United States Patent	12391414
Kind Code	B2
Date of Patent	August 19, 2025
Inventor(s)	Qiu; Li et al.

Unmanned aerial vehicle base station and unmanned aerial vehicle system

Abstract

A base station may include a base body, a landing pad, and a base station opening and closing structure. The base station opening and closing structure may include an open state and a closed state. In the open state, the base station opening and closing structure may provide a landing space for an aerial vehicle to land on the landing pad, and in the closed state, the base station opening and closing structure may provide an accommodating space to accommodate the aerial vehicle. During a process of the base station opening and closing structure transitioning from the open state to the closed state, the base station opening and closing structure may be configured to propel some blades of the aerial vehicle partially protruding out of the accommodating space to fold or retract so as to accommodate the aerial vehicle within the accommodating space.

Inventors: **Qiu; Li (Guangdong, CN), Zhang; Di (Guangdong, CN), Liu; Yi (Guangdong, CN), Zhang; Chi (Guangdong, CN), Zhang; Pan (Guangdong, CN)**

Applicant: **SZ DJI TECHNOLOGY CO., LTD.** (Guangdong, CN)

Family ID: **1000008763332**

Assignee: **SZ DJI TECHNOLOGY CO., LTD. (Shenzhen, CN)**

Appl. No.: **18/396744**

Filed: **December 27, 2023**

Prior Publication Data

Document Identifier	Publication Date
US 20240132238 A1	Apr. 25, 2024

Related U.S. Application Data

continuation parent-doc WO PCT/CN2022/079906 20220309 PENDING child-doc US 18396744

Publication Classification

Int. Cl.: **B64U70/92** (20230101); **B64U80/70** (20230101)

U.S. Cl.:

CPC **B64U70/92** (20230101); **B64U80/70** (20230101);

Field of Classification Search

CPC: B64U (70/92); B64U (80/70); B64U (70/00); B64U (70/93); B64F (1/005); B64F (1/007); B64C (29/02); E05F (15/63); E05F (15/46)

References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
3253806	12/1965	Eickmann	244/17.23	B64C 27/12
3483696	12/1968	Gilbert	416/157R	B64C 27/08
4262712	12/1980	Young	141/DIG.1	B67D 7/54
7334755	12/2007	Svoboda, Jr.	244/17.23	B64C 27/08
8052081	12/2010	Olm	244/17.23	B64U 10/13
8245469	12/2011	Rubel	52/223.6	E04B 5/48
8256172	12/2011	Benson	52/489.1	E04F 15/02183
8511606	12/2012	Lutke	320/109	B64U 80/40
9050997	12/2014	Schramm	N/A	B62D 15/0215
9056676	12/2014	Wang	N/A	B64F 1/22
9126693	12/2014	Shi	N/A	G05B 11/42
9290277	12/2015	You	N/A	B64U 50/34
9387928	12/2015	Gentry	N/A	B64U 50/39
9421869	12/2015	Ananthanarayanan	N/A	B60L 5/005
9446858	12/2015	Hess	N/A	B64F 3/02
9457899	12/2015	Duffy	N/A	B64U 10/16
9527605	12/2015	Gentry	N/A	G05D 1/0094
9551989	12/2016	Scarlatti	N/A	G05D 1/00
9589448	12/2016	Schneider	N/A	F41H 9/10
9643722	12/2016	Myslinski	N/A	G05D 1/689
9718564	12/2016	Beckman	N/A	G08G 5/57
9783075	12/2016	Henry	N/A	G05D 1/654
9783301	12/2016	Schliwa	N/A	B64D 11/0007
9957045	12/2017	Daly	N/A	B64U 50/19
10099561	12/2017	Ananthanarayanan	N/A	B60L 53/126
10099785	12/2017	Gonzalez	N/A	B64U 50/31
10176722	12/2018	Boyd	N/A	G08G 5/57
10268208	12/2018	Hopwood Thomas	N/A	G05D 1/0676
10287033	12/2018	Hu	N/A	B64F 1/04

10310501	12/2018	Greenberger	N/A	H02J 7/342
10467685	12/2018	Brisson	N/A	B64F 1/222
10526094	12/2019	Cheng	N/A	B64U 80/70
10719080	12/2019	Zhang	N/A	B64F 5/60
10745102	12/2019	Nysæter	N/A	B64U 30/20
D903576	12/2019	Feldman	D12/345	N/A
10899436	12/2020	Gentry	N/A	B64C 25/001
10967970	12/2020	Van Niekerk	N/A	B64U 30/293
11079752	12/2020	Lombardini	N/A	B64U 50/19
11111033	12/2020	Burks	N/A	B64U 50/34
D932369	12/2020	Passley	D12/16.1	N/A
11148808	12/2020	Wiggerich	N/A	B64U 30/26
11370561	12/2021	Ratajczak	N/A	B60L 53/14
11534801	12/2021	Volta	N/A	B66F 9/063
11572197	12/2022	Nevdahs	N/A	B64F 1/362
11597515	12/2022	Passley	N/A	B64F 1/007
11597516	12/2022	Klinkmueller	N/A	B64U 70/20
11603218	12/2022	Fisher	N/A	B64F 1/04
11603219	12/2022	Ratajczak	N/A	B64U 30/20
11636771	12/2022	Barker	701/16	B64U 50/39
11641966	12/2022	Nakanishi	232/44	A47G 29/124
11667402	12/2022	Liske	244/116	B64U 50/37
11673690	12/2022	Dayan	244/114R	B64U 80/70
11710092	12/2022	Dearing	705/330	G07C 9/00896
11713136	12/2022	Foggia	244/114R	B64U 80/10
11714189	12/2022	Padmanabhan	342/22	G01S 19/51
11738867	12/2022	Ehasoo	244/17.11	B60L 5/18
11741422	12/2022	Gil	705/338	B65G 1/0478
11748688	12/2022	Ur	705/332	B64C 39/024
11760485	12/2022	Wabnegger	244/121	H02G 1/02
11767129	12/2022	Warwick	244/137.1	B64C 39/024
11772814	12/2022	Dubois	244/110E	B64U 70/83
11776136	12/2022	Pachikov	244/17.23	B64U 10/13
11780606	12/2022	Carthew	244/114R	B64U 70/99
11794894	12/2022	Brock	N/A	B64U 30/20
11794922	12/2022	Twyford	N/A	B64U 80/25
11814191	12/2022	Cheng	N/A	B64U 60/50
11814241	12/2022	Tian	N/A	B60P 3/11
11840152	12/2022	Fisher	N/A	B64C 29/02
11851209	12/2022	Fisher	N/A	B64F 1/005
11858662	12/2023	Gil	N/A	B64U 70/70
11866168	12/2023	Cooper	N/A	B64U 70/97
11884422	12/2023	Lowe	N/A	H01Q 1/22
11898368	12/2023	Blake	N/A	G08G 5/57
11900823	12/2023	Surace	N/A	G05D 1/0676
11932315	12/2023	Hwang	N/A	B64F 1/32
11939046	12/2023	Berry	N/A	B64C 39/024
11939057	12/2023	Hamm	N/A	B64U 20/70
11939080	12/2023	Cowden	N/A	B64U 80/30

