

Sample Portfolio Huu Huynh

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Reach Controller



Reach Controller

Design Concept

The Reach Controller is a computer input device for School-of-the-Air students to interact in virtual environment. It allows the user to simulate live hand motion to improve social supportive learning experiences for remote Australian students.

The Reach Controller offers live and wireless gesture interaction through the amalgamation of motion-capture technologies including gyroscope, accelerometer, Bluetooth, ultrasonic sensor and bend sensor. These technologies are low-cost and low-power to ensure accessibility and practicality for students and wider audience.

The Reach Controller captures hand and finger motion allowing students and teachers to:

- Communicate with hand and finger gesture
- Show body language
- Interact in 3D environment intuitively
- Indicate hand signals

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Reach Controller

Manufacturing Cost

Reach Controller Part	Mould Cost	Cost Per Piece	Qty	Cost Per Product	Supplier
Left Controller Housing Top	\$12,000	\$1.40	2	\$3	Tri-Star Tooling
Right Controller Housing Top	\$12,000	\$1.40	2	\$3	Tri-Star Tooling
Left and Right Controller Housing Bottom	\$14,000	\$1.30	4	\$5	Tri-Star Tooling
Left and Right Controller Button Support Layer	\$8,000	\$0.50	4	\$2	Tri-Star Tooling
Dock Housing Top	\$10,000	\$1.80	1	\$2	Tri-Star Tooling
Dock Housing Bottom	\$8,000	\$0.80	1	\$1	Tri-Star Tooling
Button 1	\$1,000	\$0.30	4	\$1	Tri-Star Tooling
Button 2	\$1,000	\$0.30	8	\$2	Tri-Star Tooling
Joystick	\$3,000	\$0.50	2	\$1	Tri-Star Tooling
Controller Strap	\$5,000	\$1.20	2	\$2	Tri-Star Tooling
Surface Finish: Edge Surface	\$2,000	-	-	-	Tri-Star Tooling
Controller Print Circuit Board	-	?	2	-	-
Dock Print Circuit Board	-	?	1	-	-
Accelerometer ADXL330	-	\$5.52	2	\$11	Analog Devices
Gyroscope	-	\$5.52	2	\$11	-
Micro-controller Atmel 20X	-	\$5.24	3	\$16	Atmel
Half-height Mini-joystick	-	\$9.27	2	\$19	CTS Electrocomponents
Lithium-ion Battery PL502025	-	\$10.00	2	\$20	Valma Battery Industrial
Bluetooth ML7050LA	-	\$12.24	2	\$24	OKI Semiconductor
Microphone KJB2823	-	\$0.30	2	\$1	HOSIDEN
Custom Bend Sensors FLX-01	-	\$9.50	12	\$114	Flexpoint
USB Cable	-	\$2.00	1	\$2	-
Dock Connection Point	-	\$0.55	2	\$1	-
Total	\$76,000			\$243	

Tri-Star Tooling Pty Ltd

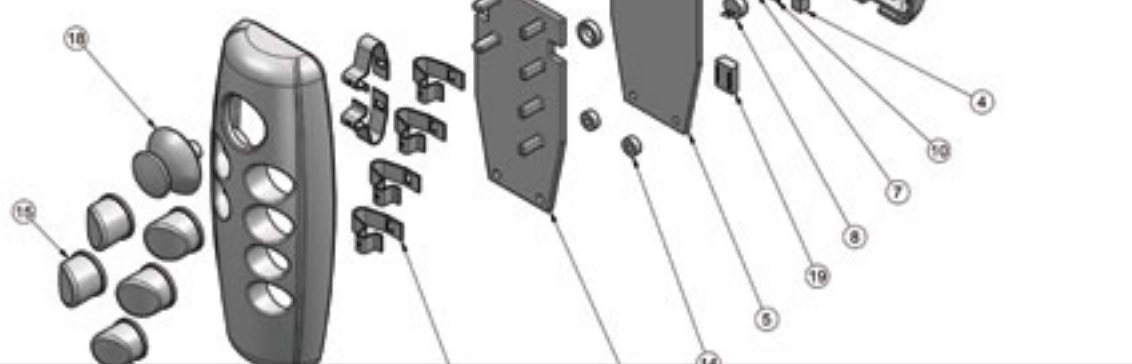
Contact Person: Charles Valian
 Power Operated Hand Tools Manufacturing
 Unit 30, 72 Percival Rd, Smithfield, NSW 2164
 Phone: (02) 9725 4758

