MASTER IN CAR AND TRANSPORTATION DESIGN:

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Domus Academy

NEW HOLLAND AGRICULTURE

WHY CHILDREN LIKE TRACTORS ?

**UNCOMMON FOR CITY STREETS*

**ADMIRE NOISE AND FUNCTIONALITY*

**GENTLE GAINT*

**FRIENDLY*

**MULTICOLORED*

**POWERFUL APPEARANCE*

**THEY DON'T NOTICE OBSTACLES*

**ABILITY TO MANAGE THE HUGE BEAST*

**THEY ARE GOOD*

**(HELPING PEOPLE PRODUCE FOOD)*

WHY TRACTORS LOOK LIKE TRACTORS ?

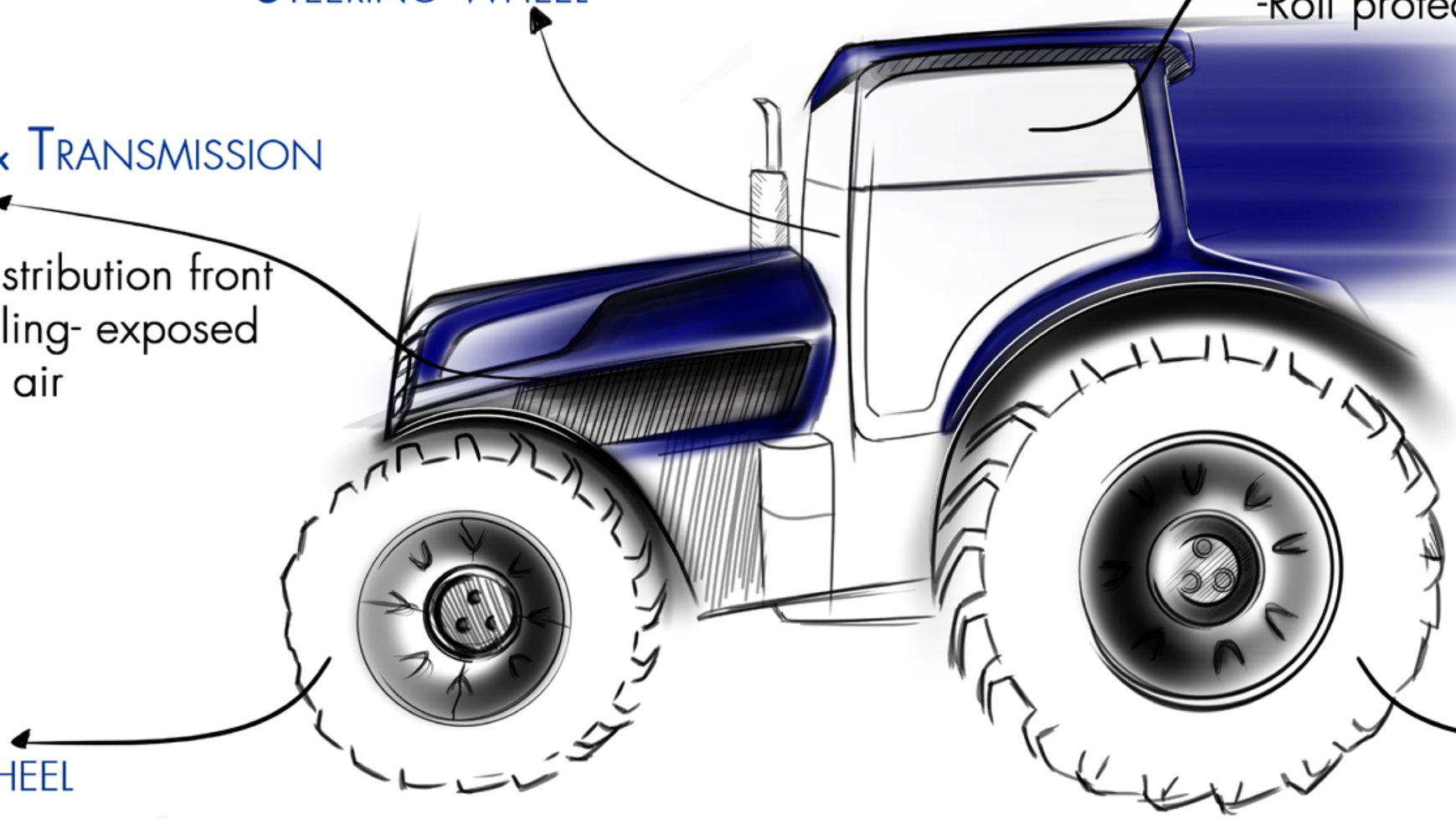
DRIVER'S CABIN

-High driver position
for clear visibility on fields
-Roll protection cage for safety
-Driver comfort

STEERING WHEEL

ENGINE & TRANSMISSION

-Weight distribution front
-Better cooling- exposed
surface to air



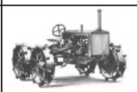
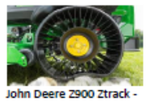
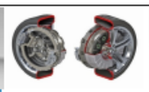
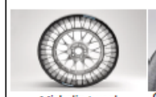
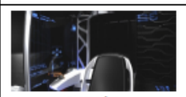
FRONT WHEEL

-Better visibility
-Small turning diameter
-lesser steering effort

REAR WHEEL

-Bigger treads for high traction / torque
-Bigger surface area for less pressure on ground, to prevent sinking
- High wheel center to prevent tractor turnover