11939083	12/2023	Baklycki	N/A	B64U 70/90
12059089	12/2023	Dunn	N/A	A47G 29/141
12084211	12/2023	Li	N/A	B64U 70/99
12091194	12/2023	Wang	N/A	E05F 15/63
12168533	12/2023	Hinman	N/A	B64U 70/97
12195213	12/2024	Qi	N/A	B64U 70/97
2004/0256519	12/2003	Ellis	244/110E	B64F 1/125
2005/0061910	12/2004	Wobben	244/17.23	B64C 29/00
2005/0178894	12/2004	McGeer	244/63	B64F 1/06
2006/0038067	12/2005	Dennis	244/63	B64U 70/50
2006/0249622	12/2005	Steele	244/115	B64U 70/30
2007/0176432	12/2006	Rolt	290/55	F03D 9/255
2008/0217486	12/2007	Colten	244/45R	B64U 10/25
2009/0057486	12/2008	Becht, IV	244/114R	B64F 1/007
2010/0170993	12/2009	Misegades	244/130	B64C 7/00
2010/0320313	12/2009	Hanafin	244/114R	B64F 1/125
2011/0174925	12/2010	Ying	701/16	B64F 1/005
2012/0080556	12/2011	Root, Jr.	73/170.28	B64F 1/06
2013/0233964	12/2012	Woodworth	244/175	B64U 10/60
2013/0344778	12/2012	Schafer	451/294	B24B 41/02
2014/0124621	12/2013	Godzdanker	244/110E	B64F 1/28
2014/0257595	12/2013	Tillmann	701/2	B64U 10/14
2014/0319272	12/2013	Casado	244/110E	B60L 3/12
2015/0069968	12/2014	Pounds	320/109	B60L 53/35
2015/0123462	12/2014	Kamradt	141/192	B67D 7/02
2015/0158599	12/2014	Sisko	244/114R	B64F 1/20
2015/0175276	12/2014	Koster	244/114R	A47G 29/14
2015/0183528	12/2014	Walsh	244/114R	B64F 1/32
2015/0336669	12/2014	Kantor	701/3	G01C 21/343
2015/0336677	12/2014	Smaoui	320/109	H02J 7/0045
2015/0363843	12/2014	Loppatto	705/330	G06Q 30/0283
2016/0001883	12/2015	Sanz	244/17.23	B64U 10/13
2016/0003637	12/2015	Andersen	701/519	G01C 21/362
2016/0011592	12/2015	Zhang	244/114R	G05D 1/10
2016/0023761	12/2015	McNally	701/3	G05D 1/0094
2016/0039541	12/2015	Beardsley	701/2	B60L 53/14
2016/0068264	12/2015	Ganesh	701/4	G08G 5/55
2016/0068265	12/2015	Hoareau	701/3	G06Q 10/08
2016/0101856	12/2015	Kohstall	244/17.23	G05D 1/0669
2016/0130000	12/2015	Rimanelli	244/2	B64U 20/50
2016/0131025	12/2015	Pekrul	123/205	F02B 53/10
2016/0144982	12/2015	Sugumaran	244/108	B64F 1/005
2016/0185466	12/2015	Dreano, Jr.	705/26.81	G06Q 10/083
2016/0194959	12/2015	Pekrul	418/146	F01C 19/06
2016/0196756	12/2015	Prakash	701/3	G08G 5/54
2016/0200438	12/2015	Bokeno	244/2	G05D 1/102
2016/0207627	12/2015	Hoareau	N/A	B64D 1/02
2016/0229299	12/2015	Streett	N/A	B64F 1/222
2016/0244162	12/2015	Weller	N/A	B64U 10/13

2016/0244187	12/2015	Byers	N/A	G06Q 10/0832
2016/0257423	12/2015	Martin	N/A	B64U 50/34
2016/0257426	12/2015	Mozer	N/A	B64F 1/362
2016/0272317	12/2015	Cho	N/A	G08G 1/162
2016/0280371	12/2015	Canavor	N/A	H04W 4/029
2016/0286128	12/2015	Zhou	N/A	H04L 65/762
2016/0291445	12/2015	Fisher, Sr.	N/A	F16M 11/10
2016/0304198	12/2015	Jourdan	N/A	G08G 5/57
2016/0304217	12/2015	Fisher	N/A	G05D 1/0011
2016/0307448	12/2015	Salnikov	N/A	A01C 21/00
2016/0311329	12/2015	Rodriguez	N/A	B60L 58/18
2016/0340006	12/2015	Tang	N/A	B63C 9/01
2016/0340021	12/2015	Zhang	N/A	B64C 27/006
2016/0355261	12/2015	Chin	N/A	B64U 70/20
2016/0364989	12/2015	Speasl	N/A	G08G 5/57
2016/0378108	12/2015	Paczan	705/330	B64C 37/02
2017/0011333	12/2016	Greiner	N/A	G06K 7/10722
2017/0015415	12/2016	Chan	N/A	G06Q 30/04
2017/0021941	12/2016	Fisher	N/A	B64U 10/20
2017/0021942	12/2016	Fisher	N/A	B64U 70/80
2017/0023949	12/2016	Fisher	N/A	G08G 5/55
2017/0050749	12/2016	Pilskalns	N/A	B60L 53/14
2017/0073085	12/2016	Tremblay	N/A	A47G 29/141
2017/0081043	12/2016	Jones	N/A	B64C 37/02
2017/0096222	12/2016	Spinelli	N/A	B64U 80/25
2017/0117676	12/2016	James	N/A	B64U 70/90
2017/0121023	12/2016	High	N/A	B64D 9/00
2017/0129464	12/2016	Wang	N/A	H02J 7/0045
2017/0129603	12/2016	Raptopoulos	N/A	B64F 1/22
2017/0132558	12/2016	Perez	N/A	G06Q 10/083
2017/0137118	12/2016	Gentry	N/A	B64D 1/02
2017/0144776	12/2016	Fisher	N/A	B64U 10/25
2017/0158352	12/2016	von Flotow	N/A	B64C 27/26
2017/0158353	12/2016	Schmick	N/A	B60L 53/12
2017/0174335	12/2016	Malloy	N/A	B64D 35/04
2017/0190443	12/2016	Fisher	N/A	B64F 1/005
2017/0203632	12/2016	Westendarp	N/A	B60H 1/00378
2017/0203857	12/2016	O'Toole	N/A	A47G 29/141
2017/0225782	12/2016	Kohstall	N/A	B64U 30/26
2017/0225799	12/2016	Selwyn	N/A	B64F 1/005
2017/0225802	12/2016	Lussier	N/A	B64U 10/14
2017/0240291	12/2016	Kim	N/A	H01M 16/006
2017/0247120	12/2016	Miller	N/A	B64U 20/83
2017/0253349	12/2016	Wang	N/A	B64U 70/97
2017/0270314	12/2016	Tsybrovskyy	N/A	H04W 12/06
2017/0275025	12/2016	Johnson	N/A	B64F 1/362

