can dispense one packet **260** at a time such that each packet **260** is individually cut and removed from the roll **262** as the packet **260** is dispensed from the touchless food dispenser **210**. In some embodiments, the controller **504** can dispense multiple packets **260** at a time. For example, the controller **504** can dispense five packets **260** at a time and cut only the fifth packet **260** to remove the packets **260** from the roll **262**. In some embodiments, the controller **504** can dispense the selected quantity of packets **260** at one time. For example, if the selected quantity of packets **260** is eight packets **260**, the controller **504** can control the touchless food dispenser **210** to dispense eight packets **260** and to cut the eighth packet **260** to remove the eight packets **260** from the roll **262**.
[0080] In some embodiments, the controller **504** can control the drive rollers **272**, as detailed above, to squeeze or otherwise force the food out of the packets **260** to dispense the food out of the aperture **230** rather than dispensing the packets **260** themselves out of the aperture **230**. For example, the cutting mechanism **278** can cut a front end of the packets **260** (e.g., an end facing the aperture **230** when the packet **260** is within the touchless food dispenser **210**) and the food is squeezed out of the packets **260** and through the aperture **230** as the packets **260** pass through the drive rollers **272**. In some embodiments, the roll **262** can comprise a single, continuous packet **260** such that there are no perforations. In such embodiments, the packet **260** can be opened (e.g., manually by an operator or automatically by the cutting mechanism **278**) and the food can be dispensed from the packet **260** as the packet **260** passes through the drive rollers **272**.
[0081] In some embodiments, the controller **504** can receive a user input of a selection of an amount of food to dispense. The controller **504** can dispense the amount of food, can determine an amount of food that has been dispense, and can automatically stop dispensing when the selection of the amount of food has been dispensed. In some embodiments, the controller **504** can be programmed to dispense a predetermined amount of the food or a predetermined quantity of packets **260** every time a user gestures in front of a respective dispenser proximity sensor **242**. For example, an operator of the touchless food dispenser **210** can set the predetermined amount of food (e.g., 1 ounce, 2 ounces, 3 ounces, etc.) or the predetermined quantity of packets **260** (e.g., 1 packet, 2 packets, 3 packets, etc.) to dispense. In such embodiments, the controller **504** need not receive a user input selection of the amount of food or a user input selection of the quantity of packets **260** from a user that desires to dispense the food or the packets **260**.
[0082] In some embodiments, the controller **504** can control the feed mechanism **373** (FIG. **3**) and/or the feed mechanism **473** (FIG. **4**) to release the packets from the food storage containers and towards the aperture **230** to dispense the packets out of the aperture **230**, as detailed above.
[0083] FIGS. **7**A and **7**B illustrate various views of a touchless food dispenser **710**, according to another embodiment. FIG. **7**A illustrates a schematic, front perspective view of the touchless food dispenser **710**, and FIG. **7**B illustrates a schematic, front cutaway view of the touchless food dispenser **710** with a front portion of the touchless food dispenser **710** removed such that an inner

portion **711** of the touchless food dispenser **710** is shown. The touchless food dispenser **710** can be utilized as the touchless food dispenser **10**, shown and described with respect to FIG. **1**. The arrangement of the components of the touchless food dispenser **710** shown in FIGS. **7**A to **7**B are exemplary only, and the components may be arranged in any configuration, as desired, without deviating from the present disclosure.

[0084] Referring to FIG. **7**A, the touchless food dispenser **710** includes a casing **712** that defines a front side **714**, a rear side **716**, a left side **718**, a right side **720**, a bottom side **722**, and a top side **724**, per the orientation of the touchless food dispenser **710** shown in FIG. **7**A. While the exemplary embodiment shows the casing **712** having a generally rectangular configuration, the casing **712** of the touchless food dispenser **710** can have any configuration, shape, and/or size, as desired. The touchless food dispenser **710** can store one or more types of food within the casing **712** for being dispensed from the touchless food dispenser **710**, as detailed further below. For example, the touchless food dispenser **710** can store condiments, spices, chopped foods (e.g., onions, lettuce, tomatoes, etc.), or the like for being dispensed from the touchless food dispenser **710** into a receptacle **760** (e.g., a condiment cup), onto a food item (e.g., onto a hamburger), or otherwise dispensed out of the touchless food dispenser **710**.

[0085] The touchless food dispenser **710** includes one or more dispensing mechanisms, such as one or more removable nozzles **730** for dispensing one or more types of food **758** from the touchless food dispenser **710**. The one or more removable nozzles **730** can include apertures or the like for dispensing the food **758** from the touchless food dispenser **710**. In the exemplary embodiment, the one or more removable nozzles **730** include three such removable nozzles **730** including as a first removable nozzle **730***a*, a second removable nozzle **730***b*, and a third removable nozzle **730***c*. The one or more removable nozzles **730** may include any number of removable nozzles **730** for dispensing any number of types of food **758**, as desired, and may be sized and shaped for dispensing various types of food from the touchless food dispenser **710**. The touchless food dispenser **710** includes a dispensing area **732** in which the one or more removable nozzles **730** are oriented to dispense the food **758** food from the touchless food dispenser **710**.

[0086] Each of the removable nozzles **730** includes one or more clasps **731**. For example, the one or more clasps **731** can be pinch clasps that can be pinched and inserted into a corresponding aperture **729** (FIG. **7**B) or the like on the touchless food dispenser **710** and can expand within the aperture **729** (FIG. **7**B) to secure the removable nozzles **730** to the touchless food dispenser **710**. The removable nozzles **730** can be single-use nozzles such that the removable nozzles **730** are replaced after each use of the removable nozzle **730** (e.g., after each time food is dispensed through the removable nozzle **730**), as detailed further below. Thus, the removable nozzles **730** can be removed from the touchless food dispenser **710** and replaced with new removable nozzles **730**. In some embodiments, the removable nozzles **730** can include threads that can be threaded into corresponding threads in the apertures **729** (FIG. **7**B). The removable nozzles **730** can include any apparatus for allowing the removable nozzles **730** to be removed from the touchless food dispenser **710**.

[0087] The touchless food dispenser **710** also includes one or more user proximity sensors **740** and one or more dispenser proximity sensors **742**. The one or more user proximity sensors **740** are positioned and oriented to detect a user in front of, or otherwise near or proximate, the touchless food dispenser **710**, as detailed above with respect to the user proximity sensors **40** of FIG. **1**. The one or more dispenser proximity sensors **742** are positioned and oriented to detect an object, such as a receptacle for receiving the dispensed food, a food item, a user's hand, etc., in front of, or below, a respective removable nozzle **730**, as detailed above with respect to the dispenser proximity sensors **42** of FIG. **1**. The one or more dispenser proximity sensors **742** include a proximity sensor associated with each of the one or more removable nozzles **730**. For example, the one or more dispenser proximity sensors **742** include one or more first dispenser proximity sensors **742***a* associated with the first removable nozzle **730***a*, one or more second dispenser proximity sensors

742*b* associated with the second removable nozzle **730***b*, and one or more third dispenser proximity sensors **742***c* associated with the third removable nozzle **730***c*.

[0088] In some embodiments, the touchless food dispenser **710** includes a display **750**. The display **750** can display the various types of food that are available in the touchless food dispenser **710** for dispensing, can display a selected type of food for dispensing from the touchless food dispenser **710**, can display an amount of food being dispensed, and/or can display advertisements, pictures, video or text, as detailed above with respect to the display **50** of FIG. **1**.

[0089] FIG. **7**B shows the front side **714** of the inner portion **711** of the touchless food dispenser **710**. The dispenser proximity sensors **742** (FIG. **7**A) are removed from FIG. **7**B for clarity. As shown in FIG. **7**B, the touchless food dispenser **710** includes one or more apertures **729** (shown schematically by dashed lines in FIG. **7**B) for receiving the removable nozzles **730**. For example, the one or more apertures include a first aperture **729***a* for receiving the first removable nozzle **730***a*, a second aperture **729***b* for receiving the second removable nozzle **730***b*, and a third aperture **729***c* for receiving the third removable nozzle **730***c*. The one or more apertures **729** may include any number of apertures for receiving any number of removable nozzles **730**.