Motion Capture Technology Chart

Motion Capture Technology	Cost	Sample Rate	Resolution	Real-Time
Optical Motion Capture Systems	\$100,000 to \$200,000 (Merache 2000, p. 20)	30 to 1000 fps	4096 x 4096 Resolution (Merache 2000, p. 15)	Yes
Vicon 1100 Camera	-	30-2000 fps (Vicon Motion 2006, p. 17)	4194 x 3450 Resolution (Vicon Motion 2006, p. 17)	-
Sturdy Report Interface	Concept Design	n/a	n/a	Yes
Electromagnetic Trackers	\$,000 to \$150,000 (Merache 2000, p. 22)	144 fps (Merache 2000, p. 20)	Never Outside	Yes
Flock of Birds by Ascension Technology	-	Up to 144 measured (Ascension Tech, n.d.)	0.07 in., 3 3/8" (Ascension Tech, n.d.)	-
Polaris Pasvik	-	120 optical/second (Polhemus 2000)	0.03 in., 3 1/2" (Polhemus 2000)	Yes
Electromechanical Suits	\$20,000 to \$25,000	Low sample rate (Merache 2000, p. 24)	-	Yes
Ascension OptiTrack	\$,21,810 to \$,34,430 (Ascension n.d.)	15-120 fps (Ascension n.d.)	1" (Ascension n.d.)	Yes
Accurate Hybrid Motion Capture	\$100 to \$500 (Vicon 2007, p. 6)	10 fps (Vicon 2007, p. 6)	-	Yes
Digital Anemours	Low cost (Merache 2000, p. 27)	Low sample rate (Merache 2000, p. 28)	n/a	Yes
Joystick	\$80	Low sample rate (Merache 2000, p. 28)	-	Yes
Mouse	\$30	8000 fps (Microsoft Corp. 2007)	400 points per inch (Microsoft Corp. 2007)	Yes
Space Navigator	\$75	-	-	Yes
Fibre Optic	Expensive (Cooper 2006)	50 fps (Merache 2000, p. 30)	1" (Merache 2000, p. 30)	-
Calogrove	\$800 to \$14,800 (Merache 2000, p. 28)	110 fps (Merache 2000, p. 28)	0.3" (Merache 2000, p. 28)	Yes
Measurement Shape Tape (Dillon n.d.)	\$5,940	1/10 Hz	0.3 mm, 3 1/2" (Dillon n.d.)	Yes
Inertial Motion Capture	Low Cost (Cooper 2006)	100 Hz to 50 Hz (Cooper 2006)	Accumulates Error (Cooper 2006)	-
Vicon Intra 1.5x12	\$445	200 fps	0.080 qt, 50"	Yes
Infrared Image Sensor	-	-	-	-
3DV Zoom	Low Cost (3DV System 2006)	50 fps	1.3 M-Pixel RGB video	Yes
3rd Remote Gyroscope and Accelerometer	\$24.95 (Shining Devices 2007)	-	-	Yes
Flexpoint Bend Sensor	\$12.25	-	100 ohms to 500k ohms	Yes

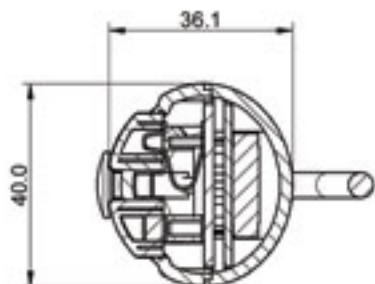
Commercial, off-the-shelf (COTS) Components

Component	Description	Batch Price	Company	QTY
Accelerometer ADXL330	Component measuring multi axis movement in a linear manner	\$5.52	Analog Devices	2
Gyroscope	Similar to Accelerometer, gyroscope measures rotation instead	\$5.52	-	2
Micro-controller Atmel 20X	Processing and interpretation of data measured by the controller. Data is sent via Bluetooth to the central processor in the dock.	\$5.24	Atmel	3
Half-height Mini-joystick	Small, light, strong, half-height mini-joystick allowing 4 degree of movement	\$9.27	CTS Electrocomponents	2
Lithium-ion Battery PL502025	Small and thin battery with connector to secure on Print Circuit Board	\$10.00	Valma Battery Industrial	2
Bluetooth ML7050LA	Short-range wireless communication technology	\$12.24	OKI Semiconductor	2
Microphone KJB2823	Ultrasonic sensor together with the source, it allows measure of distance between the controllers and the dock.	\$0.30	HOSIDEN	2
Custom Bend Sensors FLX-01	Custom conductive ink strip allow measure of bending. Part needs to be custom fabrication on a metal bend shape.	\$12.95	Flexpoint	12
USB Cable	USB connection cable to the computer.	\$2.00	-	1
Dock Connection Point	Dock connection point for controller to be recharged.	\$0.55	-	2





Reach Controller



SECTION J-J



Market Segmentation

Factor	Detail
Geographical	
Region	Rural and Regional Australia, Central & non-coastal Australia
City Size	Under 1000, 1001-3000
Density	Rural 0.5 percent of the population occupying 50 percent of land areas (ABS 2007)
Climate	Low rainfall, mainland, central Australia
Demographic	
Age	10.5-19
Sex	Male, Female
Family Size	2,3,4,5,6
Family Life Cycle	Traditional family, older married with two children
Income	\$25,00 - \$30,000
Occupation	Agriculture forestry, Fishing and Hunting Industry 25%; Health and Education 15%; Wholesale/retail industry with 14%; Private Sector
Education	Some High School, 42% High School Leaver Rate at age 15, Some TAFE College
Psychographic	
Socioeconomic	Low-medium Spending, Basic Needs
Status	Lower than average family income and education, occupation in agriculture, health and education sector predominately
Values, attitudes & lifestyle groupings	Traditional Family Life, Basic Needs
Personality	Relax, curious
Behavioral	
Purchase occasion	Basic Needs, Batch Buy, Special Occasion
Benefits sought	Basic Needs, Quality & Functionality
User status	Potential & First Time User
Usage rate	Medium User
Loyalty status	-
Readiness stage	Unaware, aware
Attitude towards product	Enthusiastic, positive

Australian Standard

Hazard	Reach Controller Hazard	Solution
Gaps & opening that could trap finger, limb, head	Controller is place on a dock that could trap fingers	Keep the product light and round
Cord and elastic leading to trap	Dock cord and rubber strap can get caught on hooks	Shorter Cord Length, design for loose fit
Scissoring, shearing and pinching from locking and latching mechanism	Rubber strap pinching and straining on large hands	Reduce sharp edges and design to fit 50th percentile population, use of strap mechanism over rubber glove
Hazardous sharp points and sharp edges	Sharp points and edges on form	The form was design to be smooth with large radius curves
Choke hazard of small objects	-	-
Structural integrity	Weak form and support	Use of oval form, 2.5mm wall thickness, use of ribs and support
Release of chemical, release of nickel	Release of toxic electronic chemical in manufacturing and disposal	Selection of toxin safe electronic in the future, use of management system in manufacturing houses
Product safety warning and labels	No warning of ergonomic issue	Use labels warning problems of long period of use and trapping of strap
Ergonomic	Over exertion of force by hands and fingers	Position finger within reach, made buttons softer to touch, small round form