Technological Research - Evolution of Tractors and future technologies

Areas	Past	Present (in production, Jan'15)	Future (Concept, Research & development)
Engine & fuel	 Steam engine  Gasoline / diesel engines 	 Diesel / Gasoline engine  Electric - Hybrid (CAT D7E Track)  New Holland NH2 (H2 fuel cell _ under development)  Hybrid John Deere 644K - wheel loader 	 Electric engine  Hybrid engine  Hydrogen fuel cell engine  Air powered engine  Diesel-fed micro gas turbines Jaguar C-X75  Biogas_tractor_six_cylinder _SCR_engine_valtra  MIT Liquid piston engine
Wheels	 Metallic wheels with spikes  1916_Clayton_&_Shuttleworth_tractor   Halftrack	   John Deere Z900 Ztrack - Michelin, airless tyre    	 Continuous track triangular  polaris air less tyre  Michelin active wheel system (in built - motor, suspension)  Kumho conept wheel in Frankfurt motors show  Inbuilt electric motors wheels  Boston dynamics -- Google  Kumho cconcept wheel  Michelin tweel concept  Good year Dunlop chip inside, self inflating - computer controlled while driving  Mitas award winning Pneutrack tyre with pneumatic & track  soft wheel concept  dynamic tyre concept  loop wheel concept
Layout	 Fordson_F  1916_Clayton_&_Shuttleworth  Volvo - T	   	 Case IH Quadtrac  lamborghini toro concept  Cosmic Trac conept  marauder-dozer - (ants inspired)  John Deere - Autonomous concept  Valtra Ants - Concept  Lamborghini Nitro  Yanmer Y-concept YT01  ETRION 400 Concept Autonomous  Deuterium - Concept -IITK
Cabin interiors and navigation		 John Deere - navigarion display  New Holland T navigation display  Panoramic view - Case IH  Panoramic view - Case IH	 Interactive cockpit  180 deg cock pit  Complete Joystick control  Remote access GPS - satellite, radiio  Multifunctional Steering wheels
Chassis / modularity / lightness	  	   	 marauder-dozer - (ants inspired)  Big dog - Boston dynamics  Valtra Ants - Concept  Deuterium - Concept -IITK  Timberjack walking machine  Genesis 3d - printed car by EDAG
Equipment and advanced Machineries		 	 Robot farming  Robots in prescision agriculture  Drones  Drones  Drones

ENGINE

20th century

Steam engine

Gasoline / diesel engines

2014 - 15

Diesel / Gasoline engine

Electric - Hybrid (CAT D7E Track)

Hybrid John Deere 644K - wheel loader

New Holland NH2 (H2 fuel cell _ under development)

Future

Electric engine

Hybrid engine

Biogas_tractor_six_cylinder _SCR_engine_valtra

Hydrogen fuel cell engine

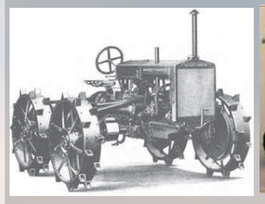
Air powered engine

MIT Liquid piston engine

Diesel-fed micro gas turbines Jaguar C-X75

WHEELS

20th century



Metallic wheels with spikes

1916_Clayton_&_Shuttleworth_tracto

Metallic wheels with spikes

Halftrack

2014 - 15

John Deere Z900 Ztrack - Michelin, airless tyre

Future

Continuous track triangular

Michelin tweel concept

Good year Dunlop chip inside, self inflating - computer controlled while driving

polaris air less tyre

Michelin active wheel system (in built - motor, suspension)

Kumho conept wheel in Frankfurt motors show

Mitas award winning Pneutrack tyre with pneumatic & track

soft wheel concept

dynamic tyre concept

Inbuilt electric motors wheels

Boston dynamics -- Google

LAYOUT

20th century

Fordson_F

1916_Clayton_&_Shuttleworth_tracto

Volvo - T

2014 - 15

Future

Case IH Quadtrac

Cosmic Trac conept

John Deere - Autonomous concept

lamborghini toro concept

marauder-dozer - (ants inspired)

Valtra Ants - Concept

Lamborghini Nitro

ETRION 400 Concept Autonomous

Yanmer Y-concept YT01

Deuterium - Concept - IITK

CABIN INTERIORS AND NAVIGATION

20th century

2014 - 15

John Deere - navigarion display

New Holland T navigation display

Panoramic view - Case IH

Panoramic view - Case IH

Future

Interactive cockpit

180 deg cock pit

Complete Joystick control

Remote access GPS - satellite, radiio

Multifunctional Steering wheels

CHASSIS / MODULARITY / LIGHTNESS

20th century	2014 - 15	Future
 	 	 marauder-dozer - (ans inspired)
		 Valtra Ants - Concept
		


Big dog - Bostondynamics


Deuterium - Concept - IITK


Timberjack walking machine


Genesis 3d - printed car by EDAG

ADVANCE EQUIPMENTS

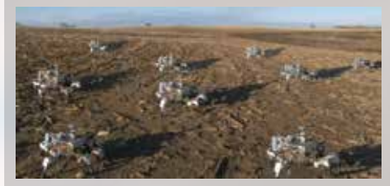
20th century

2014 - 15

Future

Robot farming

Robots in prescision agriculture



Robots in prescision agriculture

Drones

Drones

CASE STUDY:

Valtra Robotrac (2008) :

Fully automated and programmable robot designed to supplement a farm team. It can smoothly carry out all necessary activities for your farmhouse including tilling, disking, plowing, planting, spraying, weeding and many other activities which a normal farm team cannot do

Tech info:
-2 or 4 wheel drive, depending on a need
-steering rear wheels. Rear wheels are wider to get better ground support and -eliminate need for double-wheels

ETRION 400 CONCEPT:

The design exploits the best features of wheeled and tracked tractors to enhance stability and reduce ground compaction. . ETRION 400 is designed to be driverless.