[0090] As shown in FIG. **7**B, the touchless food dispenser **710** includes one or more food storage containers **770** for storing one or more types of food. In the exemplary embodiment, the one or more food storage containers **770** include a first food storage container **770***a* that stores a first type of food (e.g., ketchup), a second food storage container **770***b* that stores a second type of food (e.g., mustard), and a third food storage container **770***c* that stores a third type of food (e.g., relish). The food storage containers **770** may include any number of food storage containers with any number of different types of food, and can store any amount of food therein. In some embodiments, the touchless food dispenser **710** includes a single food storage container **770** that stores various types of food. The food may be stored directly within the food storage containers **770**. In some embodiments, the food is stored in one or more food-containing bags **772** that are inserted into the one or more food storage containers **770**. For example, the one or more food-containing bags **772** include a first food-containing bag **772***a* within the first food storage container **770***a*, a second food-containing bag **772***b* within the second food storage container **770***b*, and a third food-containing bag **772***c* within the third food storage container **770***c*. Each food-containing bag **772** may store a different type of food. The food-containing bags **772** may include any number of food-containing bags for containing any number of different types of food.

[0091] Each food storage container **770** may include a door or the like for providing access to the food storage container **770**. In this way, an operator of the touchless food dispenser **710** can insert the food-containing bags **772** into the food storage containers **270**. In some embodiments, the touchless food dispenser **710** includes a single door that opens all of the food storage containers **770** at once. In some embodiments, each food storage container **770** includes a separate door such that each food storage container **770** can be opened individually. Thus, the food-containing bags **772** can be removed and replaced with new food-containing bags **772** when the food-containing bags **772** are empty or nearly empty (e.g., after all or nearly all of the food **758** of a food-containing bag **772** has been dispensed). In some embodiments, the operator can refill the food storage containers **770** directly, for example, by pouring additional food from the food-containing bags **772** into the food storage container **770**, rather than replacing an entire food-containing bag **772** with a new food-containing bag **772**. In some embodiments, rather than food-containing bags **772**, the food storage containers **770** can include vats, reservoirs, or the like for storing food therein.

[0092] The touchless food dispenser **710** also includes one or more tubes **774** that provide fluid communication between the one or more food-containing bags **772** and the one or more removable nozzles **730**. In this way, the food can be dispensed from a respective food-containing bag **772** through a respective removable nozzle **730** and out of the touchless food dispenser **710**, as detailed further below. In the exemplary embodiment, the one or more tubes **774** include a first tube **774***a* between the first food-containing bag **772***a* and the first removable nozzle **730***a*, a second tube

774*b* between the second food-containing bag **772***b* and the second removable nozzle **730***b*, and a third tube **774***c* between the third food-containing bag **772***c* and the third removable nozzle **730***c*. The one or more tubes **774** can include any number of tubes **774** for providing fluid communication between the food-containing bags **772** and the removable nozzles **730**. The one or more tubes **774** can include flexible tubes, such as rubber tubes or the like, to carry food from the food-containing bags **772** to the removable nozzles **730**.

[0093] The touchless food dispenser **710** also includes a power supply **280**, one or more pumps **781**, a refrigeration device **782**, and a controller **804**. The power supply **780** provides electric power to the various electronic components of the touchless food dispenser **710**. The power supply **780** can include, for example, a power chord that plugs into a corresponding power outlet, one or more batteries, or any other type of power supply. The one or more pumps **781** can include any type of pump for pushing or otherwise moving the food from the food-containing bags **772** through the removable nozzles **730**. For example, the one or more pumps **781** are coupled to the food-containing bags **772** via tubing (e.g., the tubes **774**) or the like. In the exemplary embodiment, the one or more pumps **781** include a first pump **781***a* associated with the first food-containing bag **772***a*, a second pump **781***b* associated with the second food-containing bag **772***b*, and a third pump **781***c* associated with the third food-containing bag **772***c*. The one or more pumps **781** can include any number of different pumps for pumping the food from the food-containing bags **772** through the removable nozzles **730** to dispense food from the touchless food dispenser **710**.

[0094] The refrigeration device **782** can control the climate (e.g., the temperature) within the touchless food dispenser **710** such as to control the temperature of the food that is stored within the touchless food dispenser **710**. In some embodiments, the touchless food dispenser includes a heating device to heat aspects of the touchless food dispenser **710**. In exemplary embodiments, the heating and/or refrigeration devices may heat or cool the touchless food dispenser **710** to a specified temperature or within a specified temperature range to heat or to cool the food stored within the touchless food dispenser **710**. The controller **804** can control aspects of the touchless food dispenser **710** to automatically dispense a portion of the food, as detailed further below.

[0095] The touchless food dispenser **710** can also be in communication with a computing device **790**, such as, for example, a smartphone, a table, a computer, a laptop, or the like. In some embodiments, the touchless food dispenser **710** can receive user input from the computing device **790**. In this way, the user can input commands to the controller **804**, to control aspects of the touchless food dispenser **710**, as detailed further below. For example, the computing device **790** can display a graphical user interface (e.g., via a mobile application or the like) such that the user can input a selection of a type of food for dispensing from the touchless food dispenser **710**, a selection of an amount of the food to dispense, or any other user input can be input to the controller **804** from the computing device **790**. In this way, the user can control aspects of the touchless food dispenser **710** without physically touching the touchless food dispenser **710**. In some embodiments, the mobile application can store user preferences including the amount of food to dispense. The user preferences can be sent to the touchless food dispenser **710** (e.g., via a numerical code, via a barcode, via a QR code, via wireless communication, or the like) and the touchless food dispenser **710** can automatically dispense the food based on the user preferences.

[0096] In some embodiments, the removable nozzles **730** define a receptacle into which the food is dispensed. In this way, a portion of food can be dispensed into a respective removable nozzle **730** and the user can remove the removable nozzle **730** to take the dispensed food from the touchless food dispenser **710**. In some embodiments, the removable nozzles **730** can be automatically removed and replaced. For example, the touchless food dispenser **710** can store a plurality of removable nozzles **730** associated with each of the different food storage containers **770**. The controller **804** can control the touchless food dispenser **710** to dispense the food and to remove the removable nozzle **730** from the aperture **729** after the food has been dispensed. A different (e.g., a new) removable nozzle **730** can then be inserted into the aperture **729** (e.g., the different removable

nozzle **730** can drop down or otherwise be inserted into the aperture **729**), as detailed further below.
[0097] FIG. **7**C is a schematic, front cutaway view of the touchless food dispenser **710**, according to the present disclosure. The view of FIG. **7**C shows one or more nozzle containers **733**, and the food storage containers **770** are not shown in this view for clarity. The one or more nozzle containers **733** can be in front of, behind, or in line with, the one or more food storage containers **770**. The one or more nozzle containers **733** store the removable nozzles **730** therein. For example, the one or more nozzle containers **733** include a first nozzle container **733***a* for storing a plurality of first removable nozzles **730***a*, a second nozzle container **733***b* for storing a plurality of second removable nozzles **730***b*, and a third nozzle container **733***c* for storing a plurality of third removable nozzles **730***c*. The one or more nozzle containers **733** can include any number of nozzle containers **733** for containing any number of different removable nozzles **730**.
[0098] The touchless food dispenser **710** also includes one or more nozzle replacement mechanisms **734** for replacing the removable nozzles **730** after a respective removable nozzle **730** has been used. The one or more nozzle replacement mechanisms **734** include an electro-mechanical device that is controlled by the controller **804** (FIGS. **7**B and **8**). The one or more nozzle replacement mechanisms **734** can be controlled to remove a respective removable nozzle **730** after food has been dispensed through or into the removable nozzle **730**. For example, the one or more nozzle replacement mechanisms **734** can open the clasps **731** such that the removable nozzle **730** drops or is otherwise placed into a disposal container **735**. In this way, used removable nozzles **730** can be disposed in the disposal container **735** and a person (e.g., an employee or owner of the touchless food dispenser **710**) can remove the disposal container **735** to dispose the used removable nozzles **730**. In some embodiments, the one or more nozzle replacement mechanisms **734** can unscrew the removable nozzle **730** from the threaded connection to remove the removable nozzle **730** from the aperture **729**. In embodiments in which the food is dispensed into the removable nozzle **730**, the one or more nozzle replacement mechanisms **734** can remove the removable nozzle **730** from the aperture **729** such that the user can take the removable nozzle **730** from the touchless food dispenser **710**.
[0099] The one or more nozzle replacement mechanisms **734** can be controlled to insert a different removable nozzle **730** from the stack of removable nozzles **730** in a respective nozzle container **733**. In this way, the one or more nozzle replacement mechanisms **734** can automatically remove a used removable nozzle **730** and replace the used removable nozzle **730** with a different removable nozzle **730**. For example, the touchless food dispenser **710** includes a first state in which the food is dispensed through a first removable nozzle **730** in the first aperture **729***a*, and a second state in which the food is dispensed through a different or second removable nozzle **730** that has been inserted into the first aperture **729***a* after the first removable nozzle **730** has been removed by the one or more nozzle replacement mechanisms **734**. The one or more nozzle replacement mechanisms **734** can include a first nozzle replacement mechanism **734***a* associated with the plurality of first removable nozzles **730***a*, a second nozzle replacement mechanism **734***b* associated with the plurality of second removable nozzles **730***b*, and a third nozzle replacement mechanism **734***c* associated with the plurality of third removable nozzles **730***c*. The one or more nozzle replacement mechanisms **734** can include any number of nozzle replacement mechanisms **734** for removing and replacing the removable nozzles **730**.
[0100] FIG. **8** is a block diagram of a touchless food dispenser control system **800**, for operation and control of at least portions of the touchless food dispenser **710** (FIGS. **7**A to **7**C). The touchless food dispenser control system **800** includes inputs **802**, the controller **804**, and outputs **806**. The inputs **802** include user input **810** from the display **750** and/or from the computing device **790**, one or more user proximity sensor signals **812** from the one or more user proximity sensors **740**, and one or more dispenser proximity sensor signals **814** from the one or more dispenser proximity sensors **742**. The outputs **806** include the one or more pumps **781** and the one or more removable nozzles **730**. The pumps **781** output includes control of the one or more pumps **781** to control