2017/0283090	12/2016	Miller	N/A	B64U 70/97
2017/0305575	12/2016	Bash	N/A	B64F 1/32
2017/0308850	12/2016	Roush	N/A	G01C 21/343
2017/0316701	12/2016	Gil	N/A	B60P 3/11
2017/0323129	12/2016	Davidson	N/A	G05D 1/0234
2017/0327091	12/2016	Capizzo	N/A	H01M 10/30
2017/0341769	12/2016	Haberbusch	N/A	F17C 5/007
2018/0039286	12/2017	Tirpak	N/A	B64U 80/25
2018/0053139	12/2017	Stoman	N/A	B64U 10/13
2018/0056794	12/2017	Kim	N/A	B60L 53/126
2018/0092345	12/2017	Okumura	N/A	F41G 7/2253
2018/0092484	12/2017	Lewis	N/A	G08G 5/54
2018/0105020	12/2017	Smith	N/A	B60H 1/262
2018/0105289	12/2017	Walsh	N/A	B60L 53/30
2018/0118340	12/2017	Russo	N/A	B64U 50/37
2018/0118374	12/2017	Lombardini	N/A	B64F 3/02
2018/0194484	12/2017	Livieratos	N/A	F02D 13/0269
2018/0196418	12/2017	Meier	N/A	G05D 1/0206
2018/0233055	12/2017	Damnjanovic	N/A	G08G 5/57
2018/0237161	12/2017	Minnick	N/A	B64U 50/37
2018/0245365	12/2017	Wankewycz	N/A	B64U 10/13
2018/0265295	12/2017	Beckman	N/A	G08G 5/57
2018/0265296	12/2017	Beckman	N/A	B64U 70/90
2018/0295327	12/2017	Yearwood	N/A	B25J 11/002
2018/0312276	12/2017	Miller	N/A	B64U 10/14
2018/0319496	12/2017	Zhang	N/A	B64U 20/50
2018/0327091	12/2017	Burks	N/A	B64U 50/13
2018/0354649	12/2017	Ortiz	N/A	G08B 13/1436
2018/0357910	12/2017	Hobbs	N/A	B64C 27/00
2018/0364740	12/2017	Collins	N/A	G05D 1/0088
2018/0370618	12/2017	Harris	N/A	B64C 25/24
2019/0009926	12/2018	Hu	N/A	B64U 70/99
2019/0016476	12/2018	Scherz	N/A	H02J 7/0042
2019/0023133	12/2018	Renold	N/A	B60L 53/35
2019/0023416	12/2018	Borko	N/A	B66C 7/08
2019/0028904	12/2018	Carpenter	N/A	G08G 5/76
2019/0047462	12/2018	Vijayaraghavan	N/A	B60W 30/00
2019/0055018	12/2018	Bei	N/A	B64U 70/92
2019/0100108	12/2018	Davis	N/A	B64U 80/84
2019/0100313	12/2018	Campbell	N/A	B64U 10/14
2019/0106224	12/2018	Nishikawa	N/A	B64U 80/70
2019/0108472	12/2018	Sweeney	N/A	G06Q 10/083
2019/0135403	12/2018	Perry	N/A	B64U 10/25
2019/0152326	12/2018	Nishikawa	N/A	B64U 50/19
2019/0161190	12/2018	Gil	N/A	E05F 15/77
2019/0193952	12/2018	Zevenbergen	N/A	B64U 80/25
2019/0217952	12/2018	Zawadzki	N/A	B64D 1/02
2019/0233103	12/2018	High	N/A	A47G 29/141

2019/0233107	12/2018	Tian	N/A	B64C 39/12
2019/0245365	12/2018	Farrahi Moghaddam	N/A	H02J 7/0042
2019/0256201	12/2018	Plekhanov	N/A	B64U 20/40
2019/0256202	12/2018	Resnick	N/A	B64U 10/13
2019/0256207	12/2018	Nohmi	N/A	G05D 1/0866
2019/0258910	12/2018	Stoman	N/A	G06K 19/06028
2019/0263519	12/2018	Argus	N/A	B64U 50/11
2019/0270526	12/2018	Hehn	N/A	B64U 80/70
2019/0283871	12/2018	Wieczorek	N/A	B64U 10/60
2019/0291961	12/2018	Urban	N/A	G06Q 50/40
2019/0308724	12/2018	Cooper	N/A	B64U 80/25
2019/0315235	12/2018	Kung	N/A	B64U 50/39
2019/0348862	12/2018	Obayashi	N/A	H02J 50/90
2019/0383052	12/2018	Blake	N/A	G08G 5/22
2020/0017218	12/2019	Ahmad	N/A	B64D 9/00
2020/0017237	12/2019	Walker	N/A	B64F 1/362
2020/0036243	12/2019	Zhao	N/A	H02K 1/145
2020/0044463	12/2019	Kim	N/A	B64U 10/14
2020/0055613	12/2019	Miller	N/A	G05D 1/0676
2020/0062373	12/2019	Liao	N/A	B64U 10/16
2020/0094957	12/2019	Sohmshetty	N/A	B60P 3/11
2020/0148322	12/2019	Pekrul	N/A	B63H 5/02
2020/0165008	12/2019	Krauss	N/A	B64U 80/25
2020/0180940	12/2019	Rainville	N/A	B64F 1/28
2020/0189731	12/2019	Mistry	N/A	H04B 7/18502
2020/0207484	12/2019	Foggia	N/A	B64U 70/92
2020/0218287	12/2019	Wang	N/A	B64U 50/34
2020/0218288	12/2019	Johnson	N/A	B64U 30/26
2020/0225684	12/2019	Anderson	N/A	B64U 70/95
2020/0239160	12/2019	Cheng	N/A	B64F 1/22
2020/0247540	12/2019	Jones	N/A	B64D 7/08
2020/0262583	12/2019	Ducharme	N/A	B64U 70/97
2020/0290752	12/2019	Kolosiuk	N/A	B64U 70/30
2020/0301445	12/2019	Jourdan	N/A	G06K 19/06037
2020/0309489	12/2019	Kadavanich	N/A	F41J 9/08
2020/0346736	12/2019	Krasnoff	N/A	B64U 30/16
2020/0346743	12/2019	Bernard	N/A	B64C 25/18
2020/0349852	12/2019	DiCosola	N/A	G08G 5/55
2020/0369408	12/2019	Dolata	N/A	B60L 53/16
2020/0398999	12/2019	Ortiz	N/A	G07C 9/00309
2020/0406773	12/2019	Lacaze	N/A	G05D 1/0094
2021/0031947	12/2020	Wankewycz	N/A	E04H 6/44
2021/0045564	12/2020	Duckers	N/A	E06B 3/483
2021/0047055	12/2020	Lee	N/A	B64F 1/36
2021/0053677	12/2020	Passley	N/A	B64U 70/95
2021/0070468	12/2020	Svirsky	N/A	B64U 80/25

