

## Shell Fabrication

Weight: 2.5 lb

### Material:

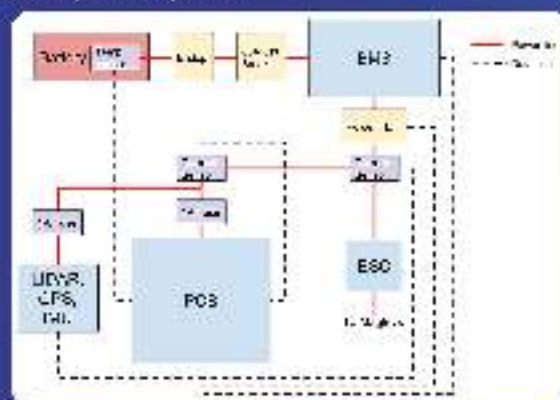
- ◆ Proper curing of film is important
- ◆ Pre-impregnated resin does not cure at ambient temperatures
- ◆ Hold resin at 120°C for 100 minutes to cure
- ◆ Bonding a core between two layers of screen offers a higher strength to weight ratio than solid carbon fiber cores

## Method

- Male and female gametes, not the whole gametes, fuse (H)
- Fertilisation of sperm and egg is described in a series of four steps
- Two sperm find female egg, compete to fertilise the egg (1)
- Male enters cell of egg and binds together to form a zygote (2)
- Sperm cells and egg combine to form a modified, unfertilised zygote, are fused in female cell (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100) (101) (102) (103) (104) (105) (106) (107) (108) (109) (110) (111) (112) (113) (114) (115) (116) (117) (118) (119) (120) (121) (122) (123) (124) (125) (126) (127) (128) (129) (130) (131) (132) (133) (134) (135) (136) (137) (138) (139) (140) (141) (142) (143) (144) (145) (146) (147) (148) (149) (150) (151) (152) (153) (154) (155) (156) (157) (158) (159) (160) (161) (162) (163) (164) (165) (166) (167) (168) (169) (170) (171) (172) (173) (174) (175) (176) (177) (178) (179) (180) (181) (182) (183) (184) (185) (186) (187) (188) (189) (190) (191) (192) (193) (194) (195) (196) (197) (198) (199) (200) (201) (202) (203) (204) (205) (206) (207) (208) (209) (210) (211) (212) (213) (214) (215) (216) (217) (218) (219) (220) (221) (222) (223) (224) (225) (226) (227) (228) (229) (230) (231) (232) (233) (234) (235) (236) (237) (238) (239) (240) (241) (242) (243) (244) (245) (246) (247) (248) (249) (250) (251) (252) (253) (254) (255) (256) (257) (258) (259) (260) (261) (262) (263) (264) (265) (266) (267) (268) (269) (270) (271) (272) (273) (274) (275) (276) (277) (278) (279) (280) (281) (282) (283) (284) (285) (286) (287) (288) (289) (290) (291) (292) (293) (294) (295) (296) (297) (298) (299) (300) (301) (302) (303) (304) (305) (306) (307) (308) (309) (310) (311) (312) (313) (314) (315) (316) (317) (318) (319) (320) (321) (322) (323) (324) (325) (326) (327) (328) (329) (330) (331) (332) (333) (334) (335) (336) (337) (338) (339) (340) (341) (342) (343) (344) (345) (346) (347) (348) (349) (350) (351) (352) (353) (354) (355) (356) (357) (358) (359) (360) (361) (362) (363) (364) (365) (366) (367) (368) (369) (370) (371) (372) (373) (374) (375) (376) (377) (378) (379) (380) (381) (382) (383) (384) (385) (386) (387) (388) (389) (390) (391) (392) (393) (394) (395) (396) (397) (398) (399) (400) (401) (402) (403) (404) (405) (406) (407) (408) (409) (410) (411) (412) (413) (414) (415) (416) (417) (418) (419) (420) (421) (422) (423) (424) (425) (426) (427) (428) (429) (430) (431) (432) (433) (434) (435) (436) (437) (438) (439) (440) (441) (442) (443) (444) (445) (446) (447) (448) (449) (450) (451) (452) (453) (454) (455) (456) (457) (458) (459) (460) (461) (462) (463) (464) (465) (466) (467) (468) (469) (470) (471) (472) (473) (474) (475) (476) (477) (478) (479) (480) (481) (482) (483) (484) (485) (486) (487) (488) (489) (490) (491) (492) (493) (494) (495) (496) (497) (498) (499) (500) (501) (502) (503) (504) (505) (506) (507) (508) (509) (510) (511) (512) (513) (514) (515) (516) (517) (518) (519) (520) (521) (522) (523) (524) (525) (526) (527) (528) (529) (530) (531) (532) (533) (534) (535) (536) (537) (538) (539) (540) (541) (542) (543) (544) (545) (546) (547) (548) (549) (550) (551) (552) (553) (554) (555) (556) (557) (558) (559) (560) (561) (562) (563) (564) (565) (566) (567) (568) (569) (570) (571) (572) (573) (574) (575) (576) (577) (578) (579) (580) (581) (582) (583) (584) (585) (586) (587) (588) (589) (590) (591) (592) (593) (594) (595) (596) (597) (598) (599) (600) (601) (602) (603) (604) (605) (606) (607) (608) (609) (610) (611) (612) (613) (614) (615) (616) (617) (618) (619) (620) (621) (622) (623) (624) (625) (626) (627) (628) (629) (630) (631) (632) (633) (634) (635) (636) (637) (638) (639) (640) (641) (642) (643) (644) (645) (646) (647) (648) (649) (650) (651) (652) (653) (654) (655) (656) (657) (658) (659) (660) (661) (662) (663) (664) (665) (666) (667) (668) (669) (670) (671) (672) (673) (674) (675) (676) (677) (678) (679) (680) (681) (682) (683) (684) (685) (686) (687) (688) (689) (690) (691) (692) (693) (694) (695) (696) (697) (698) (699) (700) (701) (702) (703) (704) (705) (706) (707) (708) (709) (710) (711) (712) (713) (714) (715) (716) (717) (718) (719) (720) (721) (722) (723) (724) (725) (726) (727) (728) (729) (730) (731) (732) (733) (734) (735) (736) (737) (738) (739) (740) (741) (742) (743) (744) (745) (746) (747) (748) (749) (750) (751) (752) (753) (754) (755) (756) (757) (758) (759) (760) (761) (762) (763) (764) (765) (766) (767) (768) (769) (770) (771) (772) (773) (774) (775) (776) (777) (778) (779) (780) (781) (782) (783) (784) (785) (786) (787) (788) (789) (790) (791) (792) (793) (794) (795) (796) (797) (798) (799) (800) (801) (802) (803) (804) (805) (806) (807) (808) (809) (810) (811) (812) (813) (814) (815) (816) (817) (818) (81