operation of the one or more pumps **781**. The nozzle replacement mechanism **734** output includes control of the one or more nozzle replacement mechanisms **734** to remove and/or replace the removable nozzles **730**. The controller **804** receives the inputs **802**, implements a method of dispensing food from a touchless food dispenser **710**, and controls the outputs **806**, as detailed with reference to FIG. **9** below.

[0101] The controller **804** may be one or more standalone controllers. In this embodiment, the controller **804** includes a computing device having one or more processors **805** and a memory **807**. Accordingly, the controller **804** can be implemented as the computing device **1000** detailed below with respect to FIG. **10**.

[0102] FIG. **9** is a flow diagram of a method **900** of dispensing food from a touchless food dispenser, according to another embodiment of the present disclosure. Reference is made to the touchless food dispenser **710** of FIGS. **7**A to **7**Cand to the touchless food dispenser control system **800** of FIG. **8** in the description of the method **900** below.

[0103] In step **905**, the method **900** includes receiving user input **810**. For example, the controller **804** receives user input **810**. The controller **804** can receive a selection of a type of food **758** to dispense from the touchless food dispenser **710**, can receive an amount of the food **758** to dispense, or the like. For example, the controller **804** can receive a selection of a type of condiment (e.g., ketchup, mustard, relish, etc.) to dispense, a type of spice (e.g., salt, pepper, oregano, etc.) to dispense, and/or a type of food (e.g., lettuce, onions, tomatoes, etc.) to dispense. The amount of food **758** to dispense can include an amount by volume (e.g., fluid ounces, milliliters, etc.), an amount by weight (e.g., ounces), or the like. The controller **804** can receive any type of user input for dispensing the food **758** from the touchless food dispenser **710** without the user having to physically touch the touchless food dispenser **710** to dispense the food **758**.

[0104] In step **910**, the method **900** includes receiving one or more proximity sensor signals. For example, the controller **804** receives the one or more user proximity sensor signals **812** from the one or more user proximity sensors **740** that indicate the user is proximate (e.g., standing in front of) the touchless food dispenser **710**. The controller **804** can also receive the one or more dispenser proximity sensor signals **814** from one or more of the dispenser proximity sensors **742** that indicate the user is gesturing in front of, or below, a respective removable nozzle **730** of the selected type of food **758**.

[0105] In step **915**, the method **900** includes dispensing the food **758** through the removable nozzle **730**. For example, the controller **804** dispenses the food **758** through the removable nozzle **730**. For example, the controller **804** can dispense the selected amount of food **758**. To dispense the food **758**, the controller **804** can control one or more of the pumps **781** to pump the food **758** from the food-containing bag **772**, through the tube **774**, and through the removable nozzle **730**. In this way, the food **758** is dispensed into a receptacle **760**, onto a food item, or otherwise dispensed from the touchless food dispenser **710**. In some embodiments, when the removable nozzles **730** define receptacles, the food **758** can be dispensed into the removable nozzles **730**. In this way, the controller **804** can dispense a predetermined amount of food into the removable nozzle **730** and the user can remove the removable nozzle **730** with the food **758** therein from the touchless food dispenser **710**. For example, the controller **804** can dispense an amount of food **758** corresponding to a volume of the removable nozzle **730**.

[0106] The controller **804** can also determine an amount of food **758** that has been dispensed. For example, the controller **804** can determine the amount of food **758** that has been dispensed based on the pumping action of the pumps **781**, based on a sensor that senses the food **758** passing through the tubes **774** or through the removable nozzle **730**, based on a weight of the food **758** in the food-containing bag **772**, and/or by any other means for determining an amount of the food **758** that has been dispensed. In this way, the controller **804** can determine when to stop dispensing the food **758** from the touchless food dispenser **710**. For example, the controller **804** can automatically stop dispensing the food **758** from the touchless food dispenser **710** when the selected amount of

food **758** has been dispensed.
[0107] In some embodiments, the controller **804** can be programmed to dispense a predetermined amount of the food **758** every time a user gestures in front of, or below, a respective dispenser proximity sensor **742**. For example, an operator of the touchless food dispenser **710** can set the predetermined amount of food (e.g., 1 fluid ounce, 2 fluid ounces, 3 fluid ounces, etc.) to dispense. In such embodiments, the controller **804** need not receive a user input selection of the amount of food **758** from a user that desires to dispense the food **758** from the touchless food dispenser **710**.
[0108] After the food **758** has been dispensed, in step **920**, the method **900** includes removing the removable nozzle **730**. For example, the user can remove the removable nozzle **730** and/or the operator can remove the removable nozzle **730** from the aperture **729**. In some embodiments, the controller **804** can control the touchless food dispenser **710** to automatically remove the removable nozzle **730**. For example, the controller **804** can control an actuator or like device, such as the one or more nozzle replacement mechanisms **734**, such that the removable nozzle **730** is removed from the aperture **729**. In some embodiments, the user or the operator can dispose of the removable nozzle **730**. In some embodiments, the removable nozzle **730** can be disposed of in the disposal container **735** within the touchless food dispenser **710**. For example, when the controller **804** controls the one or more nozzle replacement mechanisms **734** to remove the removable nozzle **730** from the aperture **729**, the removable nozzle **730** can fall into, or otherwise be placed into, the disposal container **735**.
[0109] In step **925**, the method **900** includes inserting a different removable nozzle **730** into the touchless food dispenser **710**. For example, the controller **804** can control the one or more nozzle replacement mechanisms **734** to insert a different removable nozzle **730** into the aperture **729** from the nozzle container **733**. In some embodiments, the operator or the user can insert the different removable nozzle **730** in the aperture **729**. In some embodiments, additional removable nozzles **730** can be stored within the touchless food dispenser **710** (e.g., in the one or more nozzle containers **733**) such that the different removable nozzle **730** can automatically drop down into the aperture **729** to take the place of the removed removable nozzle **730**, as detailed above. Thus, the touchless food dispenser **710** includes single-use removable nozzles **730** that can be removed and replaced after every use (e.g., every time food **758** is dispensed through, or into, a respective removable nozzle **730**).
[0110] With reference to FIG. **10**, an exemplary system includes a general-purpose computing device **1000**, including a processing unit (CPU or processor) **1020** and a system bus **1010** that couples various system components including a memory **1030** such as read-only memory (ROM) **1040** and random-access memory (RAM) **1050** to the processor **1020**. The computing device **1000** can include a cache of high-speed memory connected directly with, in close proximity to, or integrated as part of the processor **1020**. The computing device **1000** copies data from the memory **1030** and/or the storage device **1060** to the cache for quick access by the processor **1020**. In this way, the cache provides a performance boost that avoids processor **1020** delays while waiting for data. These and other modules can control or be configured to control the processor **1020** to perform various actions. Other memory **1030** may be available for use as well. The memory **1030** can include multiple different types of memory with different performance characteristics. It can be appreciated that the disclosure may operate on a computing device **1000** with more than one processor **1020** or on a group or cluster of computing devices networked together to provide greater processing capability. The processor **1020** can include any general-purpose processor and a hardware module or software module, such as module 1 **1062**, module 2 **1064**, and module 3 **1066** stored in storage device **1060**, configured to control the processor **1020** as well as a special-purpose processor where software instructions are incorporated into the actual processor design. The processor **1020** may essentially be a completely self-contained computing system, containing multiple cores or processors, a bus, memory controller, cache, etc. A multi-core processor may be symmetric or asymmetric.