2021/0086913	12/2020	Friedman	N/A	B64F 1/362
2021/0107684	12/2020	Le Lann	N/A	B60L 53/52
2021/0122495	12/2020	Rezvani	N/A	B64F 1/007
2021/0125503	12/2020	Henry	N/A	G05D 1/606
2021/0214102	12/2020	Geng	N/A	G08G 5/22
2021/0237694	12/2020	Hirschvogel	N/A	B60J 7/16
2021/0237899	12/2020	Warwick	N/A	B64C 39/024
2021/0253242	12/2020	Falk-Petersen	N/A	B64U 80/40
2021/0276735	12/2020	Raptopoulos	N/A	A47G 29/141
2021/0284356	12/2020	Jourdan	N/A	G08G 5/55
2021/0300591	12/2020	Tian	N/A	B64F 1/007
2021/0354820	12/2020	Hiller	N/A	B60L 53/12
2021/0394930	12/2020	O'Toole	N/A	A47G 29/30
2022/0019247	12/2021	Dayan	N/A	B64F 1/222
2022/0041279	12/2021	Rowse	N/A	G05D 1/104
2022/0041299	12/2021	Wankewycz	N/A	B64U 50/31
2022/0055745	12/2021	Walker	N/A	H02G 11/02
2022/0055770	12/2021	O'Toole	N/A	B60L 53/80
2022/0063798	12/2021	Johnson	N/A	B64C 13/24
2022/0073214	12/2021	Liske	N/A	B64F 1/32
2022/0106125	12/2021	Ragan	N/A	F16G 3/10
2022/0119105	12/2021	Schmalzried	N/A	G05D 1/695
2022/0169401	12/2021	Di Cosola	N/A	B64U 70/95
2022/0171388	12/2021	Yanagihashi	N/A	B65G 43/00
2022/0177124	12/2021	Marshall	N/A	B64U 50/19
2022/0234757	12/2021	Dayan	N/A	B64U 80/70
2022/0242589	12/2021	Pham	N/A	G09F 27/005
2022/0380063	12/2021	Shah	N/A	B64F 1/362
2022/0396373	12/2021	Wang	N/A	B60L 53/30
2023/0017530	12/2022	Lowe	N/A	B60H 1/00278
2023/0023246	12/2022	McLaughlin	N/A	G05D 1/0088
2023/0031028	12/2022	Ehasoo	N/A	B64U 80/10
2023/0044050	12/2022	Cevacins	N/A	B64U 70/97
2023/0045483	12/2022	Ahn	N/A	G05D 1/689
2023/0045691	12/2022	Cevacins	N/A	B64U 60/00
2023/0046127	12/2022	Guerra Johansson	N/A	G05D 1/0038
2023/0063715	12/2022	Bell	N/A	G05D 1/0246
2023/0088830	12/2022	Kim	244/221	B64U 50/32
2023/0096139	12/2022	Ubaldi	198/844.1	B65G 23/44
2023/0100169	12/2022	Laczak	232/1R	A47G 29/141
2023/0140387	12/2022	Infanti	244/114R	B64C 39/024
2023/0159192	12/2022	Gil	244/137.1	B64U 80/40
2023/0202680	12/2022	Yehya	244/110E	B64U 70/30
2023/0202682	12/2022	Kiyokami	244/114R	B64U 70/90
2023/0202691	12/2022	Kiyokami	244/114R	B64U 80/86
2023/0303272	12/2022	Passley	N/A	B64U 70/00
2023/0348106	12/2022	Berthelet	N/A	B60L 53/302
2023/0373626	12/2022	Kiyokami	N/A	B64D 1/22
2023/0399132	12/2022	Kiyokami	N/A	B64C 39/024

2024/0067371	12/2023	Turner	N/A	B64U 50/37
2024/0101287	12/2023	Takahashi	N/A	B64U 80/86
2024/0109656	12/2023	Stege	N/A	G06Q 10/083
2024/0132238	12/2023	Qiu	N/A	B64U 70/92
2024/0140630	12/2023	Lee	N/A	B64U 80/40
2024/0158112	12/2023	Le Lann	N/A	H01M 50/262
2024/0278946	12/2023	Roberts	N/A	B64U 10/16
2024/0336378	12/2023	Neate	N/A	B64U 70/50
2024/0391616	12/2023	Dayan	N/A	B64U 70/90
2025/0002185	12/2024	Liu	N/A	B64U 80/70
2025/0026509	12/2024	Infanti	N/A	B64U 70/50
2025/0121966	12/2024	Gronstedt	N/A	B64U 80/10
2025/0145314	12/2024	Gronstedt	N/A	B64F 1/322

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
207029853	12/2017	CN	N/A
108945502	12/2017	CN	N/A
108945502	12/2019	CN	N/A
111483386	12/2019	CN	N/A
111691730	12/2019	CN	N/A
111731499	12/2019	CN	N/A
111776237	12/2019	CN	N/A
212313860	12/2020	CN	N/A
113002798	12/2020	CN	N/A
113479337	12/2020	CN	N/A
2018/201277	12/2017	WO	N/A
2021082794	12/2020	WO	N/A

OTHER PUBLICATIONS

International Search Report and Written Opinion mailed on Nov. 28, 2022, received for PCT Application PCT/CN2022/079906, filed on Mar. 9, 2022, 9 pages including English Translation. cited by applicant

---

Primary Examiner: Badawi; Medhat

Attorney, Agent or Firm: ANOVA LAW GROUP, PLLC

Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION (1) The present application is a continuation of International Application No. PCT/CN2022/079906, filed Mar. 9, 2022, the entire content of which being incorporated herein by reference in its entirety.

TECHNICAL FIELD

(1) Some embodiments of the present disclosure relate to the technical field of unmanned aerial vehicle (UAV), and in particular, to an unmanned aerial vehicle base station and an unmanned aerial vehicle system.

BACKGROUND

(2) With the continuous rapid development of science and technology and UAV technology, UAVs have been widely used in many fields. Due to the limitation of the battery life of UAVs, UAVs cannot stay in the air for a long time to perform tasks. Therefore, a kind of UAV base station is usually designed on the ground. The main functions of the UAV base station can be used to charge the UAV, increase the UAV range, etc. In addition, the UAV base station can communicate with the UAV and can be used to control the takeoff and landing of the UAV.

(3) However, existing UAV base stations are typically larger in size and less space efficient.

SUMMARY

(4) Embodiments of the present disclosure provide an aerial vehicle base station and an aerial vehicle system that can realize product miniaturization and reduce product cost and footprint.

(5) According to an aspect of embodiments of the present disclosure, there is provided a base station. The base station comprises a base body, a landing pad provided on the base body, and a base station opening and closing structure movably provided on the base body. The base station opening and closing structure may include an open state and a closed state. In the open state, the base station opening and closing structure may provide a landing space for an aerial vehicle to land on the landing pad, and in the closed state, the base station opening and closing structure may provide an accommodating space to accommodate the aerial vehicle. During a process of the base station opening and closing structure transitioning from the open state to the closed state, the base station opening and closing structure may be configured to propel some blades of the aerial vehicle partially protruding out of the accommodating space to fold or retract so as to accommodate the aerial vehicle within the accommodating space.

(6) According to another aspect of embodiments of the present disclosure, a system is provided. The system comprises an aerial vehicle; and a base station. The base station comprises a base body; a landing pad, provided on the base body; and a base station opening and closing structure movably disposed on the base body, the base station opening and closing structure comprising an open state and a closed state, wherein in the open state, the base station opening and closing structure provides a landing space for an aerial vehicle to land on the landing pad, and in the closed state, the base station opening and closing structure provides an accommodating space to accommodate the aerial vehicle, and during a process of the base station opening and closing structure transitioning from the open state to the closed state, the base station opening and closing structure is configured to propel some blades of the aerial vehicle partially protruding out of the accommodating space to fold or retract so as to accommodate the aerial vehicle within the accommodating space.

(7) It should be understood that the above general description and the detailed description that follows are exemplary and explanatory only and do not limit the present application.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) In order to explain the technical features of embodiments of the present disclosure more clearly, the drawings used in the present disclosure are briefly introduced as follow. Obviously, the drawings in the following description are some exemplary embodiments of the present disclosure. Ordinary person skilled in the art may obtain other drawings and features based on these disclosed drawings without inventive efforts.

(2) FIG. **1** shows a top view of a UAV base station in an open state according to one embodiment of the present disclosure;

(3) FIG. **2** shows a side view of a UAV base station in an open state according to one embodiment of the present disclosure;

(4) FIG. **3** shows a side view of a UAV base station in a closed state according to one embodiment

of the present disclosure;
(5) FIG. **4** shows a top view of a UAV base station in a closed state, wherein the protective cover on one side is removed, according to one embodiment of the present disclosure;
(6) FIG. **5** shows a three-dimensional view of a UAV base station in a closed state, wherein the protective cover on one side is removed, according to one embodiment of the present disclosure;
(7) FIG. **6** shows a top view of a UAV base station in an intermediate state according to one embodiment of the present disclosure;
(8) FIG. **7** shows a three-dimensional view of a UAV base station in an intermediate state according to one embodiment of the present disclosure;
(9) FIG. **8** shows a simplified structural schematic diagram of a translational drive mechanism according to one embodiment of the present disclosure;
(10) FIG. **9** shows a simplified structural schematic diagram of an active side rocker arm and a passive side rocker arm according to one embodiment of the present disclosure;
(11) FIG. **10** shows a schematic diagram of an embodiment of the present disclosure in which a heating member is provided on a protective cover.