HB 295 Product Safety Framework

HB 295.1-2007: Product Safety Framework - Part 1: Application guide

HB 295.2-2007: Product Safety Framework - Hazard checklist

The Product Safety Framework (PSF) set out by Australia Standard has direct relation to the design of the Reach Controller. The standard made concerns against safety issue in consumer product. The hazard checklist part of the PSF identified a range of issue regard safety issue that prevent injury that might arise when using the product including bruising, cut of flesh and permanent limb injury. The hazardous issues include:

- Gaps & opening that could trap finger, limb, head and fall through
- Cord and elastic leading to trap
- Scissoring, shearing and pinching from locking and latching mechanism
- Hazardous sharp points and sharp edges
- Choke hazard in small objects
- Structural integrity
- Release of chemical, release of nickel
- Product safety warning and labels

Ergonomic

Measure Part	5th	50th	95th
Hand Length	154	172	207
Hand Breadth	68	78	89
Middle Finger - Thumb Grip Length	76	97	113
Thumb Crotch - Middle Finger Length	102	120	139
Thumb Length	52	61	70
Middle Finger Diameter	12	14	16

Average Hand Measurements of Children from 10.5 to 19 (mm)
Based on American Population (Snyder et. al 1977)



Snyder RG, Schneider LW, Owings CL, Reynolds HM, Golomb DH, Schork MA 1977, Anthropometry of Infants, Children and Youths to Age 18 for Product safety Design, Highway Safety Research Institute, Michigan, viewed 19 October 2008, <<http://ovr.nist.gov/projects/anthro/kids/toc/77.htm>>

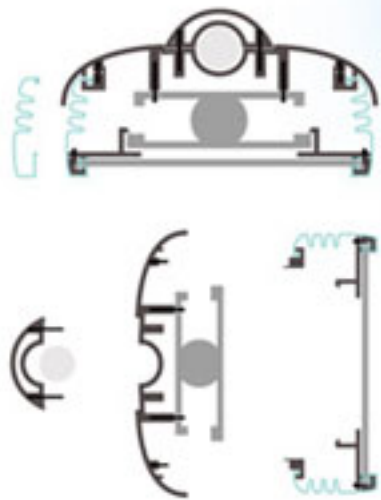


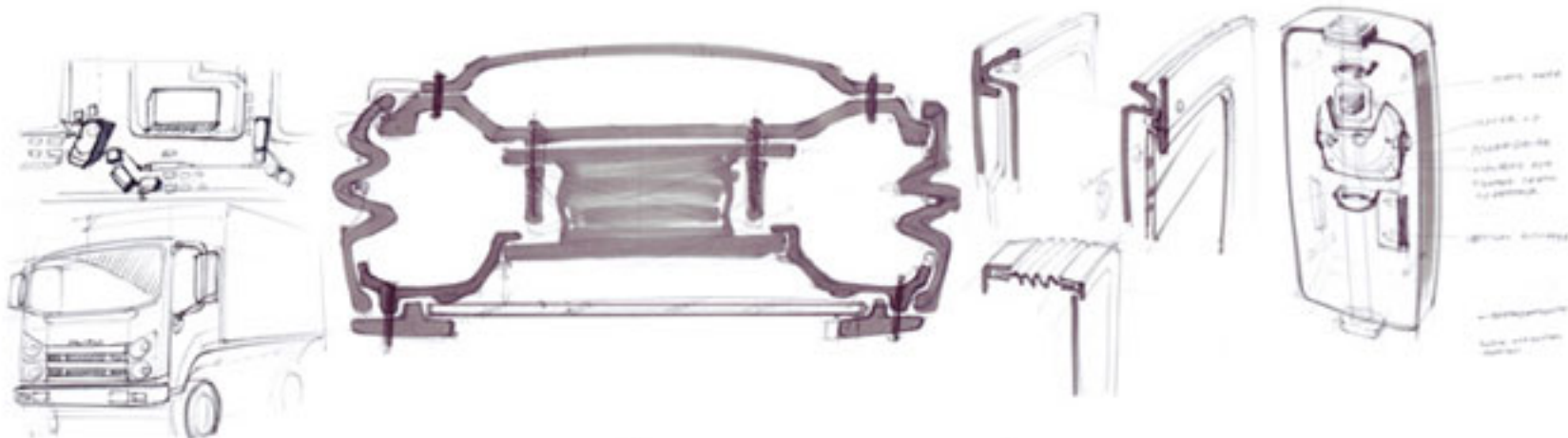
Design Concept

ARMOUR*** is a new electronic actuating truck mirror concept. Completely redesigned from top to bottom. A more simple, lighter and smaller solution.

With intensive exploration of the product architecture, the concept integrates the use of bellows to bring about a solution that allows flexible mirror rotation, minimal frame space and vandalism prevention.

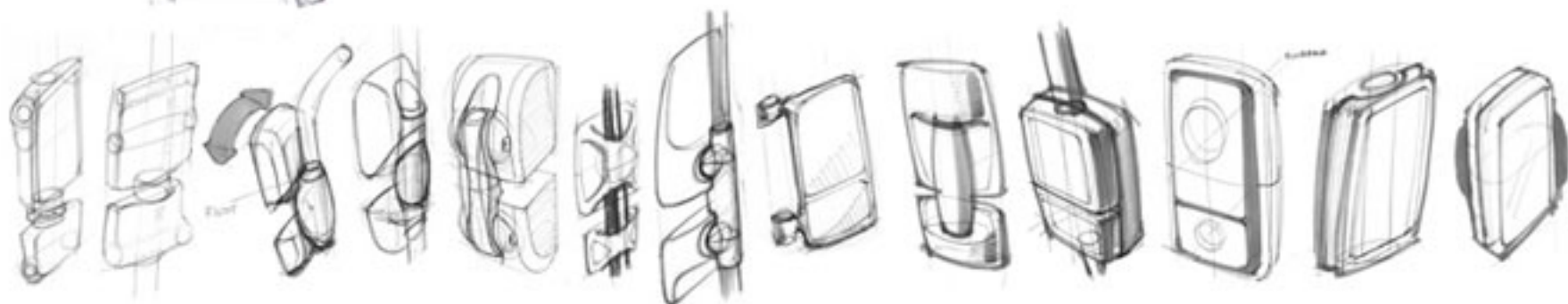
Finished with a strong and powerful styling to create a connection with the soul.