[0111] The system bus **1010** may be any of several types of bus structures including a memory bus or memory controller, a peripheral bus, and a local bus using any of a variety of bus architectures. A basic input/output (BIOS) stored in ROM **1040** or the like, may provide the basic routine that helps to transfer information between elements within the computing device **1000**, such as during start-up. The computing device **1000** further includes storage devices **1060** such as a hard disk drive, a magnetic disk drive, an optical disk drive, tape drive or the like. The storage device **1060** can include software modules **1062**, **1064**, **1066** for controlling the processor **1020**. Other hardware or software modules are contemplated. The storage device **1060** is connected to the system bus **1010** by a drive interface. The drives and the associated computer-readable storage media provide nonvolatile storage of computer-readable instructions, data structures, program modules and other data for the computing device **1000**. In one aspect, a hardware module that performs a particular function includes the software component stored in a tangible computer-readable storage medium in connection with the necessary hardware components, such as the processor **1020**, system bus **1010**, output device **1070**, and so forth, to carry out the function. In another aspect, the system can use a processor and computer-readable storage medium to store instructions which, when executed by a processor (e.g., one or more processors), cause the processor to perform a method or other specific actions. The basic components and appropriate variations are contemplated depending on the type of device, such as whether the computing device **1000** is a small, handheld computing device, a desktop computer, or a computer server.

[0112] Although the exemplary embodiment described herein employs the storage device **1060**, other types of computer-readable media which can store data that are accessible by a computer, such as magnetic cassettes, flash memory cards, digital versatile disks, cartridges, random-access memories (RAMs) **1050**, and read-only memory (ROM) **1040**, may also be used in the exemplary operating environment. Tangible computer-readable storage media, computer-readable storage devices, or computer-readable memory devices, expressly exclude media such as transitory waves, energy, carrier signals, electromagnetic waves, and signals per se.

[0113] To enable user interaction with the computing device **1000**, an input device **1090** represents any number of input mechanisms, such as a microphone for speech, a touch-sensitive screen for gesture or graphical input, keyboard, mouse, motion input, speech and so forth. An output device **1070** can also be one or more of a number of output mechanisms known to those of skill in the art, such as, for example, a display. In some instances, multimodal systems enable a user to provide multiple types of input to communicate with the computing device **1000**. The communications interface **1080** generally governs and manages the user input and system output. There is no restriction on operating on any particular hardware arrangement and therefore the basic features here may easily be substituted for improved hardware or firmware arrangements as they are developed.

[0114] The technology discussed herein refers to computer-based systems and actions taken by, and information sent to and from, computer-based systems. One of ordinary skill in the art will recognize that the inherent flexibility of computer-based systems allows for a great variety of possible configurations, combinations, and divisions of tasks and functionality between and among components. For instance, processes discussed herein can be implemented using a single computing device or multiple computing devices working in combination. Databases, memory, instructions, and applications can be implemented on a single system or distributed across multiple systems. Distributed components can operate sequentially or in parallel.

[0115] Further aspects of the present disclosure are provided by the subject matter of the following clauses.

[0116] According to an aspect of the present disclosure, a touchless food includes one or more types of food stored therein and one or more dispensing mechanisms, wherein the food is caused to be dispensed through the one or more dispensing mechanisms without a user physically touching the touchless food dispenser.

[0117] The touchless food dispenser of the preceding clause, wherein the touchless food dispenser receives a selected amount of food to dispense and dispenses the selected amount of food.
[0118] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser dispenses a predetermined amount of food.
[0119] The touchless food dispenser of any preceding clause, further comprising one or more user proximity sensors to detect a user in proximity of the touchless food dispenser.
[0120] The touchless food dispenser of any preceding clause, further comprising one or more dispenser proximity sensors to detect a gesture of the user that controls the food being dispensed through the one or more dispensing mechanisms.
[0121] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser dispenses the food as long as the one or more dispenser proximity sensors detect the gesture of the user.
[0122] The touchless food dispenser of any preceding clause, further comprising a display for displaying pictures, video, or text with information of a selected type food for dispensing or an amount of food being dispensed.
[0123] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser receives a selection of an amount of food to dispense from a computing device.
[0124] The touchless food dispenser of any preceding clause, wherein the one or more dispensing mechanisms include one or more apertures.
[0125] The touchless food dispenser of any preceding clause, wherein the food is stored in one or more packets within the touchless food dispenser, and the one or more packets are dispensed through the one or more apertures.
[0126] The touchless food dispenser of any preceding clause, wherein the one or more packets are bundled in a roll that is stored within the touchless food dispenser.
[0127] The touchless food dispenser of any preceding clause, further comprising a cutting mechanism that removes the one or more packets from the roll to dispense the one or more packets from the touchless food dispenser.
[0128] The touchless food dispenser of any preceding clause, wherein the cutting mechanism automatically opens the one or more packets as the one or more packets are being dispensed from the touchless food dispenser.
[0129] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser receives a selected quantity of packets to dispense and dispenses the selected quantity of packets.
[0130] The touchless food dispenser of any preceding clause, further comprising one or more food storage containers, wherein the food is stored within the food storage containers.
[0131] The touchless food dispenser of any preceding clause, further comprising one or more pumps that pump the food from the one or more food storage containers to dispense the food.
[0132] The touchless food dispenser of any preceding clause, further comprising one or more removable nozzles.
[0133] The touchless food dispenser of any preceding clause, wherein the one or more removable nozzles are single-use removable nozzles that are removed and replaced with a different removable nozzle after each use of a respective removable nozzle.
[0134] The touchless food dispenser of any preceding clause, wherein the food is dispensed through the one or more removable nozzles.
[0135] The touchless food dispenser of any preceding clause, wherein the one or more removable nozzles are receptacles that receive the food therein.
[0136] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser stores additional removable nozzles therein to replace the removed removable nozzle.
[0137] The touchless food dispenser of any preceding clause, further comprising a power supply that supplies power to the touchless food dispenser.
[0138] The touchless food dispenser of any preceding clause, further comprising a controller that

controls the touchless food dispenser to dispense the food.
[0139] The touchless food dispenser of any preceding clause, further comprising a refrigeration device to control a temperature of the food within the touchless food dispenser.
[0140] According to an aspect of the present disclosure, a method of dispensing food from a touchless food dispenser includes receiving a selected type of food to dispense from a touchless food dispenser and dispensing the selected type of food through one or more dispensing mechanisms from the touchless food dispenser without a user physically touching the touchless food dispenser to cause the food to be dispensed.
[0141] The method of the preceding clause, further comprising receiving a selected amount of food to dispense and dispensing the selected amount of food.
[0142] The method of any preceding clause, further comprising dispensing a predetermined amount of food.
[0143] The method of any preceding clause, further comprising detecting the user is in proximity to the touchless food dispenser.
[0144] The method of any preceding clause, wherein receiving the selected type of food to dispense includes detecting a gesture of the user that controls the food being dispensed through the one or more dispensing mechanisms.
[0145] The method of any preceding clause, further comprising dispensing the food as long as the gesture of the user is detected.
[0146] The method of any preceding clause, further comprising displaying pictures, video, or text with information of a selected type food for dispensing or an amount of food being dispensed.
[0147] The method of any preceding clause, further comprising receiving, from a computing device, a selection of an amount of food to dispense.
[0148] The method of any preceding clause, wherein the one or more dispensing mechanisms include one or more apertures.
[0149] The method of any preceding clause, wherein the food is stored in packets within the touchless food dispenser, and the method further comprises dispensing the one or more packets through the one or more apertures.
[0150] The method of any preceding clause, wherein the one or more packets are bundled in a roll that is stored within the touchless food dispenser.
[0151] The method of any preceding clause, further comprising removing the one or more packets from the roll to dispense the one or more packets from the touchless food dispenser.
[0152] The method of any preceding clause, further comprising automatically opening the one or more packets as the one or more packets are being dispensed from the touchless food dispenser.
[0153] The method of any preceding clause, further comprising receiving a selected quantity of packets to dispense and dispensing the selected quantity of packets.
[0154] The method of any preceding clause, further comprising storing the food within one or more food storage containers.
[0155] The method of any preceding clause, further comprising pumping the food from the one or more food storage containers to dispense the food.
[0156] The method of any preceding clause, wherein the touchless food dispenser includes one or more removable nozzles.
[0157] The method of any preceding clause, further comprising removing and replacing a respective removable nozzle with a different removable nozzle after each use of the respective removable nozzle.
[0158] The method of any preceding clause, further comprising dispensing the food through the one or more removable nozzles.
[0159] The method of any preceding clause, wherein the one or more removable nozzles define a receptacle, and the method further comprises dispensing the food into the one or more removable nozzles.