## Power System

The power diagram illustrates how power is compared at the pad nearest power and ground.



## Non-barred superior.

[illegible]

## Electric Billboards

Yan Xiang, *Department of Management, Hong Kong Baptist University, Kowloon, Hong Kong*  
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COMPACT ENVIRONMENT

[Career Map](#)   [Deckle](#)   [User - name](#)

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Custom Made as Specified on:

- Max. Temp: 25 °C
- Max. Current: 24 A
- Max. Power: 110 W
- 1-15 channels: 8-bit resolution digitally
- 5-bit resolution for higher range for sine

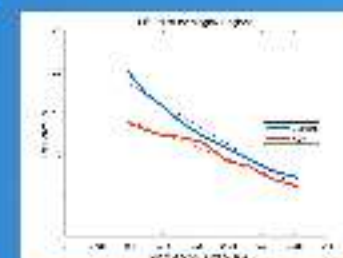
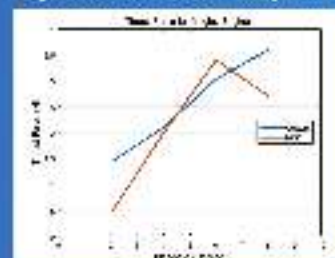
## Magnetic Levitation

### Generation & Propagation

- ◆ The beam designed to induce the  $\pi$  and transfer the  $\pi$  to the  $\pi$  magnet has two magnets with the design of parallel magnets.
- ◆ Permanent magnets are arranged in a Helmholtz design [2] with the same magnetic field on one side.
- ◆ When the magnets are turned, the resulting magnetic field induces a repulsive force on the beam, so that the beam will drift.
- ◆ When firing the magnets, the beam will become slightly on the side near the ground. The drag force makes the good example [2].
- ◆ The 50° deflection was confirmed to measure the position of the magnets. Because the beam is the same as the beam.