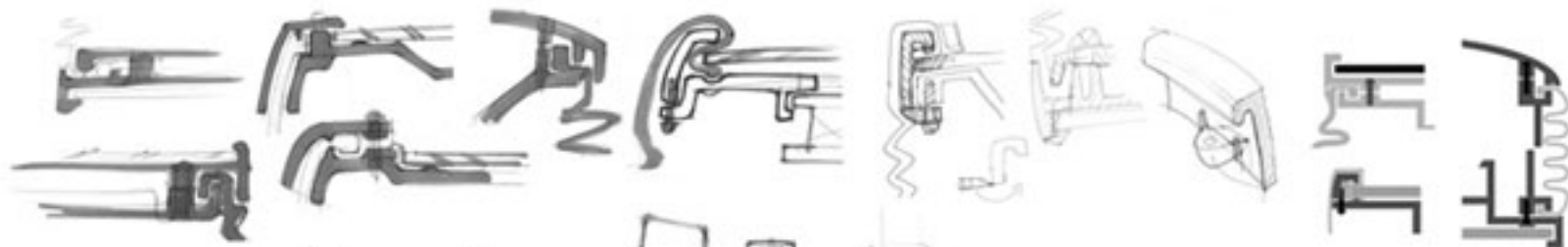
New Mirror Ideas

Actuation Method
Flexible Rotation
More Simple
Smaller
Lighter



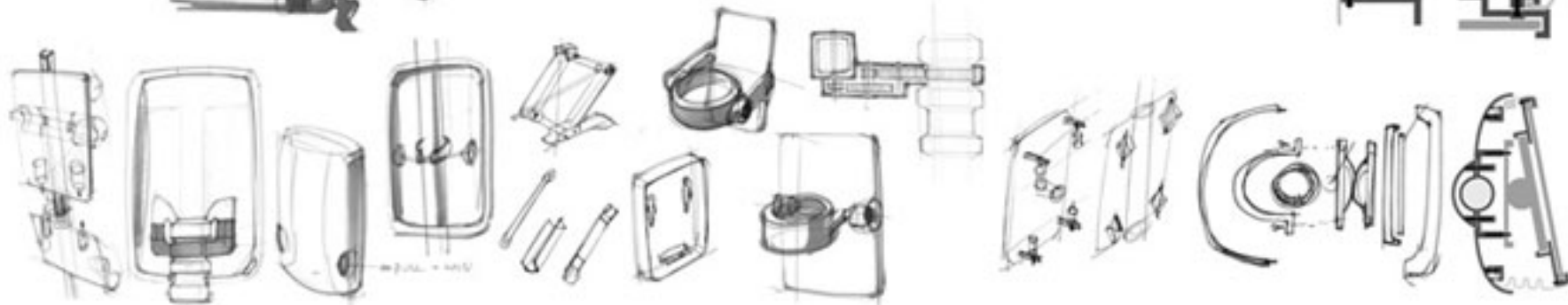
Detail Design

Design for Manufacturing
Design for Assembly
Small Footprint
Below Capture



Product Architecture

Scale Sketching
Section Illustration
Scale Illustration
Consult Expert



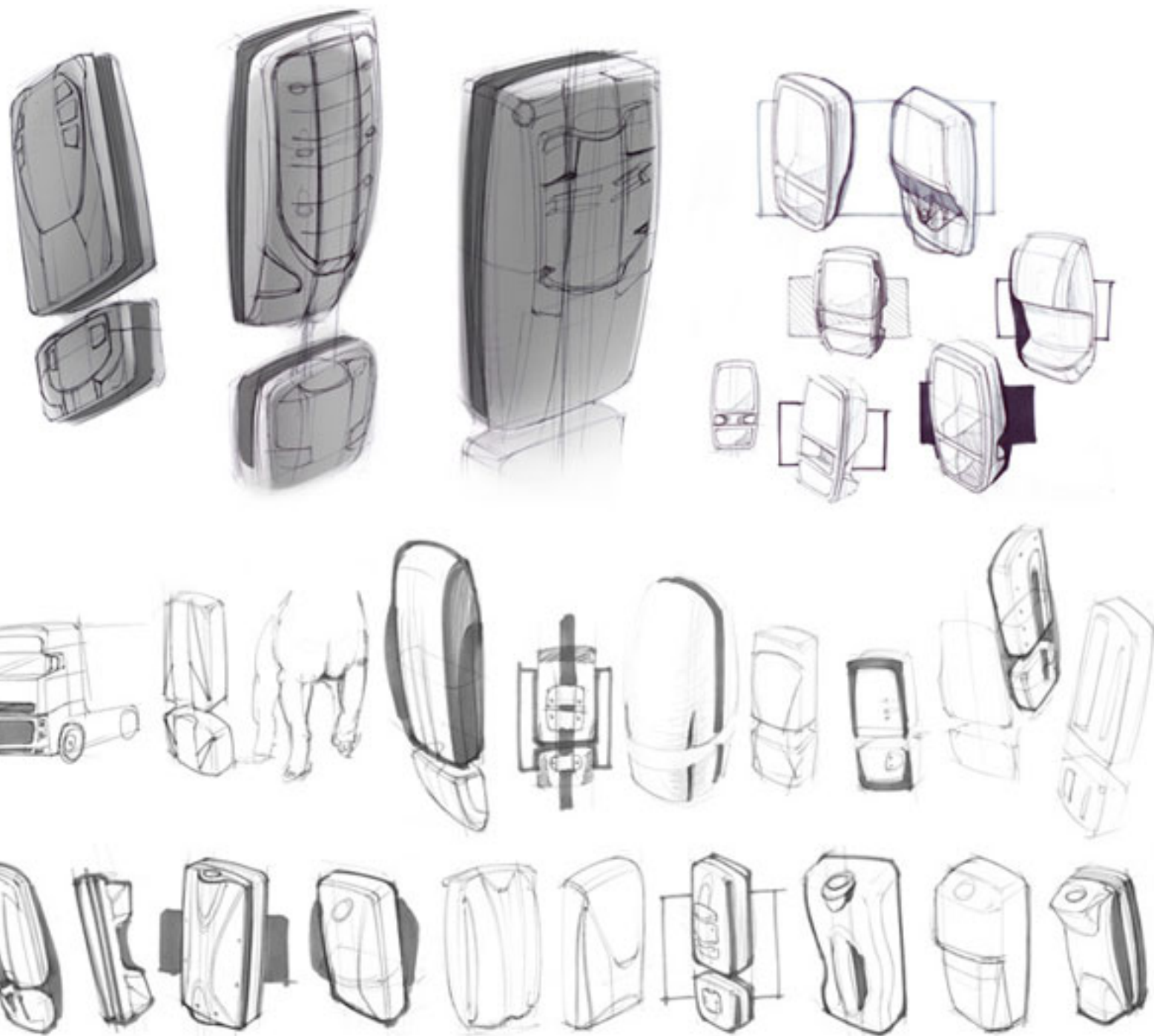


Techniques

Design Process
Brainstorm
Mood Board
Thumbnail Sketching
Detail Sketching
Photoshop Rendering
Context Drawings
Iterative Process
Chunking
Story Telling
User Analysis
Principles of Design
Golden Ratio
Affordance
Branding
Technical Design
Section Sketches
Scale Illustrations

Thinking

Aerodynamic