DETAILED DESCRIPTION

(12) The technical solutions in the embodiments of the present disclosure will be clearly and completely described below in conjunction with the accompanying drawings in the embodiments of the present disclosure, and it is clear that the described embodiments are only a part of the embodiments of the present disclosure and not all of the embodiments. Based on the embodiments in the present disclosure, all other embodiments obtained by a person of ordinary skill in the art without making creative labor fall within the scope of protection of the present disclosure.
(13) Exemplary embodiments will be described herein in detail, examples of which are represented in the accompanying drawings. When the following description relates to the accompanying drawings, the same numerals in the different accompanying drawings indicate the same or similar elements unless otherwise indicated. The embodiments described in the following exemplary embodiments do not represent all embodiments consistent with the present disclosure. Rather, they are only examples of devices and methods consistent with some aspects of the present disclosure as detailed in the appended claims.
(14) The terminology used in the present disclosure is for the sole purpose of describing particular embodiments and is not intended to limit the disclosure. The singular forms of “a” “an,” and “the” as used in the present disclosure and appended claims are also intended to encompass the plurality form, unless the context clearly indicates otherwise. It should also be understood that the term “and/or” as used herein refers to and encompasses any or all possible combinations of one or more of the listed items in association. Unless otherwise noted, the terms “front,” “rear,” “lower,” and/or “upper” and similar terms are used for convenience only and are not intended to be limited to a location or a spatial orientation. Words such as “connected” or “coupled” are not limited to physical or mechanical connections, but may include electrical connections, whether direct or indirect. “Capable” in the context of the present disclosure may denote the ability to.
(15) Various embodiments of the present disclosure are described in detail below in conjunction with the accompanying drawings. The features in the following embodiments and embodiments may be combined with each other without conflict.
(16) One embodiment of the present disclosure provides a UAV base station **100**. FIGS. **1** and **2** reveal a top view and a side view, respectively, of the UAV base station **100** in an open state of an embodiment of the present disclosure; and FIGS. **3** to **5** reveal a side view, a top view, and a three-dimensional view, respectively, of the UAV base station **100** in a closed state of an embodiment of the present disclosure. In FIGS. **4** and **5**, in order to show more clearly the state in which the blades are folded in the accommodating space, the protective cover on one side is removed. As shown in FIGS. **1** to **5**, the UAV base station **100** of one embodiment of the present disclosure includes a base body **10**, a landing pad **20** disposed on the base body **10**, and a base station opening and

closing mechanism or structure **30** movably disposed on the base body **10**.
(17) The base station opening and closing mechanism **30** includes an open state and a closed state. As shown in FIGS. **1** and **2**, when the base station opening and closing mechanism **30** is in the open state, the landing pad **20** is fully exposed and the UAV **200** may land on the landing pad **20**. As shown in FIGS. **3** through **5**, when the base station opening and closing mechanism **30** is in the closed state, an accommodating space **50** that can be used to hold the UAV **200** is formed between the base station opening and closing mechanism **30** and the landing pad **20**, and the base station opening and closing mechanism **30** covers the landing pad **20** completely, and the landing pad **20** is fully contained within the accommodating space **50**.
(18) The UAV **200** includes foldable blades **204**. and, when the UAV **200** lands on the landing pad **20**, the blades of the UAV **200** at least partially protrude outside of the accommodating space **50**. In some embodiments, after the UAV **200** lands on the landing pad **20**, the base station opening and closing mechanism **30** of an embodiment of the present disclosure may actuate the blades **204** to fold within the accommodating space **50** so that the UAV **200** is housed within the accommodating space **50**.
(19) The UAV base station **100** of the embodiment of the present disclosure can automatically drive the base station opening and closing mechanism **30** to fold the blades **204** in the accommodating space **50** during the process of closing the base station opening and closing mechanism **30** after the UAV **200** lands on the landing pad **20**, thereby holding the UAV **200** as a whole in the accommodating space **50**. Thus, the area enclosed by the boundary of the accommodating space **50** formed between the base station opening and closing mechanism **30** and the landing pad **20** during the closed state of the base station opening and closing mechanism **30** can be greatly reduced relative to the projected area of the entire envelope of the UAV **200** as it is in the flight state. The area enclosed by the boundary of the accommodating space **50** as described herein refers to the area formed by the projection of the accommodating space **50** on a plane in which the landing pad **20** is located.
(20) Therefore, the size of the UAV base station **100** of the embodiment of the disclosure can be greatly reduced relative to the existing UAV base station **100** designed with the projected area of the entire envelope, thereby enabling miniaturization of the product and reduction of the product cost and footprint.
(21) As shown in FIG. **1**, in some embodiments of the present disclosure, the UAV **200** comprises a fuselage **201**, an arm **202** disposed on the fuselage **201**, and a blade drive motor or first driving structure **203** disposed at an end of the arm **202** for driving the blades **204** to rotate. In one embodiment, a pair of blades **204** is disposed at an end of the arm **202**, and the blade drive motor **203** can simultaneously drive the pair of blades **204** to rotate. Of course, in other embodiments, only one blade **204** may be provided at the end of the arm **202**, and the blade drive motor **203** may drive the one blade **204** to rotate.
(22) Thus, in some embodiments, the area enclosed by the boundary of the accommodating space **50** of the UAV base station **100** may be determined based on the projected area of the blade drive motors **203** on the plane in which the landing pad **20** is located. The area enclosed by the boundary of the accommodating space **50** is typically larger than the projected area of the blade drive motors **203** on the plane in which the landing pad **20** is located.
(23) The UAV base station **100** of the embodiment of the present disclosure is capable of designing the size of the base station based on the projected area of the blades **204** of the UAV **200** on the plane where the landing pad **20** is located, and collapsing the blades **204** in the accommodating space **50** by changing the direction or the shape of the blades **204** or the like, so that the problem of the UAV base station **100** being oversized due to the size of the blades **204** can be avoided, and miniaturization of the base station can be realized.
(24) In some embodiments, considering that the UAV **200** may not land accurately on the landing pad **20** of the UAV base station **100** during actual landing, the area enclosed by the boundary of the

accommodating space **50** of the UAV base station **100** may be determined based on a combination of a projected area of the blade drive motors **203** on the plane where the landing pad **20** is located and the landing accuracy of the UAV **200**. If the landing accuracy of the UAV **200** can be made higher, the size of the UAV base station **100** will be able to be made smaller.

(25) With continued reference to FIG. **1**, it is shown that, in one embodiment, the UAV **200** may include four arms **202**, with two arms **202** provided on each of the opposite sides of the fuselage **201**. A blade drive motor **203** and a blade **204** are provided at the end of each arm **202**, respectively. Each blade drive motor **203** may, for example, drive a pair of blades **204** to rotate, respectively. Thus, in this case, the boundary extent of the accommodating space **50** of the UAV base station **100** may be determined based on the dimensions of a rectangle enclosed by the four blade drive motors **203**. Thus, the UAV base station **100** of the embodiment of the present disclosure can greatly reduce the size of the base station relative to existing UAV base stations designed with a complete projected envelope area of the entire UAV **200** including the blades **204**.