Google's Boston Dynamics BigDog:

Dynamically stable QUADRUPLE ROBOT created in 2005 by Boston dynaics with Foster - Miller, NASA jet propulsion laboratory and Harvard University Concord field station. BigDog is 3 feet (0.91 m) long, stands 2.5 feet (0.76 m) tall, and weighs 240 pounds (110 kg), about the size of a small mule. It is capable of traversing difficult terrain, running at 4 miles per hour (6.4 km/h), carrying 340 pounds (150 kg), and climbing a 35 degree incline. Locomotion is controlled by an onboard computer that receives input from the robot's various sensors. Navigation and balance are also managed by the control system

Recently Boston Dynamics purchased by Google
https://www.youtube.com/watch?v=rgAJnoUgP1o

Deuterium concept -- IITK:

Multidimensional concept

This multi-dimensional tractor will make farming safe, simple and sustainable in the future. Featuring an onboard CPU, GPRS and sensor controlled motion path allocation, the farming vehicle allows freedom in motion and body positioning for autonomous farming. Harnessing solar energy with embedded nano solar cells on the FRP body surface panels, the futuristic machine also includes a 360-degree light and night vision camera feed for 24-hour usability.

The concept vehicle runs on hydrogen fuel cells to ensure sustainable farming, while the front wheel shift allows increased degree of freedom.

Integrating vacuum power suction at the rear to pull heavy farm equipment and farming tools, the Deuterium comes equipped with a retractable and expandable axial shift mechanism to adjust the ground clearance and length of the vehicle. In addition, users can detach and deploy roller bots for topographic assessment, navigation and data collection.

NEW HOLLAND AGRICULTURE

Valtra Ants - Concept (2011):

Winner of the Red Dot award

Dynamic, friendly, customizable, intelligent, agile, and ligh
The tractor is modular, with two components: the "soldier," with 100 kilowatts (134 horsepower) and the "worker," with 200 kw (268 horsepower). The two components can be used individually or together — a configuration dubbed the "queen," with articulated steering and maximum power of 400 kW (536 horsepower).

The "worker" will be autonomous, able to carry out its tasks unattended. The "soldier" is fitted with a cab and electric — instead of hydraulic — actuators and controls. For those instances where the power of a hydraulic system is needed, ANTS will used a water-based system.

The operator sits in cab that rotates and can be placed almost anywhere on the module to meet specific needs. Because most tractor-related injuries occur as the operator climbs in and out of the cab, Valtra designed ANTS with a cab that can be lowered for easier access. Plus, it looks really, really cool.

Agria - intelligent farming concept (2010):

Autonomous farm robot for sowing and plant protection in small farms. Featuring infrared and UV light to control bugs, fungi and pests, the modular machine examines the soil and plants regularly to allow specific treatment. Placing seeds and fertilizer in the right place and proportion, the Agria works with an intelligent network of fields and machines, supplied by a local station, which can be controlled through a computer or smartphone, so you may store and share data with experts for better analysis

https://www.youtube.com/watch?v=C4LSWrhEsmA

NEW HOLLAND AGRICULTURE

John Deere - Autonomous concept

Case IH - Follow me concept
main tractor uses GPS navigation, other follows

John Deere - i-Tech pro concept - semi auonomous concept:

https://www.youtube.com/watch?v=8N6v5BRgAKA

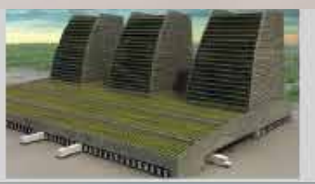
Concepts and video for discussion

Concepts	Image	video links
Valtra- Ants concept		Link: http://vimeo.com/32310267
Robotic seeding machine		Link: https://www.youtube.com/watch?v=Vg-Me19ARZUg
Agria Intelligent Farming		Link: https://www.youtube.com/watch?v=C4LS-WrhEsmA
Google's Boston Dynamics		Link: https://www.youtube.com/watch?v=QVd-QM47Av20
Timber Jack walking tech-nology		Link: https://www.youtube.com/watch?v=ftV2HeK-PeBM
Disney's Beach bot		Link: https://www.youtube.com/watch?v=e-BRrQBPtdak

Concepts and video for discussion

Concepts	Image	Link
Drones Farming - FAA		Link: http://www.businessinsider.com/drones-will-revolutionize-farming-2014-9?IR=T
John Deere - ITEC pro		Link: https://www.youtube.com/watch?v=8N-6v5BRgAKA
Prospero Robot Farmer		Link: https://www.youtube.com/watch?v=CRe-aedEF41w

AN OVERVIEW - FARMING

	PAST 1900 CENTURY	PRESENT 2015	FUTURE 2050
Population	1500 million approx	7000 million approx	9500 million approx
Agriculture Industry			
Customer			
Farming solution	  	  	?