Teardrop Form
Strong & Powerful
Small, Light & Simple
Function is King
Design for Manufacturing
Design for Assembly
Design for the Activity
Minimum Frame Footprint
Maximum Visibility
Flexible Mirror Rotation
Vandalism Prevention
Worst Case Scenario
Swivel & Position on Pole
Manual & Electronic Swivel
Design Around Actuator
(Technical Package)
Vibration

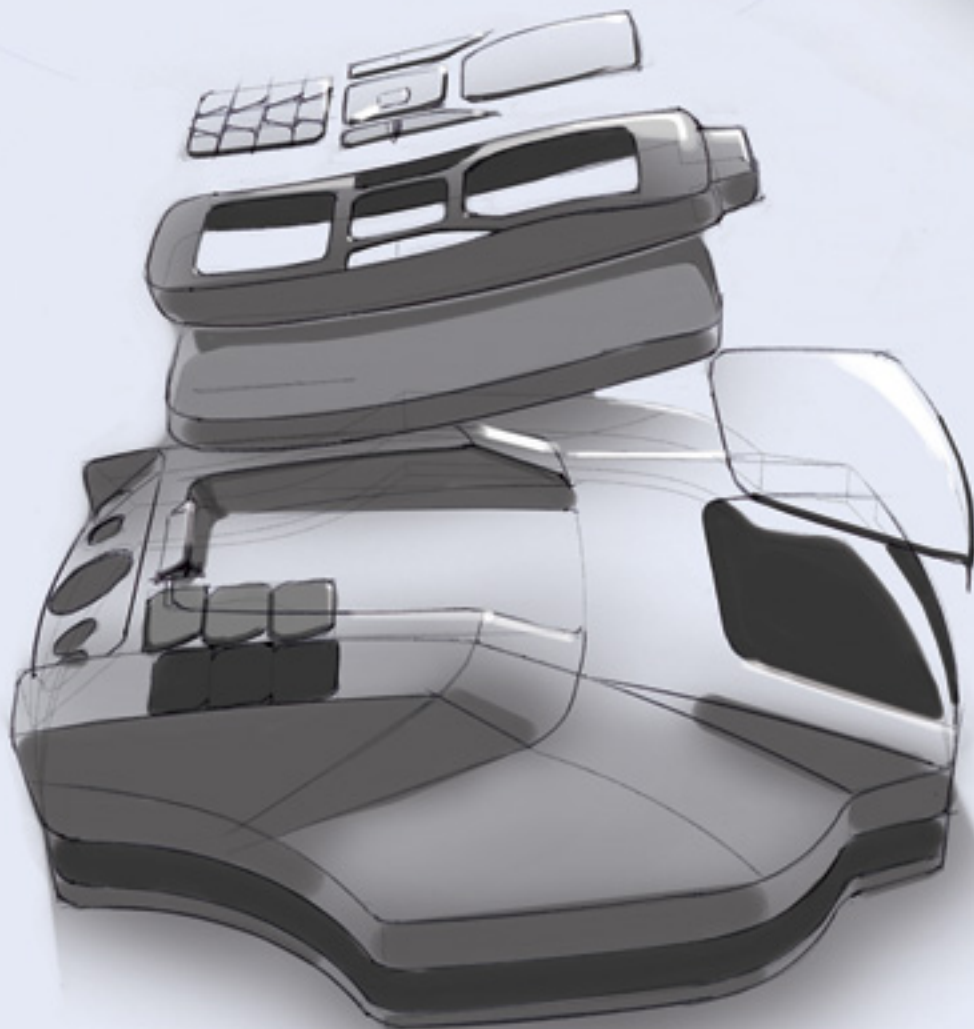




Product: Cordless Phone
Reference Animal: Elephant

While studying on exchange at North Carolina State University, Raleigh, US, the project teaches sketching and presentation technique for the subject "ID418: Ideation II" under guidance by Bong Il Jin, a former transportation designer Kia and Daewoo motors.