(26) As shown in FIGS. **4** and **5**, in some embodiments, the blades **204** of the UAV **200** housed in the accommodating space **50** are in a stationary and retracted state while the base station opening and closing mechanism **30** is in a closed state. In one embodiment, the retracted state described herein may be that the blades **204** are in a fully folded state. Of course, in other embodiments, the retracted state described herein does not necessarily require the blades **204** to be in a fully folded state, and the retracted state described herein may also be that the blades **204** are moved and folded relative to the fully unfolded state of the blades. For example, when the base station opening and closing mechanism **30** is in the closed state, it is sufficient to make the blades **204** fold into the rectangle enclosed by the four blade drive motors **203**. Thereby, the projected area of the UAV **200** on the plane where the landing pad **20** is located can be reduced, which in turn can reduce the boundary dimensions of the accommodating space **50** of the UAV base station **100**.

(27) The following will describe in detail, in conjunction with FIGS. **6** and **7**, how the process of closing the cover of the base station opening and closing mechanism **30** of the UAV base station **100** is accomplished to allow the blades **204** of the UAV **200** to retract after the UAV **200** has landed on the landing pad **20**.

(28) FIGS. **6** and **7** reveal a three-dimensional schematic view of the UAV base station **100** of one embodiment of the present disclosure when it is in an intermediate state. As shown in FIGS. **6** and **7**, the base station opening and closing mechanism **30** also has an intermediate state that is located between the open state and the closed state. During the process of closing the cover of the base station opening and closing mechanism **30**, when the base station opening and closing mechanism **30** closes the cover from the open state to the intermediate state, the base station opening and closing mechanism **30** may touch the blade **204** and may push the blade **204** to gradually carry out the retracting. Thereby, when the base station opening and closing mechanism **30** completely closes the cover in the closed state, the blades **204** of the UAV **200** are in the retracted state as shown in FIG. **3**.

(29) The UAV base station **100** of this embodiment of the disclosure further comprises a control system (not shown).

(30) In order for the base station opening and closing mechanism **30** to always be able to touch the blades **204** of the UAV **200** during the process of closing the cover, therefore, in some embodiments, when the UAV **200** lands on the landing pad **20** and the base station opening and closing mechanism **30** performs the closing of the cover, the control system of the UAV base station **100** may control the blades **204** of the UAV **200** to rotate at a low speed, that is, at a first speed, and control the base station opening and closing mechanism **30** to slowly close the cover at a second speed. In one embodiment, the first speed of the blades **204** is greater than the second speed of the base station opening and closing mechanism **30**. Thereby, when the base station opening and closing mechanism **30** closes the cover to an intermediate state, the base station opening and closing mechanism **30** can just touch the blades **204** and push the blades **204** to retract.

(31) As shown in FIG. **6**, the control system may control the blades **204** to rotate toward the cover of the base station opening and closing mechanism **30** when the base station opening and closing mechanism **30** is closing the cover. The control system drives the blades **204** to rotate towards the direction of the closing cover of the base station opening and closing mechanism **30** by controlling the blade drive motors **203** on each of the arms **202**. For example, the rotational direction of the blades **204** on the four arms **202** is shown as the direction of the arrows in FIG. **6**.
(32) In some embodiments, the base station opening and closing mechanism **30** may include a pair of protective covers **31**, the pair of protective covers **31** being disposed symmetrically on opposite sides of the base body **10**.
(33) In one embodiment, each protective cover **31** is substantially in the form of a rectangular frame, the protective cover **31** having a top wall **311**, a first sidewall **312**, and two opposing second sidewalls **313**, the two second sidewalls **313** being attached to opposite sides of the first sidewall **312**, and the top wall **311** being attached to the first sidewall **312** and to the two opposing second sidewalls **313**, respectively, to thereby enclose a rectangular frame.
(34) In the process of closing the cover of the base station opening and closing mechanism **30**, the two protective covers **31** respectively move relative to each other from the open state towards the closed state, and gradually approach each other. When the two protective covers **31** contact each other, the two protective covers **31** completely close the cover and are in the closed state. In the process of opening the cover of the base station opening and closing mechanism **30**, the two protective covers **31** respectively move relative to each other from the closed state toward the open state, and move away from each other.
(35) As shown in FIGS. **6** and **7**, when the base station opening and closing mechanism **30** is closed to an intermediate state, an end side surface **3130** of at least one of the two second sidewalls **313** of the protective cover **31** touches the blade **204** and pushes the blade **204** to retract.
(36) In the process of contacting between the protective cover **31** and the blade **204**, a line may be formed between the motor shaft of the blade drive motor **203** of the UAV **200**, the blade **204** and the point at which the second side wall **313** of the protective cover **31** comes into contact with the blade **204**, which causes the line of action of the propelling force given by the second side wall **313** of the protective cover **31** to pass through the motor shaft of the blade drive motor **203**. Since an initial phase angle of the blade **204** is not restricted, at this time, the propelling force does not play the role of propelling the blade, but gives an additional push to the entire UAV. If the protective cover **31** is continued to be driven to close at this time, there is a possibility of damaging the blades **204** or other components of the UAV **200**, a situation that is commonly referred to as reaching a dead point of the motion in the mechanics of motion. Therefore, in order to prevent the protective cover **31** and the blades **204** from reaching a kinematic dead point during the process of the protective cover **31** touching the blades **204**, as shown in FIGS. **6** and **7**, in some embodiments, a flexible device **60** may be provided at the end side surface of each second sidewall **313** of the protective cover **31**, which may be utilized to change the direction of the propelling force, which may be utilized to solve the problem of kinematic dead point.
(37) As shown in FIG. **8**, the UAV base station **100** of the embodiment of the present disclosure further comprises a drive mechanism, the drive mechanism comprising a drive motor **41** for driving the movement of the protective cover **31**. In other embodiments, the control system may also determine whether the dead point of the movement is reached by detecting the torque of the drive motor **41**, and the control system may control the drive motor **41** to rotate positively or reversely. In one embodiment, the control system may detect the magnitude of the torque of the drive motor **41** by the magnitude of the current value fed back by the drive motor **41**. If it appears that the current value fed back by the drive motor **41** is abnormally high, such as the current value fed back by the drive motor **41** is higher than a predetermined current value, when the second sidewall **313** of the protective cover **31** touches the blade **204**, it can be determined that the protective cover **31** and the blade **204** have reached a dead point of movement in this case. Therefore, at this time, the control

system may control the drive motor **41** to first reverse and then forward, so that the movement dead point can be avoided.

(38) In other embodiments, the control system may also detect a real-time position of the blade **204** and the protective cover **31**, and may control at least one of a rotational speed of the blade **204** or a closing speed of the protective cover **31** based on the real-time position of the blade **204** and the protective cover **31**, so as to avoid the protective cover **31** and the blade **204** from reaching a dead point at the same time.

(39) As shown in FIG. **2**, a top surface of the protective cover **31** may not be higher than the landing pad **20** in order to prevent that the blades **204** of the UAV **200** may touch the protective cover **31** when the UAV **200** lands on the landing pad **20** when the base station opening and closing mechanism **30** is in the open state.