[0160] The method of any preceding clause, further comprising storing additional removable nozzles within the touchless food dispenser to replace the removed removable nozzle.
[0161] The method of any preceding clause, further comprising supplying electric power to the touchless food dispenser through a power supply.
[0162] The method of any preceding clause, further comprising controlling the touchless food dispenser with a controller to dispense the food.
[0163] The method of any preceding clause, further comprising controlling a temperature of the food within the touchless food dispenser with a refrigeration device.
[0164] According to an aspect of the present disclosure, a touchless food dispenser includes one or more packets of food stored therein and one or more apertures, wherein the touchless food dispenser is configured to dispense the food through the one or more apertures.
[0165] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser is configured to receive a selected amount of food to dispense and dispense the selected amount of food.
[0166] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser is configured to dispense a predetermined amount of food.
[0167] The touchless food dispenser of any preceding clause, further comprising one or more dispenser proximity sensors that are configured to detect a gesture of the user that controls the food being dispensed through the one or more apertures.
[0168] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser is configured to dispense the food as long as the one or more dispenser proximity sensors detect the gesture of the user.
[0169] The touchless food dispenser of any preceding clause, further comprising a display for displaying pictures, video, or text with information of a selected type food for dispensing or an amount of food being dispensed.
[0170] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser is configured to receive a selection of an amount of food to dispense from a computing device.
[0171] The touchless food dispenser of any preceding clause, wherein the one or more packets are coupled together in a bundle and stored within the touchless food dispenser.
[0172] The touchless food dispenser of any preceding clause, further comprising a cutting mechanism that is configured to remove the one or more packets from the bundle to dispense the one or more packets from the touchless food dispenser.
[0173] The touchless food dispenser of any preceding clause, wherein the one or more packets are bundled together in a stack within the touchless food dispenser.
[0174] The touchless food dispenser of any preceding clause, wherein the one or more packets are bundled together in a roll within the touchless food dispenser.
[0175] The touchless food dispenser of any preceding clause, further comprising a cutting mechanism that is configured to remove the one or more packets from the roll to dispense the one or more packets from the touchless food dispenser.
[0176] The touchless food dispenser of any preceding clause, further comprising a cutting mechanism that is configured to automatically open the one or more packets as the one or more packets are being dispensed from the touchless food dispenser.
[0177] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser is configured to receive a selected quantity of packets to dispense and dispenses the selected quantity of packets.
[0178] The touchless food dispenser of any preceding clause, wherein the one or more packets are coupled together and each packet includes one or more perforations.
[0179] The touchless food dispenser of any preceding clause, further comprises a packet sensor that is configured to detect the one or more packets as the one or more packets are being dispensed.
[0180] The touchless food dispenser of any preceding clause, further comprising one or more drive

rollers, the touchless food dispenser configured to feed the one or more packets through the one or more drive rollers to dispense the one or more packets through the one or more apertures.
[0181] The touchless food dispenser of any preceding clause, the one or more drive rollers configured to force the food out of the one or more packets to dispense the food out of the one or more apertures and from the touchless food dispenser.
[0182] The touchless food dispenser of any preceding clause, further comprising an electric motor that is configured to provide mechanical power to the one or more drive rollers for rotating the one or more drive rollers.
[0183] The touchless food dispenser of any preceding clause, further comprising a power supply that is configured to supply power to the touchless food dispenser.
[0184] The touchless food dispenser of any preceding clause, further comprising a controller that is configured to control the touchless food dispenser to dispense the food.
[0185] The touchless food dispenser of any preceding clause, further comprising a refrigeration device that is configured to control a temperature of the food within the touchless food dispenser.
[0186] The touchless food dispenser of any preceding clause, wherein each of the one or more packets of food containing a single-serving of the food.
[0187] The touchless food dispenser of any preceding clause, wherein the one or more packets of food each contain less than 1 oz of food.
[0188] The touchless food dispenser of any preceding clause, wherein the one or more packets of food each contain less than 0.5 oz of food.
[0189] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser is configured to dispense the food through the one or more apertures without a user physically touching the touchless food dispenser.
[0190] The touchless food dispenser of any preceding clause, further comprising a casing, wherein the one or more packets of food are stored within the casing, and the touchless food dispenser is configured to dispense the food out of the casing through the one or more apertures.
[0191] The touchless food dispenser of any preceding clause, further comprising one or more removable nozzles inserted in the one or more apertures, wherein the touchless food dispenser is configured to dispense the food from the touchless food dispenser through the one or more nozzles.
[0192] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser is configured to dispense the one or more packets of food from the touchless food dispenser through the one or more apertures.
[0193] The touchless food dispenser of any preceding clause, wherein the one or more packets of food are stored within one or more food storage containers in the touchless food dispenser.
[0194] The touchless food dispenser of any preceding clause, further comprising a feed mechanism that is configured to release a packet of the one or more packets of food from the one or more food storage containers.
[0195] According to an aspect of the present disclosure, a method of dispensing food from a touchless food dispenser includes receiving a selected type of food to dispense from a touchless food dispenser, the touchless food dispenser storing one or more packets of food therein and dispensing the selected type of food through one or more apertures from the touchless food dispenser.
[0196] The method of any preceding clause, further comprising receiving a selected amount of food to dispense and dispensing the selected amount of food.
[0197] The method of any preceding clause, further comprising dispensing a predetermined amount of food.
[0198] The method of any preceding clause, further comprising detecting a gesture of the user that controls the food being dispensed through the one or more dispensing mechanisms.
[0199] The method of any preceding clause, further comprising dispensing the food as long as the gesture of the user is detected.

[0200] The method of any preceding clause, further comprising displaying pictures, video, or text with information of a selected type food for dispensing or an amount of food being dispensed.
[0201] The method of any preceding clause, further comprising receiving, from a computing device, a selection of an amount of food to dispense.
[0202] The method of any preceding clause, further comprising coupling the one or more packets together in a bundle and storing the coupled one or more packets within the touchless food dispenser.
[0203] The method of any preceding clause, further comprising removing the one or more packets from the bundle with a cutting mechanism to dispense the one or more packets from the touchless food dispenser.
[0204] The method of any preceding clause, further comprising storing the one or more packets in a stack within the touchless food dispenser.
[0205] The method of any preceding clause, further comprising storing the one or more packets in a roll within the touchless food dispenser.
[0206] The method of any preceding clause, further comprising removing the one or more packets from the roll to dispense the one or more packets from the touchless food dispenser.
[0207] The method of any preceding clause, further comprising automatically opening the one or more packets as the one or more packets are being dispensed from the touchless food dispenser.
[0208] The method of any preceding clause, further comprising receiving a selected quantity of packets to dispense and dispensing the selected quantity of packets.
[0209] The method of any preceding clause, further comprising detecting the one or more packets as the one or more packets are being dispensed.
[0210] The method of any preceding clause, further comprising feeding the one or more packets through one or more drive rollers to dispense the one or more packets through the one or more apertures.
[0211] The method of any preceding clause, further comprising forcing the food out of the one or more packets with the one or more drive rollers to dispense the food from the touchless food dispenser.
[0212] The method of any preceding clause, further comprising providing mechanical power to the one or more drive rollers to rotate the one or more drive rollers.
[0213] The method of any preceding clause, further comprising supplying power to the touchless food dispenser from a power supply.
[0214] The method of any preceding clause, further comprising controlling, by a controller, the touchless food dispenser to dispense the food.
[0215] The method of any preceding clause, further comprising controlling a temperature of the food within the touchless food dispenser with a refrigeration device.
[0216] The method of any preceding clause, wherein the one or more packets of food contain a single-serving of the food.
[0217] The method of any preceding clause, wherein the one or more packets of food each contain less than 1 oz of food.
[0218] The method of any preceding clause, wherein the one or more packets of food each contain less than 0.5 oz of food.
[0219] The method of any preceding clause, further comprising dispensing the food through the one or more apertures without a user physically touching the touchless food dispenser.
[0220] The method of any preceding clause, wherein the touchless food dispenser includes a casing, wherein the one or more packets of food are stored within the casing, and the method further comprises dispensing the food out of the casing through the one or more apertures.
[0221] The method of any preceding clause, wherein the touchless food dispenser includes one or more removable nozzles inserted in the one or more apertures, the method further comprising dispensing the food from the touchless food dispenser through the one or more nozzles.