The design methodology utilized was to look at nature as reference and inspiration. The cordless phone was design from the study of animal elephant form.



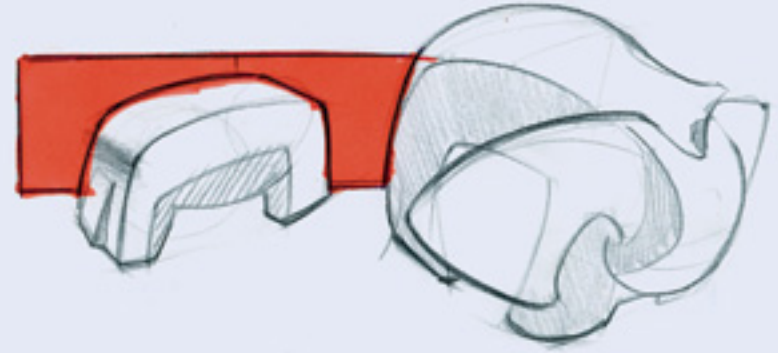
hannah



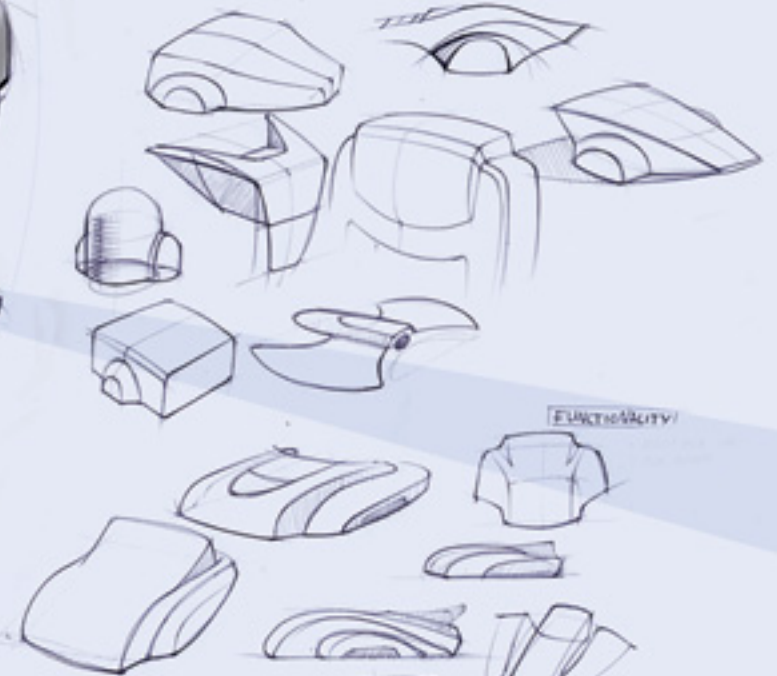
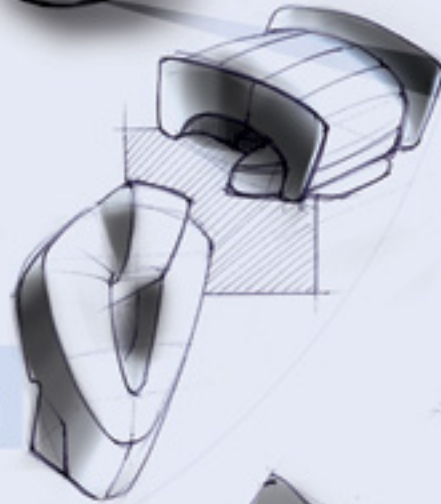
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Form Exploration