### Test Run



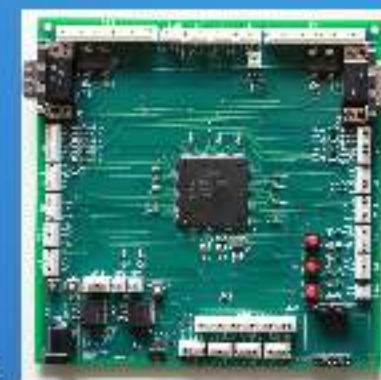
## PCB & Sensors

Custom-designed PCB (Printed Circuit Board) package as below



### Legend

- Blue - Computing
- Red - Sensor Ports
- Purple - Motor Ports
- Yellow - Power
- Orange - Wireless Ports
- Green - Communication Ports







Weightless.  
Wait less.

### OVERVIEW

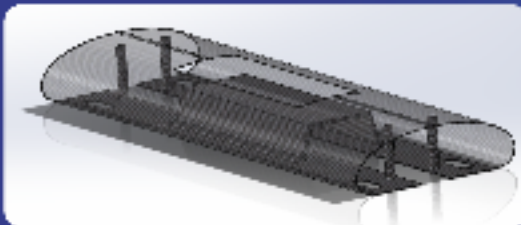
In 2013, Elon Musk proposed a futuristic transportation system, the Hyperloop, a high-speed traveling and propelled through a low-pressure vacuum tube to minimize air drag and friction.

To bring the Hyperloop concept to life, SpaceX has a head-to-head competition where teams from all over the world come to compete with their own Hyperloop pod designs.

This year, the team is competing in the first annual Competition, in which the pod must accelerate and translate in a linear and back lap down a 150 ft vacuum tube. The fastest and best!

### THE SHELL

- Stiff and lightweight carbon fiber serves as machine, structural frame and aerodynamic shell
- Honeycomb core offers high strength to weight ratio, then carbon fiber as alone



Total weight: 13.7 lbs  
Acceleration: 0.2g  
Lap time: 13.6s

### ELECTRONIC CONTROLS UNDER THE SHELL



**LIDAR**  
Uses laser to detect nearby wall and engage emergency



**PCB**  
Primary control unit and sensor monitoring system



**BMS**  
Monitors battery & protects from over-current and over-discharge



**IMU**  
Gives acceleration and rotation of pod in all 3 axes



**Battery**  
Lithium-Polymer



**GPS**  
Gives position of pod along 3-beam in real time



### Mechanical Engineers

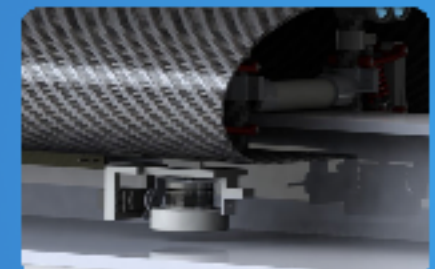
Andrew Tang, Matt Kasper, Ryan Menden, Nicholas Farnsworth, Jonathan, Thomas, Nathan, and Thomas, Joshua Wang, Kyle, Benjamin, and Greg, Richard Wang, Dan, Nicholas, Brian Ray

### Electrical Engineers

Rachel Taylor, Christopher, David Lee, Katherine, Li, Kira Reschman, Evan Wang, Computer Engineers: Nathaniel, Aaron, Aykan, Nathan, Devin, Benjamin, Mark Wu, Ryan, and

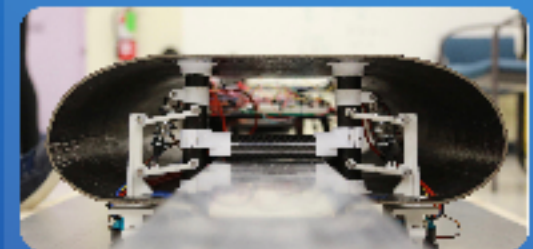
### MAGNETIC LEVITATION

- Four custom, maglev linear engines generate lift and propulsion
- Servos control tilt angle of the maglev engines for precise control of forward and reverse acceleration



### STABILITY

- Double wishbone carling, suspensions stabilizes height, pitch, and roll
- Leaf spring suspensions stabilize yaw and steering movement
- Emergency brake seeds safely bring the pod to a stop in the case of failure



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Hyperloop Competition: The team would like to thank our amazing mentors, advisors and sponsors for helping us throughout this project. Thank you to John Jacobo, Paul (Jeff), Hal, Carlos, Tyler, Susan, Dan, Dan, Michael, Yogi, James, Douglas B., Roger Green, Aron, William, Thomas, Mark, Rich, David, Jonathan, Diego, Peter, Carlos, The Tamaras Team, Chris, William, Christian, Garcia, Gilbert, Davis, and Erik, Chris.