DA

NEW HOLLAND AGRICULTURE

SCENARIO

DRONE

WORKER 1

WORKER 2

WORKER 3

WORKER

-MAP ON SCREEN
-FARMER CAN DECIDE PATH FOR ROBOT
WORKER ON TOUCHSCREEN
-FARMER CAN CONFIGERE FIELD

Farmer's Biography:

Name: Joe
Age: 35
Occupation: Farmer
Education status: Agriculture Business management
Plantation type: **Wheat, Rice, Olive, Grapes, Apple**
Others**: Cattles and Dairy Farms**
Farm Location: Toscana, Italy
Farm Size: 50 Hectares, 500000 sq mtr
Annual Turnover: € 80000

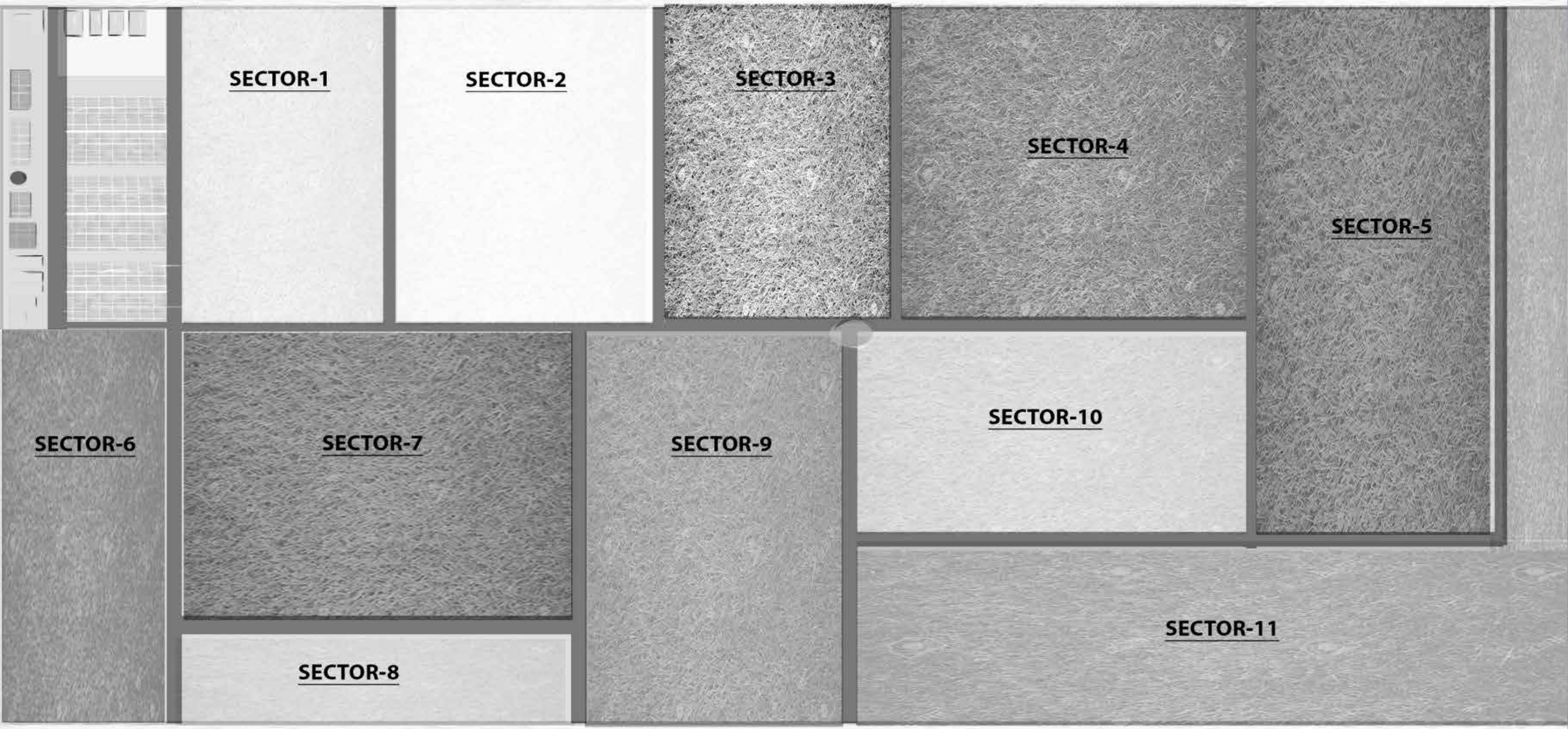
Rice

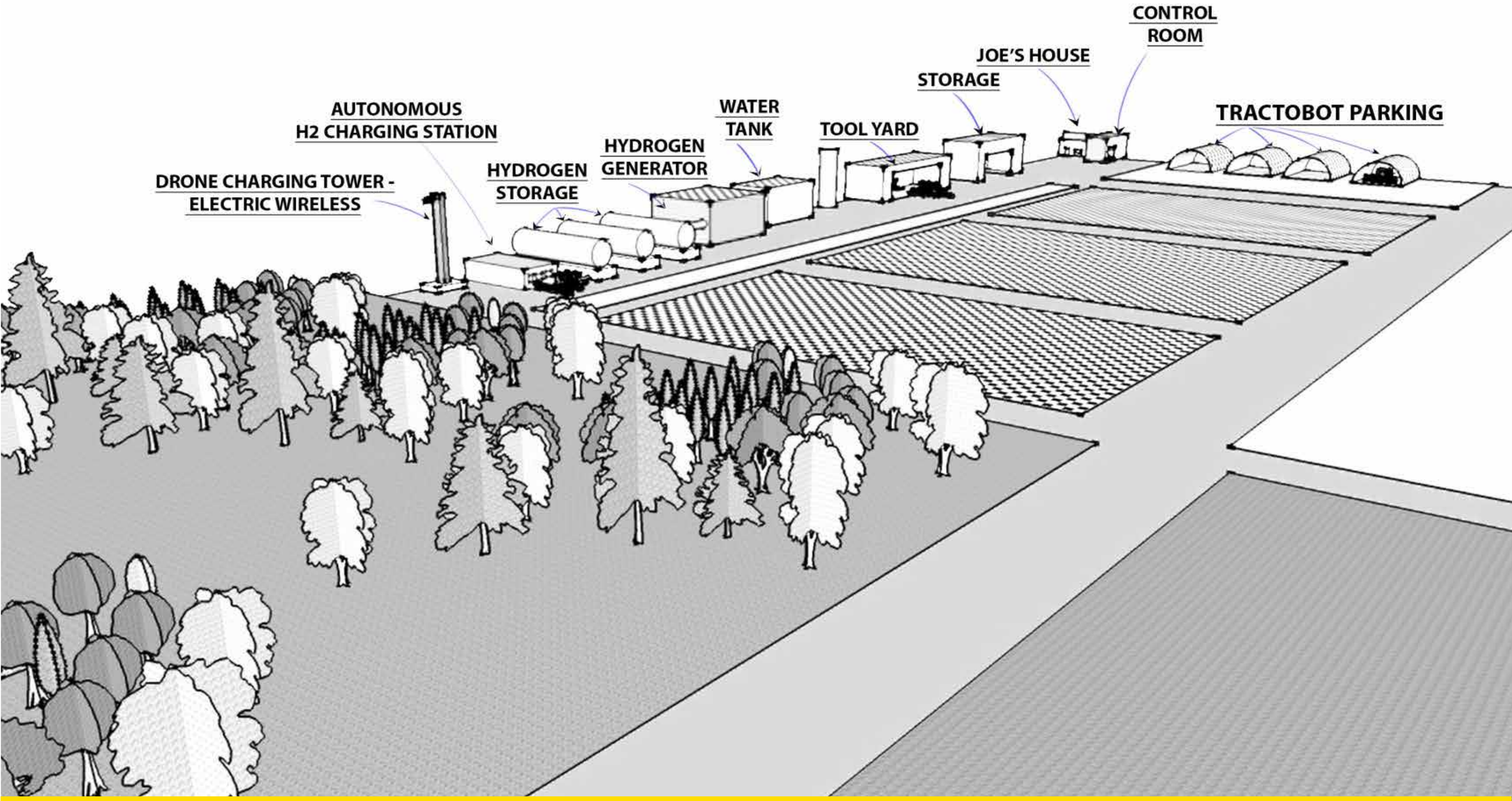
Olives

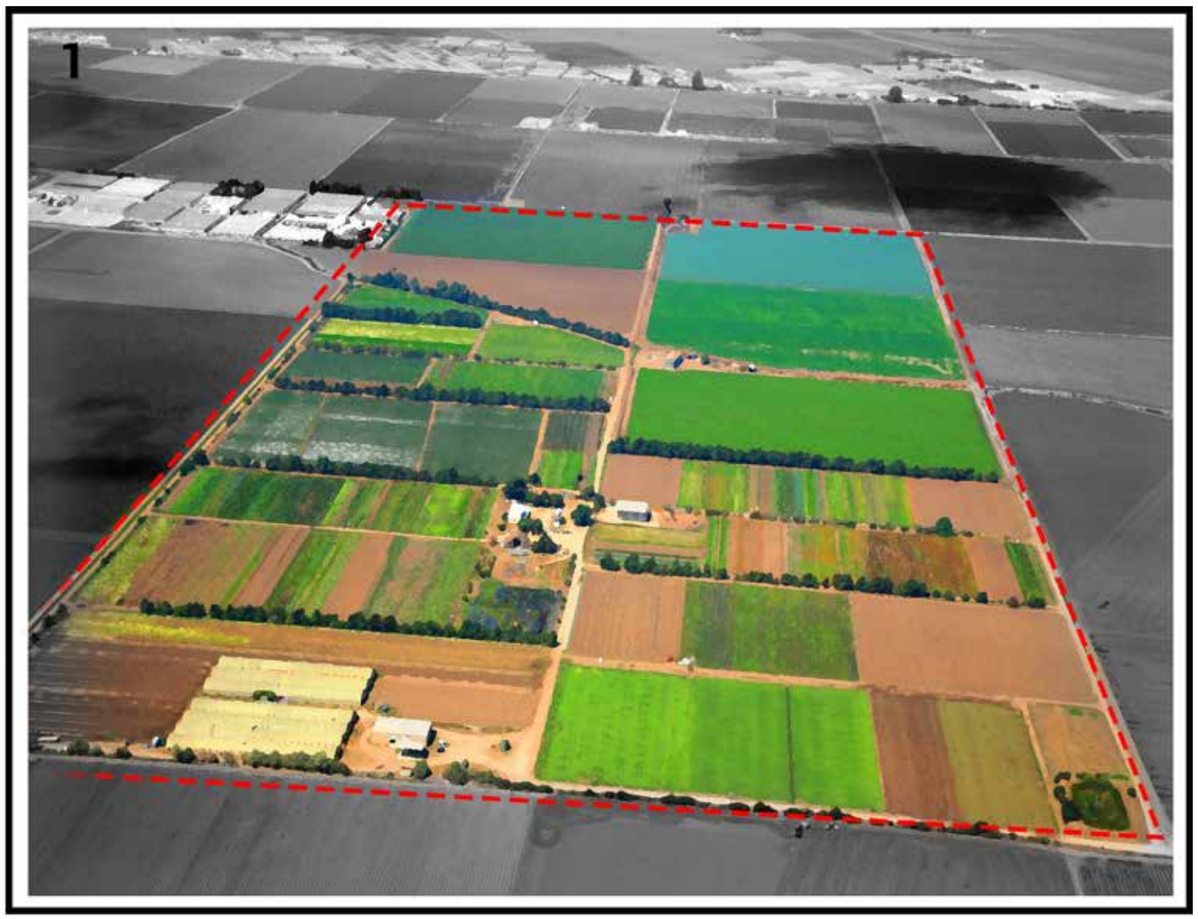
Grapes

Apples

Wheat


SECTOR-1
SECTOR-2
SECTOR-3
SECTOR-4
SECTOR-5