FUNCTIONALITY

GOLD + THUMBTIP

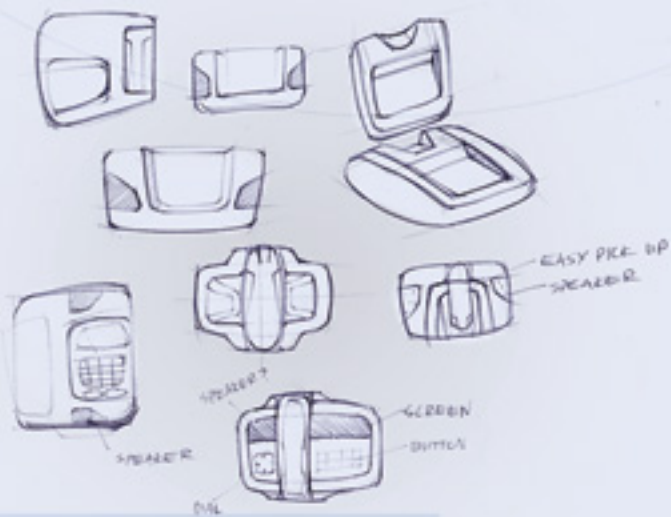
NEW OR UP DESIGN

- GROUP OF BUTTONS /

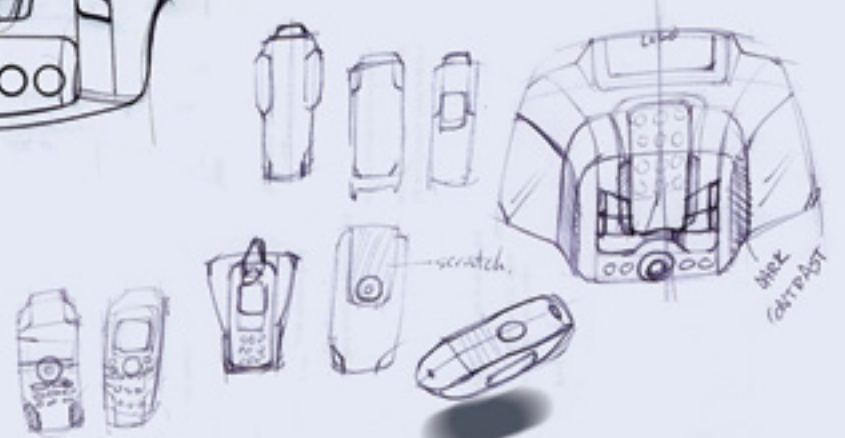
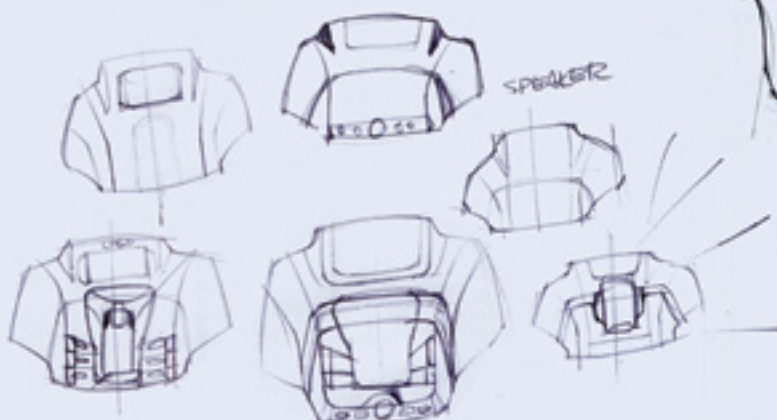
- TOUCH KEY

- SCREEN LAYOUT

Cordless Phone Design



Detail Design



Photograph of Focusing Lamp

Main Parts



Cap



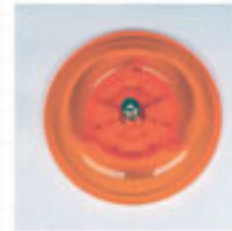
Lense



Body



Bottom



Screw

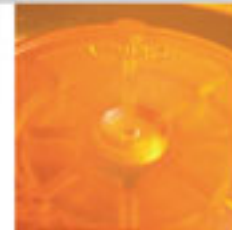
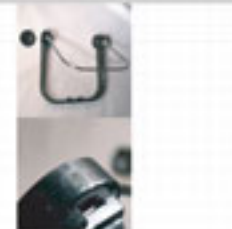


Handle



Button

Manufacturing Process and Detail



1. Surface Finish: Matte and Flossy.
2. Screw Rails and Parting Line
3. Rubber Ring
4. Injection Point

1. Electroplated, Ejection Points and Web
2. Ejection Point
3. Vernier Caliper Use

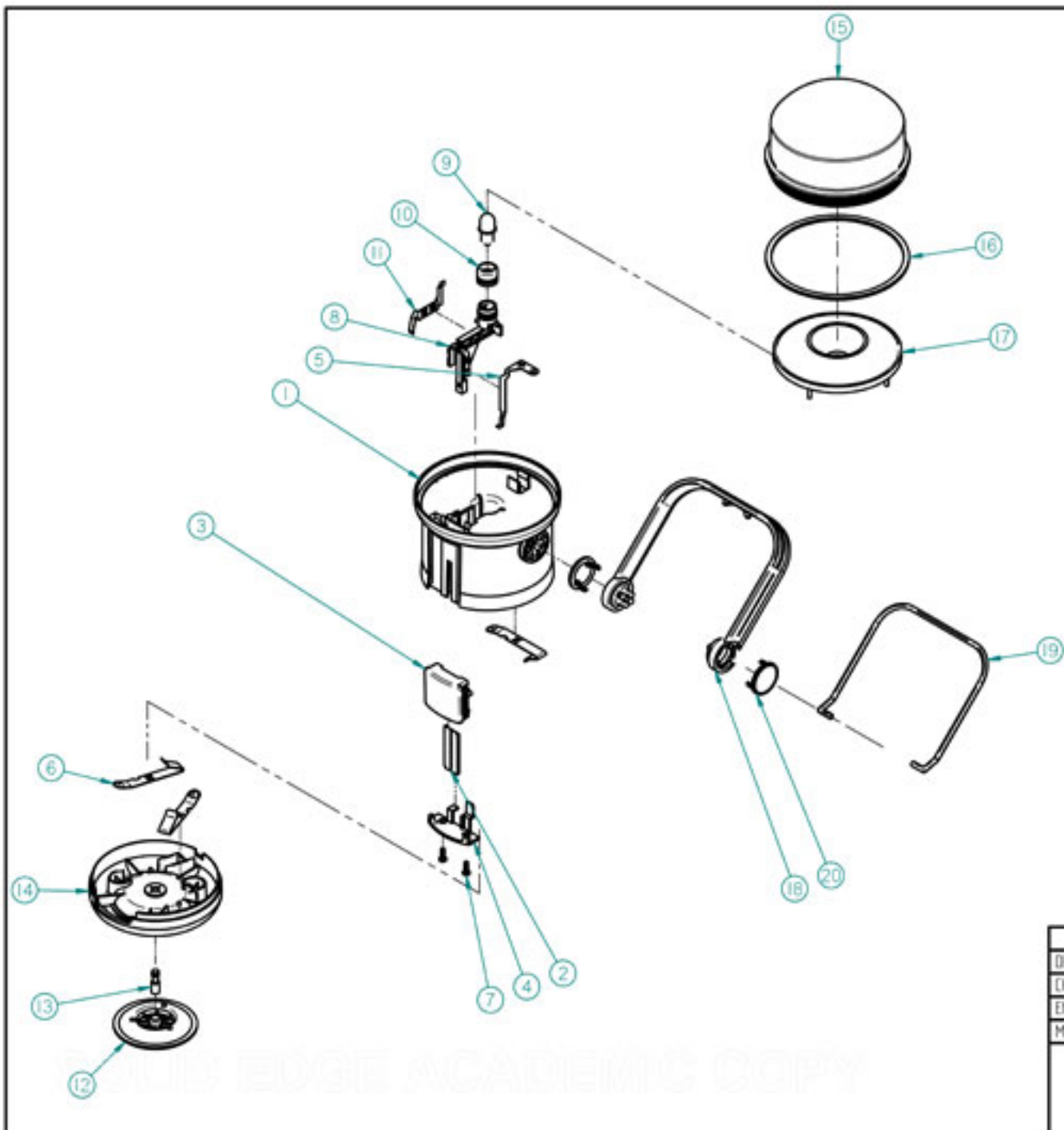
1. Ejection Points, Labelling, Electrical Component
2. Internal Parts
3. Side Detail: Multi Axil Molding
4. Internal Parts
5. Helt-joint of Two Parts