[0222] The method of any preceding clause, further comprising dispensing the one or more packets of food from the touchless food dispenser through the one or more apertures.
[0223] The method of any preceding clause, wherein the one or more packets of food are stored within one or more food storage containers in the touchless food dispenser.
[0224] The method of any preceding clause, wherein the touchless food dispenser includes a feed mechanism, the method further comprising releasing a packet of the one or more packets of food from the one or more food storage containers.
[0225] According to an aspect of the present disclosure, a touchless food dispenser control system includes a touchless food dispenser comprising one or more packets of food stored therein and one or more apertures and a controller. The controller is configured to control the touchless food dispenser to dispense the food through the one or more apertures.
[0226] The touchless food dispenser control system of the preceding clause, wherein the controller is configured to receive a selected amount of food to dispense and to dispense the selected amount of food.
[0227] The touchless food dispenser control system of any preceding clause, wherein the controller is configured to control the touchless food dispenser to dispense a predetermined amount of food.
[0228] The touchless food dispenser control system of any preceding clause, further comprising one or more dispenser proximity sensors configured to detect a gesture of the user, wherein the controller is further configured to receive one or more dispenser proximity sensor signals from the one or more dispenser proximity sensors and control the touchless food dispenser to dispense the food through the one or more apertures when receiving the one or more dispenser proximity sensor signals.
[0229] The touchless food dispenser control system of any preceding clause, wherein the controller is further configured to control the touchless food dispenser to dispense the food as long as the one or more dispenser proximity sensors detect the gesture of the user.
[0230] The touchless food dispenser control system of any preceding clause, further comprising a display, wherein the controller is configured to display, on the display, pictures, video, or text with information of a selected type food for dispensing or an amount of food being dispensed.
[0231] The touchless food dispenser control system of any preceding clause, wherein the controller is configured to receive a selection of an amount of food to dispense from a computing device.
[0232] The touchless food dispenser control system of any preceding clause, wherein the one or more packets are coupled together in a bundle and stored within the touchless food dispenser.
[0233] The touchless food dispenser control system of any preceding clause, further comprising a cutting mechanism, the controller is further configured to control the cutting mechanism to remove the one or more packets from the bundle to dispense the one or more packets from the touchless food dispenser.
[0234] The touchless food dispenser control system of any preceding clause, wherein the one or more packets are bundled together in a stack within the touchless food dispenser
[0235] The touchless food dispenser control system of any preceding clause, wherein the one or more packets are bundled in a roll that is stored within the touchless food dispenser.
[0236] The touchless food dispenser control system of any preceding clause, further comprising a cutting mechanism, wherein the controller is configured to control the cutting mechanism to remove the one or more packets from the roll to dispense the one or more packets from the touchless food dispenser.
[0237] The touchless food dispenser control system of any preceding clause, wherein the controller is configured to control the cutting mechanism to automatically open the one or more packets as the one or more packets are being dispensed from the touchless food dispenser.
[0238] The touchless food dispenser control system of any preceding clause, wherein the controller is configured to receive a selected quantity of packets to dispense and control the touchless food dispenser to dispense the selected quantity of packets.

[0239] The touchless food dispenser control system of any preceding clause, wherein the one or more packets are coupled together and each packet includes one or more perforations.
[0240] The touchless food dispenser control system of any preceding clause, further comprising a packet sensor that is configured to detect the one or more packets as the one or more packets are being dispensed, wherein the controller is configured to receive one or more packet signals from the packet sensor that indicates the detected one or more packets.
[0241] The touchless food dispenser control system of any preceding clause, further comprising one or more drive rollers, wherein the controller is configured to control the one or more drive rollers to feed the one or more packets through the one or more drive rollers to dispense the one or more packets through the one or more apertures.
[0242] The touchless food dispenser control system of any preceding clause, wherein the controller is configured to control the one or more drive rollers to force the food out of the one or more packets to dispense the food out of the one or more apertures and from the touchless food dispenser.
[0243] The touchless food dispenser control system of any preceding clause, further comprising an electric motor that is configured to provide mechanical power to the one or more drive rollers for rotating the one or more drive rollers, wherein the controller is configured to control the electric motor to rotate the one or more drive rollers.
[0244] The touchless food dispenser control system of any preceding clause, further comprising a power supply, wherein the controller is configured to supply power from the power supply to the touchless food dispenser.
[0245] The touchless food dispenser control system of any preceding clause, further comprising a refrigeration device, wherein the controller is configured to control a temperature of the food within the touchless food dispenser with the refrigeration device.
[0246] The touchless food dispenser control system of any preceding clause, wherein each of the one or more packets of food contain a single-serving of the food.
[0247] The touchless food dispenser control system of any preceding clause, wherein the one or more packets of food each contain less than 1 oz of food.
[0248] The touchless food dispenser control system of any preceding clause, wherein the one or more packets of food each contain less than 0.5 oz of food.
[0249] The touchless food dispenser control system of any preceding clause, wherein the controller controls the touchless food dispenser to dispense the food through the one or more apertures without a user physically touching the touchless food dispenser.
[0250] The touchless food dispenser control system of any preceding clause, wherein the touchless food dispenser includes a casing, wherein the one or more packets of food are stored within the casing, and the controller controls the touchless food dispenser to dispense the food out of the casing through the one or more apertures.
[0251] The touchless food dispenser control system of any preceding clause, wherein the touchless food dispenser includes one or more removable nozzles inserted in the one or more apertures, and the controller further controls the touchless food dispenser to dispense the food from the touchless food dispenser through the one or more nozzles.
[0252] The touchless food dispenser control system of any preceding clause, wherein the controller controls the touchless food dispenser to dispense the one or more packets of food from the touchless food dispenser through the one or more apertures.
[0253] The touchless food dispenser control system of any preceding clause, wherein the one or more packets of food are stored within one or more food storage containers in the touchless food dispenser.
[0254] The touchless food dispenser control system of any preceding clause, wherein the touchless food dispenser includes a feed mechanism, and the controller controls the feed mechanism to release a packet of the one or more packets of food from the one or more food storage containers.

[0255] According to an aspect of the present disclosure, a touchless food dispenser includes one or more types of food stored therein and one or more removable nozzles, wherein the touchless food dispenser is configured to dispense the food through the one or more removable nozzles, and one or more nozzle replacement mechanisms that are configured to remove the one or more removable nozzles and replace the one or more removable nozzles with a different removable nozzle.
[0256] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser is configured to receive a selected amount of food to dispense and dispense the selected amount of food.
[0257] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser is configured to dispense a predetermined amount of food.
[0258] The touchless food dispenser of any preceding clause, further comprising one or more dispenser proximity sensors that are configured to detect a gesture of the user that controls the food being dispensed through the one or more removable nozzles.
[0259] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser that is configured to dispense the food as long as the one or more dispenser proximity sensors detect the gesture of the user.
[0260] The touchless food dispenser of any preceding clause, further comprising a display for displaying pictures, video, or text with information of a selected type food for dispensing or an amount of food being dispensed.
[0261] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser is configured to receive a selection of an amount of food to dispense from a computing device.
[0262] The touchless food dispenser of any preceding clause, further comprising one or more food storage containers, wherein the food is stored within the food storage containers.
[0263] The touchless food dispenser of any preceding clause, further comprising one or more pumps that are configured to pump the food from the one or more food storage containers to dispense the food.
[0264] The touchless food dispenser of any preceding clause, wherein the one or more removable nozzles are single-use removable nozzles, and the one or more nozzle replacement mechanisms are configured to remove and replace the single-use removable nozzles with a different single-use removable nozzle after each use of a respective single-use removable nozzle.
[0265] The touchless food dispenser of any preceding clause, wherein the one or more removable nozzles are receptacles that receive the food therein.
[0266] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser stores additional removable nozzles therein to replace the removed removable nozzle.
[0267] The touchless food dispenser of any preceding clause, wherein the additional removable nozzles are stored in one or more nozzle containers.
[0268] The touchless food dispenser of any preceding clause, further comprising a disposal container, wherein the one or more nozzle replacement mechanisms are configured to remove the one or more removable nozzles into the disposal container.
[0269] The touchless food dispenser of any preceding clause, wherein the one or more removable nozzles are secured in one or more apertures within the touchless food dispenser.
[0270] The touchless food dispenser of any preceding clause, further comprising one or more clasps, wherein the one or more removable nozzles are secured to the touchless food dispenser by the one or more clasps.
[0271] The touchless food dispenser of any preceding clause, wherein the one or more removable nozzles are secured to the touchless food dispenser by a threaded connection
[0272] The touchless food dispenser of any preceding clause, further comprising a power supply that is configured to supply power to the touchless food dispenser.
[0273] The touchless food dispenser of any preceding clause, further comprising a controller that is configured to control the touchless food dispenser to dispense the food.