SECTOR-6
SECTOR-7
SECTOR-8
SECTOR-9
SECTOR-10
SECTOR-11


CONTROL ROOM
JOE'S HOUSE
STORAGE
AUTONOMOUS H2 CHARGING STATION
WATER TANK
TOOL YARD
TRACTOBOT PARKING
HYDROGEN GENERATOR
HYDROGEN STORAGE
DRONE CHARGING TOWER - ELECTRIC WIRELESS

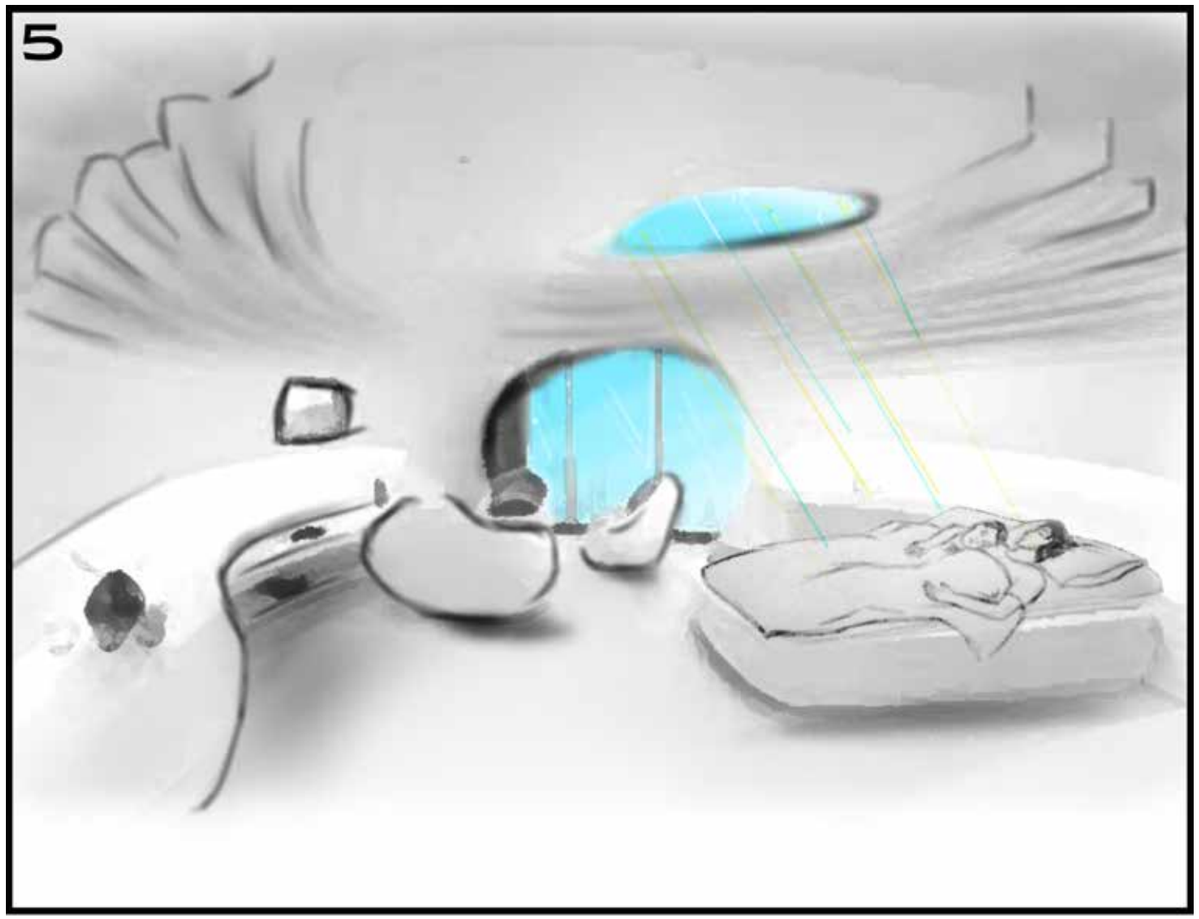


TUSCANY - ITALY YEAR 2030
FARMER JOE'S BIG FARMING PROPERTY.