(40) In some embodiments, the drive mechanism or structure for driving the opening and closing motion of the base station opening and closing mechanism **30** of an embodiment of the present disclosure comprises a pair of translational drive mechanisms or structures **40**. FIG. **8** reveals a schematic diagram of the translational drive mechanisms **40** of an embodiment of the present disclosure. As shown in FIG. **8**, each translational drive mechanism **40** is provided between a side of the base body **10** and a protective cover **31**, and can be used to drive the protective cover **31** to translate relative to the base body **10**.

(41) In some embodiments, each translational drive mechanism **40** includes a drive motor **41**, a motor drive shaft **42**, and a pair of rocker arms **43**. The motor drive shaft **42** is provided on one side of the base body **10**, and both ends of the motor drive shaft **42** are respectively fixed to the base body **10** via bearings **44**. The pair of rocker arms **43** are respectively provided on opposite sides of the protective cover **31**, and one end of each rocker arm **43** is fixedly connected to one end of the motor drive shaft **42**, and the other end is movably connected to the protective cover **31**. The translational drive mechanism **40** further includes a protective cover follower shaft **45**. The protective cover follower shaft **45** is movably disposed on the protective cover **31**, for example, the protective cover follower shaft **45** may be fixed to the protective cover **31** by means of a bearing **46**. When the rocker arm **43** swings, the protective cover **31** can rotate freely around the protective cover follower shaft **45**. Therein, the other end of the rocker arm **43** is fixedly connected to the protective cover follower shaft **45**, thereby, realizing a movable connection between the rocker arm **43** and the protective cover **31**. In one embodiment, both ends of the rocker arm **43** are fixedly connected to the motor drive shaft **42** and the protective cover follower shaft **45**, respectively, by means of flange bolt **47** connections.

(42) Wherein, the drive motor **41** on each side of the base body **10** can drive the pair of rocker arms **43** to swing by rotating the drive motor drive shaft **42**, thereby driving the protective cover **31** on that side to move.

(43) In some embodiments, the translational drive mechanism **40** may maintain an attitude of the top wall **311** of the protective cover **31** facing upward at all times during the opening and closing of the protective cover **31**. The translational drive mechanism **40** also includes an attitude retention mechanism, and the attitude retention mechanism may be used to maintain the attitude of the protective cover **31**.

(44) A pair of rocker arms **43** of an embodiment of the present disclosure comprises an active side rocker arm **431** and a passive side rocker arm **432**. FIG. **9** reveals a simplified structural schematic diagram of the active side rocker arm **431** and the passive side rocker arm **432** of an embodiment of the present disclosure. As shown in FIG. **9**, the attitude retention mechanism may be provided in the active side rocker arm **431**, while the attitude retention mechanism may not be provided in the passive side rocker arm **432**. Since the protective cover **31** is usually made of a rigid material, the attitude retention mechanism provided in the active side rocker arm **431** will give a holding force to the second side wall **313** of the protective cover **31** located on the side of the active side rocker arm **431** while also giving a holding force to the second side wall **313** of the protective cover **31** located

on the side of the passive side rocker arm **432**. The second side wall **313** of the protective cover **31** on the side of the passive side rocker arm **432** is given a holding force, so that the protective cover **31** always maintains a posture of the top wall **311** of the protective cover **31** facing upward during opening and closing.

(45) In some embodiments, the attitude retention mechanism includes a first sprocket **4311**, a second sprocket **4312**, and a chain **4313**. The first sprocket **4311** is secured to the base body **10**, and the second sprocket **4312** is secured to the protective cover **31**. The first sprocket **4311** and the second sprocket **4312** are connected in tension by the chain **4313**. The first sprocket **4311** and the second sprocket **4312** are respectively co-centered with the ends of the rocker arm **43**.

(46) When the drive motor **41** on each side can drive the rocker arm **43** to rotate via the motor drive shaft **42**, the second sprocket **4312** can rotate with the rocker arm **43** around the first sprocket **4311**, and because of the chain **4313**, the second sprocket **4312** can be kept in the same phase with the first sprocket **4311**, which can make it possible for the protective cover **31** to keep the attitude consistently the same in the process of opening and closing.

(47) The translational drive mechanism **40** of the embodiment of the present disclosure can realize a large angle swing of the rocker arm **43**, which can make the space above the landing plane of the UAV **200** clear, avoiding the interference of external factors causing the UAV **200** to collide.

(48) FIG. **9** reveals a schematic view of a structure of the passive side rocker arm **432** of one embodiment of the present disclosure. As shown in FIG. **9**, since the attitude retention mechanism formed by the first sprocket **4311**, the second sprocket **4312**, and the chain **4313** is not provided in the passive side rocker arm **432**, in some embodiments, the alignments of the electronic components used for the protective cover **31** can be arranged in the internal cavity **4320** of the passive side rocker arm **432**. Thus, the internal space of the protective cover **31** can be saved, the utilization of the space is high, the electronic components for the protective cover **31** can be integrated in the top layout of the product, the product deployment is more convenient, and the product integration is high.

(49) Electronic components such as antennas, cameras, etc. can be arranged on top of the protective cover **31**.

(50) In some embodiments, at least one of an environmental monitoring device such as a rain gauge, an anemometer, a wind gauge, a temperature sensor, a humidity sensor, and the like may be arranged on the top of the protective cover **31**. In other embodiments, the UAV base station **100** may also include a weather station **90** that centralizes the functions of the multiple environmental monitoring devices in a single station, and the weather station **90** may be directly on top of the protective cover **31**.

(51) Considering that when the UAV base station **100** is deployed in a cold, rainy, or snowy region, the protective cover **31** of the UAV base station **100** may be susceptible to being frozen by snow and ice and thus unable to be opened and closed, an ice-melting device may be designed around the protective cover **31** of the UAV base station **100**, so that unattended deployment can be realized globally. In some embodiments, the UAV base station **100** of an embodiment of the present disclosure may further comprise a heating member **70**, wherein the heating member **70** may be used to heat the seams of the pair of protective covers **31**.

(52) FIG. **10** reveals a schematic diagram of an embodiment of the present disclosure in which a heating member **70** is provided on a protective cover **31**. As shown in FIG. **10**, the top wall **311** of one of the pair of protective covers **31** is provided with a convex bar (not labeled) extending outwardly, and a corresponding groove (not labeled) is provided at the lower end of the top wall **311** of the other protective cover **31**, and the convex bar is mated with the groove, and the heating member **70** is provided in the convex bar.

(53) When the pair of protective covers **31** is in a closed state with the cover completely closed, the heating member **70** is disposed at the seam of the pair of protective covers **31** and can heat the seam of the pair of protective covers **31**.

