SUMMARY

[0005] The present application discloses implementations that relate to an unmanned aerial vehicle (UAV) landing structure. UAVs are increasingly more common and as such, dedicated landing structures are necessary to support UAV delivery services. For example, a structure with the capability to load and unload payloads from UAVs may help merchants looking to utilize UAV delivery services in their business. In order to facilitate delivery of payloads, a UAV may land on an elevated landing platform and lower a payload through a cavity in the platform. Additional devices or systems may be included within the landing structure in order to orientate the UAV or component(s) of the UAV such that the UAV can pick up or drop off a payload. For example, a track may be coupled to the landing platform in order to position the UAV over the cavity. In another example, a track may be coupled to the landing platform in order to align a tether of the UAV with a payload below the landing platform. Example landing structures described herein may be installed on freestanding support structures or may be installed on existing structures such as exterior building walls, rooftops, lamp posts, cell towers, etc. Beneficially, the landing structure(s) described herein may be installed in a variety of locations without impeding everyday life of merchants, customers, or other people, while increasing access to UAV delivery service to the same merchants, customers, or other people.

[0005a] According to a first aspect of the present invention, there is disclosed a landing structure comprising: a landing platform for an unmanned aerial vehicle (UAV), wherein the landing platform includes a cavity therein, and wherein the UAV comprises a winch system comprising a tether coupleable to a payload; and a track that runs along the landing platform from a touchdown area to the cavity, wherein the track tapers outward from the touchdown area to the cavity such that after the UAV lands on the landing platform, the track guides the UAV towards a docked position over the cavity, wherein the UAV travels along the landing platform to the docked position under power from the UAV.

[0005b] According to a second aspect of the present invention, there is disclosed a system comprising: an unmanned aerial vehicle (UAV) comprising a winch system, wherein the winch system comprises a tether coupleable to a payload; a landing platform including a cavity therein and comprising a track that runs along the landing platform from a touchdown area to the cavity, wherein the track tapers outward from the touchdown area to the cavity such that the track guides the UAV to a docked position, wherein the UAV travels along the landing platform to the docked position under power from the UAV; and a control system configured to: instruct

the UAV to apply a forward thrust such that the UAV contacts the track; and instruct the UAV to continue to apply the forward thrust until the UAV reaches the docked position.

[0005c] According to a third aspect of the present invention, there is disclosed a landing structure comprising: a landing platform for an unmanned aerial vehicle (UAV), wherein the UAV comprises a first landing pad, a second landing pad, and a winch system comprising a tether coupleable to a payload; a track that runs along the landing platform such that the track guides the UAV to a docked position while the UAV travels along the landing platform under power from the UAV; wherein the track comprises a slot in the landing platform, wherein the first landing pad and the second landing pad of the UAV each have a pin that extends beyond the pad such that when the UAV moves along the landing platform the pin in the first landing pad will engage the slot, then the second pin will engage the slot so as the UAV continues to move along the landing platform the UAV will follow a path of the slot to the docked position.

[0006] In at least one embodiment, a device is described. The device includes a landing platform for a UAV, a cavity within the landing platform, and a track that runs along the landing platform and at least a part of the cavity. The UAV includes a winch system that includes a tether that can be coupled to a payload. Furthermore, the cavity is aligned over a predetermined target location. Also, the cavity is sized to allow the winch system to pass a tethered payload through the cavity. Additionally, the track guides the UAV to a docked position in which the tether is positioned over the cavity. When the UAV is in the docked position, the tether can raise or lower a payload through the cavity.

[0007] In another embodiment, a system is described. The system includes a winch system for a UAV, and a landing platform. The winch system of the UAV includes a tether that can be coupled to a payload. Furthermore, the landing platform includes a cavity and a track that runs along the landing platform and at least a part of the cavity. Additionally, the cavity is aligned over a predetermined target location. The cavity is sized to allow the winch system to pass a tethered payload through the cavity. The track guides the UAV to a docked position over the cavity as the UAV moves along the landing platform. When the UAV is in the docked

position, a payload may be loaded to or unloaded from the UAV through the cavity.

[0008] In yet another embodiment, a method is described. The method includes landing a UAV on a landing platform, the UAV engaging a track that runs along the landing platform including along at least a part of a cavity within the landing platform, the track guiding the UAV to a docked position over the cavity, and then loading or unloading a payload to or from the UAV through the cavity when the UAV is in the docked position. The UAV includes a winch system that includes a tether that can be coupled to a payload. Furthermore, the cavity is aligned over a predetermined target location and is sized to allow the winch system to pass a payload through the cavity.

[0009] In yet another ~~aspect~~embodiment, another system is described. The system includes means for landing a UAV on a landing platform, means for engaging a track that runs along the landing platform including along at least a part of a cavity within the landing platform, means for guiding the UAV to a docked position over the cavity, and means for loading or unloading a payload to or from the UAV through the cavity when the UAV is in the docked position. The UAV includes a winch system that includes a tether that can be coupled to a payload. Furthermore, the cavity is aligned over a predetermined target location and is sized to allow the winch system to pass a tethered payload through the cavity.

[0010] These as well as other aspects, advantages, and alternatives will become apparent to those of ordinary skill in the art by reading the following detailed description, with reference where appropriate to the accompanying drawings.