1. Electrical Component and Web
2. Ejection Points
3. Injection Point

1. Internal Component and Web
2. Injection Points

1. Internal Component
2. Parting Line
3. Parting Line (Close Up)

1. Internal Component
2. Injention and Ejection Point and Wall.



REVISION HISTORY

REV	DESCRIPTION	DATE	APPROVED

Item Number	Title	Quantity	Material
1	4Body	1	PVC-U
2	Button-Rubber	2	Rubber
3	Body-Button	1	PP
4	Body-Clip	1	PVC-U
5	Metal Plate Body	1	Copper
6	Metal Strip	3	copper
7	Screw	2	Stainless Steel
8	Body-Light	1	PP
9	Standart Light	1	
10	Light Holder	1	Stainless Steel
11	Body Plate	1	Copper
12	Focusing Lamp - Base	1	PVC-U
13	2BaseScrew	1	steel
14	3Base2	1	PVC-U
15	Cap	1	Polycarbonate
16	Cap-Stripe	1	Rubber
17	Lense	1	PVC-U
18	Handle	1	PP
19	Handle-Metal	1	Stainless Steel
20	Handle Cap	2	PP

	NAME	DATE
DRAWN	15753540	09/20/05
CHECKED		
ENG APPR.		
MGR APPR.		

SOLID EDGE

UGS - The PLM Company

 TITLE
 Exploded Assembly

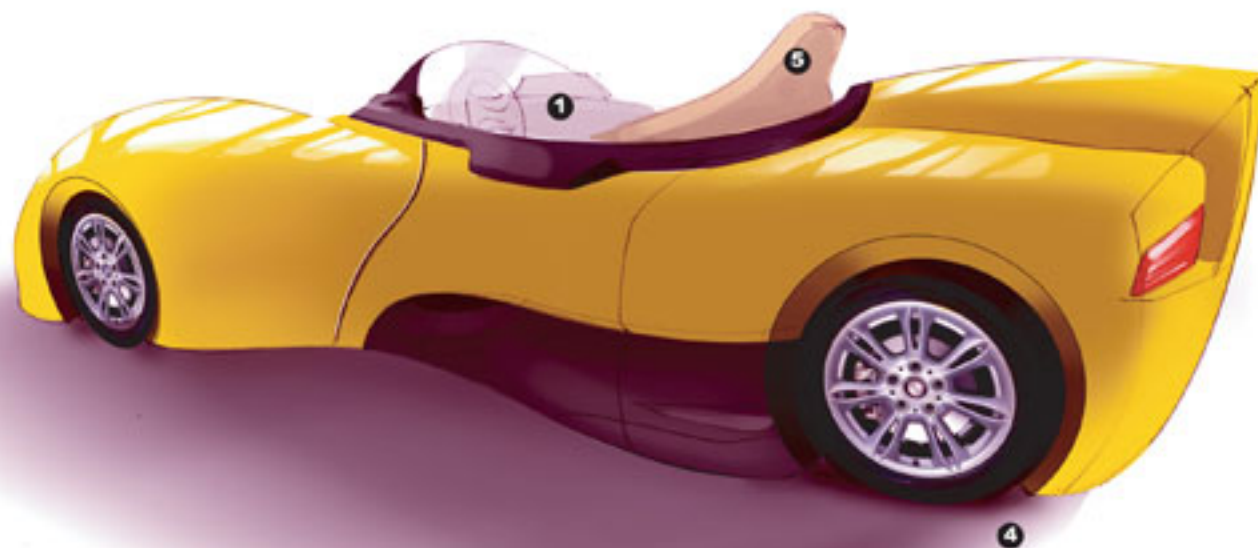
 UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE IN MILLIMETERS
 ANGLES °X'X"

2 PL *X00X 3 PL *X00X

SIZE	DWG NO	REV
A3		
FILE NAME: Explode.dft		
SCALE: 1 : 3	WEIGHT	SHEET 1 OF 1

SOLID EDGE ACADEMIC COPY





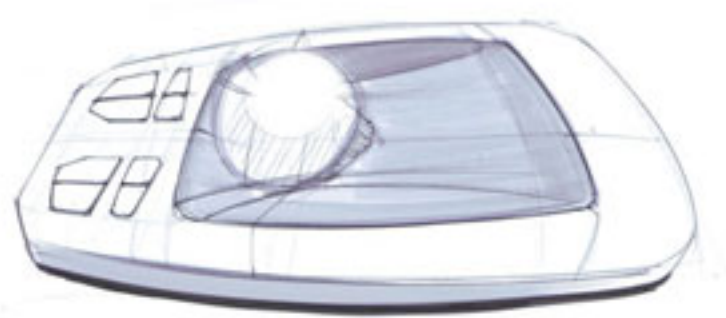
PHANTOM

Small and Light

- ① Spacious Open Interior
- ② Rain Water Hole
- ③ Part line
- ④ Scope-in Wheels
Emphasis on strong large wheel
- ⑤ Weather Proof
Leather Seat
- ⑥ Independent Electric Motors
- ⑦ Head Light and Air Suction



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stimulate