(54) The heating member **70** is communicatively coupled to a control system, which can be used to control the heating member **70**. In some embodiments, the control system can be used to control the heating member **70** based on the weather station **90** or based on the outdoor temperature read by the temperature sensor. When the control system determines that the protective cover **31** is frozen with snow and ice based on the weather station **90** or based on the outdoor temperature read by the temperature sensor, the control system may control to turn on the heating member **70**, so that the snow and ice at the crevices of the protective cover **31** can be heated and melted so that the protective cover **31** can be opened smoothly to adapt to global unattended deployment. Of course, in other embodiments, the protective cover **31** of the UAV base station **100** may also be manually observed via a camera to see if the protective cover **31** is frozen with ice. When the protective cover **31** of the UAV base station **100** is observed to be iced over and frozen, the heating member **70** may be manually turned on to heat and melt the snow and ice at the seams of the protective cover **31**.
(55) Embodiments of the present disclosure also provide a UAV system. The UAV system comprises a UAV **200** and a UAV base station **100** as described in the above embodiments.
(56) The UAV system of the embodiments of the present disclosure has beneficial technical effects that are substantially similar to those of the UAV base station **100** described in the various embodiments above, and, therefore, will not be repeated herein.
(57) It should be noted that, in this document, relational terms such as “first” and “second” are used only to distinguish one entity or operation from another, and do not necessarily require or imply the existence of any such actual relationship or order between those entities or operations. The terms “including”, “comprising”, or any other variant thereof, are intended to cover non-exclusive inclusion, such that a process, method, article or apparatus comprising a set of elements includes not only those elements, but also other elements not expressly listed. Or it also includes elements that are inherent to such process, method, article or apparatus. Without further limitation, the fact that an element is defined by the phrase “includes a . . . ” does not preclude the existence of another identical element in the process, method, article or apparatus that includes the element.
(58) The UAV base station and UAV system provided by the embodiments of the present disclosure are described in detail above, and specific examples are applied herein to illustrate the principles and implementations of the present disclosure, and the description of the above embodiments is only used to help understand the method of the present disclosure and its core ideas, and the contents of this specification shall not be construed as a limitation of the present disclosure. At the same time, for the general technical personnel in the field, based on the idea of the present disclosure, can make any modification, equivalent replacement or improvement on the specific implementation and application scope, which should be included in the scope of the claims of the present disclosure.

Claims

1. A base station, comprising: a base body; a landing pad, provided on the base body; a base station opening and closing structure movably disposed on the base body, the base station opening and closing structure comprising an open state and a closed state; and a control system, wherein in the open state, the base station opening and closing structure provides a landing space for an aerial vehicle to land on the landing pad, and in the closed state, the base station opening and closing structure provides an accommodating space to accommodate the aerial vehicle, during a process of the base station opening and closing structure transitioning from the open state to the closed state, the base station opening and closing structure is configured to propel some blades of the aerial vehicle partially protruding out of the accommodating space to fold or retract so as to accommodate the aerial vehicle within the accommodating space, the base station opening and closing structure further comprises an intermediate state between the open state and the closed

state, wherein when the base station opening and closing structure is in the intermediate state, the base station opening and closing structure is in contact with the blades to propel the blades to retract, and at a time that the aerial vehicle landing on the landing pad and the base station opening and closing structure is in the intermediate state, the control system is configured to control the blades of the aerial vehicle to rotate, such that the blades have a first tip speed, and simultaneously control the base station opening and closing structure to close at a second speed, the first tip speed is greater than the second speed.

2. The base station of claim 1, wherein an area enclosed by a boundary of the accommodating space is determined based on a) an area enclosed by projections of first driving structures for driving the blades of the aerial vehicle on a plane where the landing pad is located and/or b) landing accuracy of the aerial vehicle.

3. The base station of claim 2, wherein the area enclosed by the boundary of the accommodating space is greater than the area enclosed by the projections of the first driving structures for driving the blades of the aerial vehicle on the plane where the landing pad is located, and/or the area enclosed by the projections of the first driving structures for the blades of the aerial vehicle on the plane where the landing pad is located is a rectangular area enclosed by the projections of the first driving structures for driving the blades of the aerial vehicle on the plane where the landing pad is located, the projections of the first driving structures for driving the blades of the aerial vehicle are vertices of the rectangular area.

4. The base station of claim 1, wherein the base station opening and closing structure is configured to cause the blades of the aerial vehicle accommodated in the accommodating space to stay in a stationary and retracted state when the base station opening and closing structure is in the closed state.

5. The base station of claim 1, wherein when the base station opening and closing structure is in the intermediate state, the control system is further configured to control the blades to rotate such that first blades protruding out of the accommodating space at edges of the accommodating space along an opening and closing direction of the base station opening and closing structure each rotate in a direction against a closing direction of a corresponding protective cover of the base station opening and closing structure.

6. The base station of claim 1, wherein the base station opening and closing structure comprises a pair of protective covers, the pair of protective covers are disposed symmetrically on opposite sides of the base body.

7. The base station of claim 6, wherein each of the protective covers has a top wall, a first side wall and two second side walls opposite each other, the two second side walls are connected to opposite sides of the first side wall, and the top wall is connected to the first side wall and to the two second side walls opposite each other, respectively.

8. The base station of claim 7, wherein when the base station opening and closing structure is in the intermediate state, an end side surface of at least one of the two second sidewalls of the protective cover touches the blades to propel the blades to fold or retract.

9. The base station of claim 8, wherein a structure is provided on the end side surface of the at least one of the two second sidewalls of the protective cover to change a direction of a propelling force exerted by the base station opening and closing structure on the end side surface.

10. The base station of claim 6, further comprising: a driving structure comprising a second driving structure to drive the protective cover in motion, wherein the control system is further configured to detect a torque of the second driving structure, and to control the second driving structure to rotate forward or reverse based on a magnitude of the detected torque of the second driving structure, and when the torque is higher than a predetermined value, the second driving structure is controlled to change rotation direction.

11. The base station of claim 1, further comprising: a control system, wherein the control system is configured to: detect a position of the blades and a position of at least one moving structure in the

base station opening and closing structure; and control at least one of a rotational speed of the blades and a speed of the at least one moving structure in the base station opening and closing structure based on the position of the blades and the position of the at least one moving structure in the base station opening and closing structure.

12. The base station of claim 1, wherein the base station opening and closing structure comprises a pair of protective covers, the pair of protective covers are disposed symmetrically on opposite sides of the base body.

13. The base station of claim 12, wherein a top surface of the protective cover is not higher than the landing pad when the base station opening and closing structure is in the open state.

14. The base station of claim 12, further comprising: a pair of second driving structures, each of the second driving structures provided between a side of the base body and one of the protective covers to drive the one of the protective covers to move relative to the base body.

15. The base station of claim 14, wherein the second driving structure comprises: a drive motor; a motor drive shaft, provided on one side of the base body; and a rocker arm, one end of the rocker arm is fixedly connected to one end of the motor drive shaft and the other end is movably connected to the protective cover, wherein the drive motor drives the rocker arm to swing by driving the motor drive shaft to rotate.

16. The base station of claim 12, further comprising: a heater to heat a seam of the pair of the protective covers.

17. The base station of claim 12, further comprising: at least one of a weather station, an antenna, a camera, a rain gauge, an anemometer, a wind gauge, a temperature sensor, or a humidity sensor at a top of one of the protective covers.

18. A movable platform system, comprising: an aerial vehicle; and a base station, the base station comprising: a base body; a landing pad, provided on the base body; a base station opening and closing structure movably disposed on the base body, the base station opening and closing structure comprising an open state and a closed state; a control system, wherein in the open state, the base station opening and closing structure provides a landing space for an aerial vehicle to land on the landing pad, and in the closed state, the base station opening and closing structure provides an accommodating space to accommodate the aerial vehicle, during a process of the base station opening and closing structure transitioning from the open state to the closed state, the base station opening and closing structure is configured to propel some blades of the aerial vehicle partially protruding out of the accommodating space to fold or retract so as to accommodate the aerial vehicle within the accommodating space, the base station opening and closing structure further comprises an intermediate state between the open state and the closed state, wherein when the base station opening and closing structure is in the intermediate state, the base station opening and closing structure is in contact with the blades to propel the blades to retract, and at a time that the aerial vehicle landing on the landing pad and the base station opening and closing structure is in the intermediate state, the control system is configured to control the blades of the aerial vehicle to rotate, such that the blades have a first tip speed, and simultaneously control the base station opening and closing structure to close at a second speed, the first tip speed is greater than the second speed.