[0274] The touchless food dispenser of any preceding clause, further comprising a refrigeration device that is configured to control a temperature of the food within the touchless food dispenser.
[0275] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser is configured to dispense the food through the one or more removable nozzles without a user physically touching the touchless food dispenser.
[0276] The touchless food dispenser of any preceding clause, further comprising a casing, wherein the one or more types of food are stored within the casing, and the touchless food dispenser is configured to dispense the food out of the casing through the one or more removable nozzles.
[0277] The touchless food dispenser of any preceding clause, further comprising one or more packets that contain the one or more types of food therein.
[0278] The touchless food dispenser of any preceding clause, wherein the touchless food dispenser includes a first state in which a removable nozzle of the one or more removable nozzles is configured to dispense the one or more types of food therethrough, and a second state in which the different removable nozzle is configured to dispense the one or more types of food therethrough.
[0279] The touchless food dispenser of any preceding clause, wherein the one or more types of food are stored in one or more food-containing bags within the touchless food dispenser.
[0280] The touchless food dispenser of any preceding clause, wherein the one or more food-containing bags are stored within one or more food storage containers.
[0281] The touchless food dispenser of any preceding clause, further comprising a dispensing area, wherein the one or more removable nozzles are oriented to dispense the food into the dispensing area.
[0282] The touchless food dispenser of any preceding clause, further comprising one or more user proximity sensors that are configured to detect a user in proximity to the touchless food dispenser.
[0283] The touchless food dispenser of any preceding clause, further comprising one or more stacks of additional removable nozzles stored within the touchless food dispenser.
[0284] The touchless food dispenser of any preceding clause, further comprising one or more tubes that are configured to provide the one or more types of food to the one or more removable nozzles to dispense the food through the one or more removable nozzles.
[0285] According to an aspect of the present disclosure, a method of dispensing food from a touchless food dispenser includes receiving a selected type of food to dispense from a touchless food dispenser, the touchless food dispenser storing one or more types of food therein, dispensing the selected type of food through one or more removable nozzles from the touchless food dispenser with, and removing, with one or more nozzle replacement mechanisms, the one or more removable nozzles and replacing, with the one or more nozzle replacement mechanisms, the one or more removable nozzles with a different removable nozzle.
[0286] The method of any preceding clause, further comprising receiving a selected amount of food to dispense and dispensing the selected amount of food.
[0287] The method of any preceding clause, further comprising dispensing a predetermined amount of food.
[0288] The method of any preceding clause, further comprising detecting a gesture of the user that controls the food being dispensed through the one or more dispensing mechanisms.
[0289] The method of any preceding clause, further comprising dispensing the food as long as the gesture of the user is detected.
[0290] The method of any preceding clause, further comprising displaying pictures, video, or text with information of a selected type food for dispensing or an amount of food being dispensed.
[0291] The method of any preceding clause, further comprising receiving, from a computing device, a selection of an amount of food to dispense.
[0292] The method of any preceding clause, further comprising storing the food within one or more food storage containers.
[0293] The method of any preceding clause, further comprising pumping the food from the one or

more food storage containers to dispense the food.
[0294] The method of any preceding clause, further comprising removing and replacing, with the one or more nozzle replacement mechanisms, a respective removable nozzle with a different removable nozzle after each use of the respective removable nozzle.
[0295] The method of any preceding clause, further comprising storing the additional removable nozzles in one or more nozzle containers.
[0296] The method of any preceding clause, further comprising a disposal container, the method further comprising removing, with the one or more nozzle replacement mechanisms, the one or more removable nozzles into the disposal container.
[0297] The method of any preceding clause, wherein the one or more removable nozzles are secured in one or more apertures within the touchless food dispenser.
[0298] The method of any preceding clause, wherein the one or more removable nozzles are secured to the touchless food dispenser by one or more clasps.
[0299] The method of any preceding clause, wherein the one or more removable nozzles are secured to the touchless food dispenser by a threaded connection
[0300] The method of any preceding clause, wherein the one or more removable nozzles define receptacles that receive the food therein.
[0301] The method of any preceding clause, further comprising storing additional removable nozzles within the touchless food dispenser to replace the removed removable nozzle.
[0302] The method of any preceding clause, further comprising supplying power to the touchless food dispenser from a power supply.
[0303] The method of any preceding clause, further comprising controlling, by a controller, the touchless food dispenser to dispense the food.
[0304] The method of any preceding clause, further comprising controlling a temperature of the food within the touchless food dispenser with a refrigeration device.
[0305] The method of any preceding clause, further comprising dispensing the food through the one or more removable nozzles without a user physically touching the touchless food dispenser.
[0306] The method of any preceding clause, wherein the touchless food dispenser includes a casing, wherein the one or more types of food are stored within the casing, and the method further comprises dispensing the food out of the casing through the one or more removable nozzles.
[0307] The method of any preceding clause, wherein the touchless food dispenser includes one or more packets that contain the one or more types of food therein.
[0308] The method of any preceding clause, wherein the touchless food dispenser includes a first state in which a removable nozzle of the one or more removable nozzles is configured to dispense the one or more types of food therethrough, and a second state in which the different removable nozzle is configured to dispense the one or more types of food therethrough.
[0309] The method of any preceding clause, wherein the one or more types of food are stored in one or more food-containing bags within the touchless food dispenser.
[0310] The method of any preceding clause, wherein the one or more food-containing bags are stored within one or more food storage containers.
[0311] The method of any preceding clause, wherein the touchless food dispenser includes a dispensing area, wherein the one or more removable nozzles are oriented to dispense the food into the dispensing area.
[0312] The method of any preceding clause, wherein the touchless food dispenser includes one or more user proximity sensors that are configured to detect a user in proximity to the touchless food dispenser.
[0313] The method of any preceding clause, wherein the touchless food dispenser includes one or more stacks of additional removable nozzles stored within the touchless food dispenser.
[0314] The method of any preceding clause, wherein the touchless food dispenser includes one or more tubes that are configured to provide the one or more types of food to the one or more