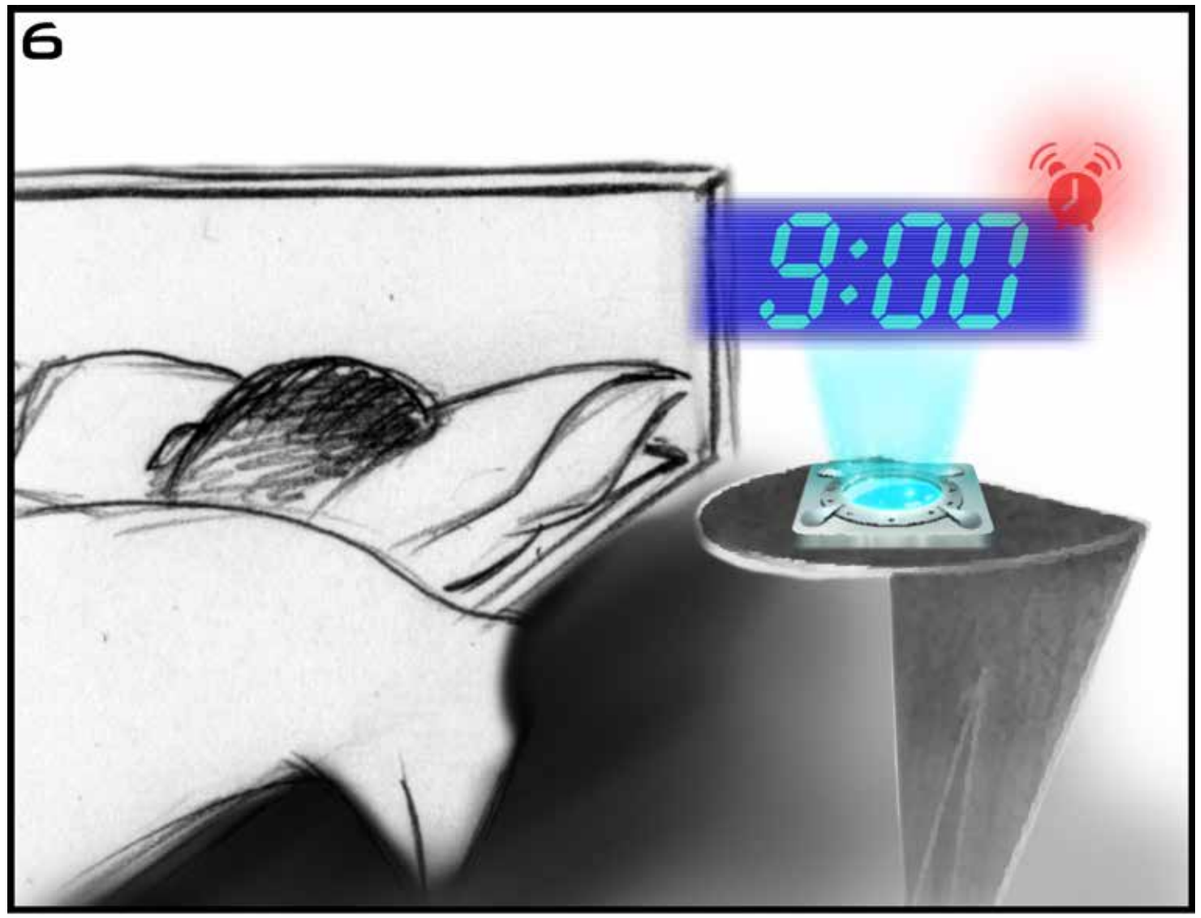
A CONTEMPORARY FARM HOUSE OF THE YEAR.

GARAGE AND MAIN ENTRANCE

CORRIDOR TO JOE'S BEDROOM



JOE'S BEDROOM.
SLEEPING WITH HIS WIFE.