removable nozzles to dispense the food through the one or more removable nozzles.
[0315] According to an aspect of the present disclosure, a touchless food dispenser control system includes a touchless food dispenser comprising one or more types of food stored therein and one or more removable nozzles and a controller configured to control the touchless food dispenser to dispense the food through the one or more removable nozzles, and to remove, with one or more nozzle replacement mechanisms, the one or more removable nozzles and replace, with the one or more nozzle replacement mechanisms, the one or more removable nozzles with a different removable nozzle.
[0316] The touchless food dispenser control system of any preceding clause, wherein the controller is configured to receive a selected amount of food to dispense and to control the touchless food dispenser to dispense the selected amount of food.
[0317] The touchless food dispenser control system of any preceding clause, wherein the controller is configured to control the touchless food dispenser to dispense a predetermined amount of food.
[0318] The touchless food dispenser control system of any preceding clause, further comprising one or more dispenser proximity sensors that are configured to detect a gesture of the user, wherein the controller is further configured to receive one or more dispenser proximity sensor signals from the one or more dispenser proximity sensors and control the food being dispensed through the one or more removable nozzles when receiving the one or more dispenser proximity sensor signals.
[0319] The touchless food dispenser control system of any preceding clause, wherein the controller is further configured to control the touchless food dispenser to dispense the food as long as the one or more dispenser proximity sensors detect the gesture of the user.
[0320] The touchless food dispenser control system of any preceding clause, further comprising a display, wherein the controller is configured to display, on the display, pictures, video, or text with information of a selected type food for dispensing or an amount of food being dispensed.
[0321] The touchless food dispenser control system of any preceding clause, wherein the controller is configured to receive a selection of an amount of food to dispense from a computing device.
[0322] The touchless food dispenser control system of any preceding clause, further comprising one or more food storage containers, wherein the food is stored within the food storage containers.
[0323] The touchless food dispenser control system of any preceding clause, further comprising one or more pumps, wherein the controller is configured to control the one or more pumps to pump the food from the one or more food storage containers to dispense the food.
[0324] The touchless food dispenser control system of any preceding clause, wherein the one or more removable nozzles are single-use removable nozzles, and the controller is configured to control the one or more nozzle replacement mechanisms remove and replace the single-use removable nozzles with a new single-use removable nozzle after each use of a respective single-use removable nozzle.
[0325] The touchless food dispenser control system of any preceding clause, wherein the one or more removable nozzles define receptacles, wherein the controller is configured to control the touchless food dispenser to dispense the food into the one or more removable nozzles.
[0326] The touchless food dispenser control system of any preceding clause, wherein the touchless food dispenser stores additional removable nozzles therein, wherein the controller is configured to control the touchless food dispenser to replace the removed removable nozzle with an additional removable nozzle.
[0327] The touchless food dispenser control system of any preceding clause, wherein the additional removable nozzles are stored in one or more nozzle containers.
[0328] The touchless food dispenser control system of any preceding clause, further comprising a disposal container, wherein the controller controls the one or more nozzle replacement mechanisms to remove the one or more removable nozzles into the disposal container.
[0329] The touchless food dispenser control system of any preceding clause, wherein the one or more removable nozzles are secured in one or more apertures within the touchless food dispenser.

[0330] The touchless food dispenser control system of any preceding clause, wherein the one or more removable nozzles are secured to the touchless food dispenser by one or more clasps.
[0331] The touchless food dispenser control system of any preceding clause, wherein the one or more removable nozzles are secured to the touchless food dispenser by a threaded connection
[0332] The touchless food dispenser control system of any preceding clause, further comprising a power supply that is configured to supply power from the power supply to the touchless food dispenser.
[0333] The touchless food dispenser control system of any preceding clause, further comprising a refrigeration device, wherein the controller is configured to control a temperature of the food within the touchless food dispenser with the refrigeration device.
[0334] The touchless food dispenser control system of any preceding clause, wherein the controller controls the touchless food dispenser to dispense the food through the one or more removable nozzles without a user physically touching the touchless food dispenser.
[0335] The touchless food dispenser control system of any preceding clause, wherein the touchless food dispenser includes a casing, wherein the one or more types of food are stored within the casing, and the controller controls the touchless food dispenser to dispense the food out of the casing through the one or more removable nozzles.
[0336] The touchless food dispenser control system of any preceding clause, wherein the touchless food dispenser includes one or more packets that contain the one or more types of food therein.
[0337] The touchless food dispenser control system of any preceding clause, wherein the touchless food dispenser includes a first state in which a removable nozzle of the one or more removable nozzles is configured to dispense the one or more types of food therethrough, and a second state in which the different removable nozzle is configured to dispense the one or more types of food therethrough.
[0338] The touchless food dispenser control system of any preceding clause, wherein the one or more types of food are stored in one or more food-containing bags within the touchless food dispenser.
[0339] The touchless food dispenser control system of any preceding clause, wherein the one or more food-containing bags are stored within one or more food storage containers.
[0340] The touchless food dispenser control system of any preceding clause, wherein the touchless food dispenser includes a dispensing area, wherein the one or more removable nozzles are oriented to dispense the food into the dispensing area.
[0341] The touchless food dispenser control system of any preceding clause, wherein the touchless food dispenser includes one or more user proximity sensors that are configured to detect a user in proximity to the touchless food dispenser.
[0342] The touchless food dispenser control system of any preceding clause, wherein the touchless food dispenser includes one or more stacks of additional removable nozzles stored within the touchless food dispenser.
[0343] The touchless food dispenser control system of any preceding clause, wherein the touchless food dispenser includes one or more tubes that are configured to provide the one or more types of food to the one or more removable nozzles to dispense the food through the one or more removable nozzles.
[0344] Although the foregoing description is directed to the preferred embodiments, it is noted that other variations and modifications will be apparent to those skilled in the art and may be made without departing from the spirit or scope of the disclosure. Moreover, features described in connection with one embodiment may be used in conjunction with other embodiments, even if not explicitly stated above.

Claims

1. A touchless food dispenser comprising: one or more packets of food stored therein; one or more apertures, wherein the touchless food dispenser is configured to dispense the food out of the touchless food dispenser through the one or more apertures; one or more drive rollers, the touchless food dispenser configured to feed the one or more packets of food through the one or more drive rollers to dispense the one or more packets of food through the one or more apertures; and a cutting mechanism disposed between the one or more drive rollers and the one or more apertures, wherein the cutting mechanism is configured to cut the one or more packets of food as the one or more packets of food are fed through the one or more drive rollers towards the one or more apertures.
2. The touchless food dispenser of claim 1, wherein the cutting mechanism includes a blade for cutting the one or more packets of food.
3. The touchless food dispenser of claim 2, wherein the cutting mechanism includes an actuator configured to move the blade to cut the one or more packets of food.
4. The touchless food dispenser of claim 1, wherein the one or more packets of food are coupled together, and the cutting mechanism removes an individual packet of food from the one or more packets of food to dispense the individual packet of food from the touchless food dispenser.
5. The touchless food dispenser of claim 1, wherein the cutting mechanism cuts the one or more packets of food to open the one or more packets of food.
6. The touchless food dispenser of claim 5, wherein the cutting mechanism cuts a front end of the one or more packets of food.
7. The touchless food dispenser of claim 1, wherein the one or more drive rollers are configured to force the food out of the one or more packets of food to dispense the food out of the one or more apertures and from the touchless food dispenser.
8. The touchless food dispenser of claim 1, further comprising an electric motor that is configured to provide mechanical power to the one or more drive rollers for rotating the one or more drive rollers.
9. The touchless food dispenser of claim 1, wherein the touchless food dispenser is configured to receive a selected amount of food to dispense and dispense the selected amount of food.
10. The touchless food dispenser of claim 1, wherein the touchless food dispenser is configured to dispense a predetermined amount of food through the one or more apertures.
11. The touchless food dispenser of claim 1, further comprising one or more dispenser proximity sensors that are configured to detect a gesture of a user that controls the food being dispensed through the one or more apertures.
12. The touchless food dispenser of claim 11, wherein the touchless food dispenser is configured to dispense the food as long as the one or more dispenser proximity sensors detect the gesture of the user.
13. The touchless food dispenser of claim 1, further comprising a display for displaying pictures, video, or text with information of a selected type food for dispensing or an amount of food being dispensed.
14. The touchless food dispenser of claim 1, wherein the touchless food dispenser is configured to receive a selection of an amount of food to dispense from a computing device.
15. The touchless food dispenser of claim 1, further comprising a power supply that is configured to supply power to the touchless food dispenser.
16. The touchless food dispenser of claim 1, further comprising a controller that is configured to control the touchless food dispenser to dispense the food.
17. The touchless food dispenser of claim 16, wherein the controller controls the cutting mechanism to cut the one or more packets of food.
18. The touchless food dispenser of claim 1, further comprising a refrigeration device that is configured to control a temperature of the food within the touchless food dispenser.
19. A touchless food dispenser comprising: one or more packets of food stored therein; one or more

apertures, wherein the touchless food dispenser is configured to dispense the food out of the touchless food dispenser through the one or more apertures; one or more drive rollers, the touchless food dispenser configured to feed the one or more packets of food through the one or more drive rollers to dispense the one or more packets of food through the one or more apertures; a cutting mechanism including a blade and an actuator disposed between the one or more drive rollers and the one or more apertures; and a controller configured to control the actuator to move the blade to cut the one or more packets of food as the one or more packets of food are fed through the one or more drive rollers towards the one or more apertures.

20. The touchless food dispenser of claim 1, wherein the one or more packets of food are coupled together, and the cutting mechanism removes an individual packet of food from the one or more packets of food to dispense the individual packet of food from the touchless food dispenser.