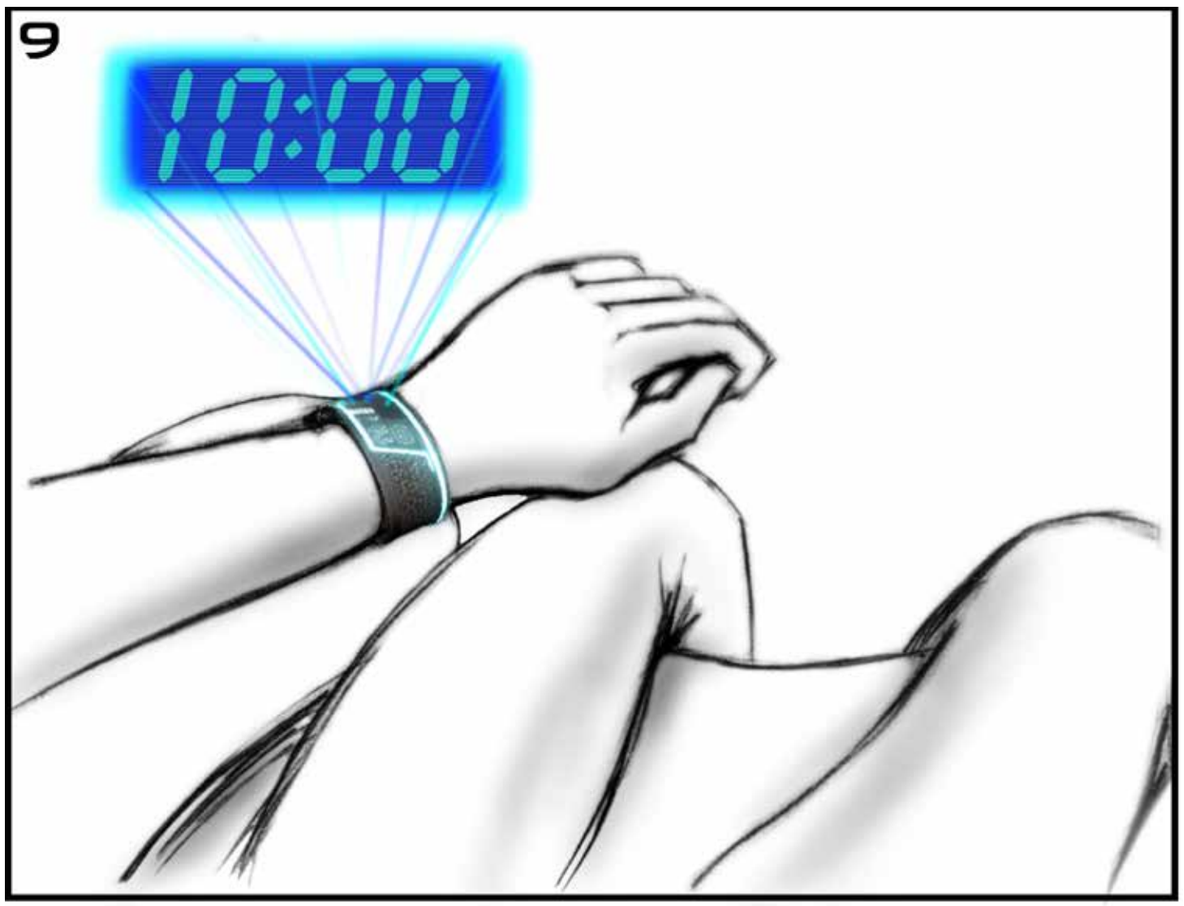


ALARM CLOCK HITS 9;00AM

Heads to the kitchen for a morning coffee.

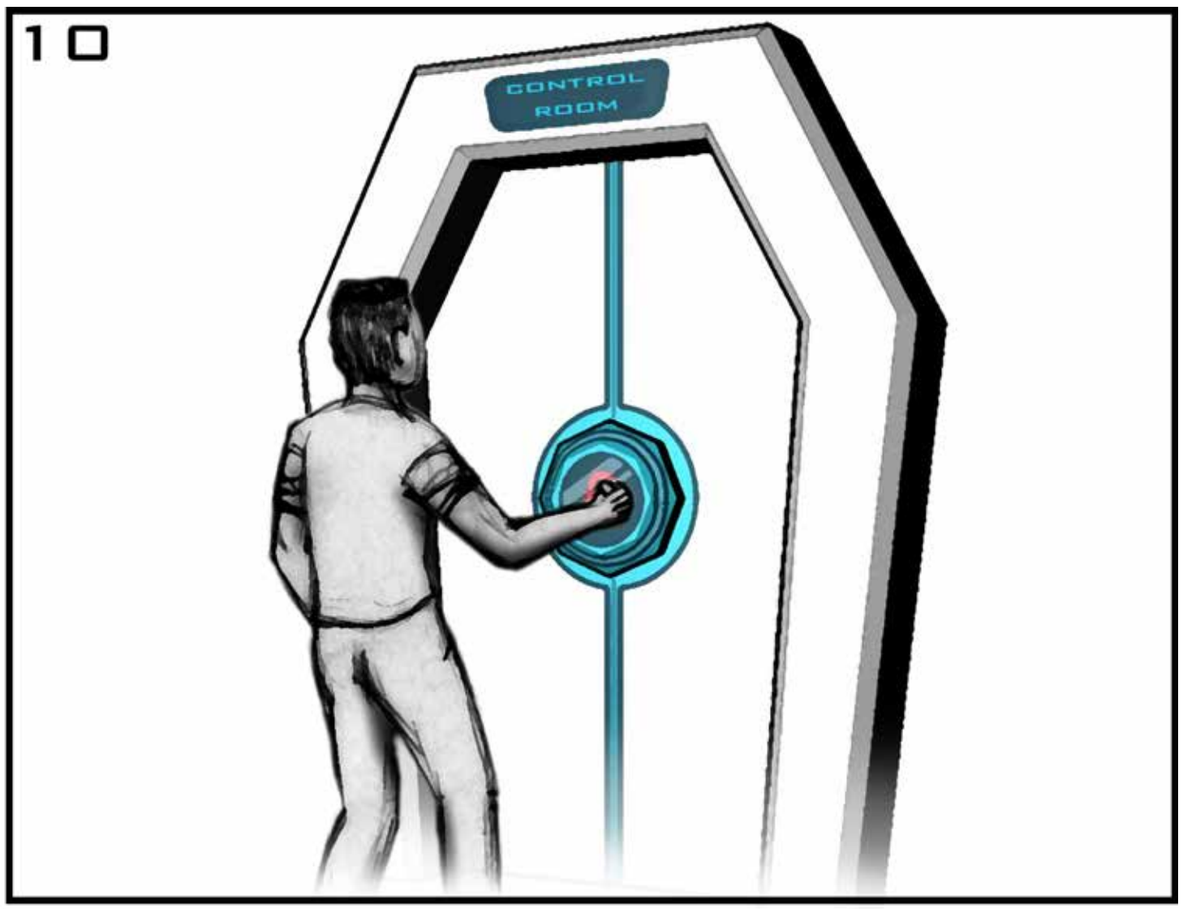
Watches the morning news in the family room,
via internet

9

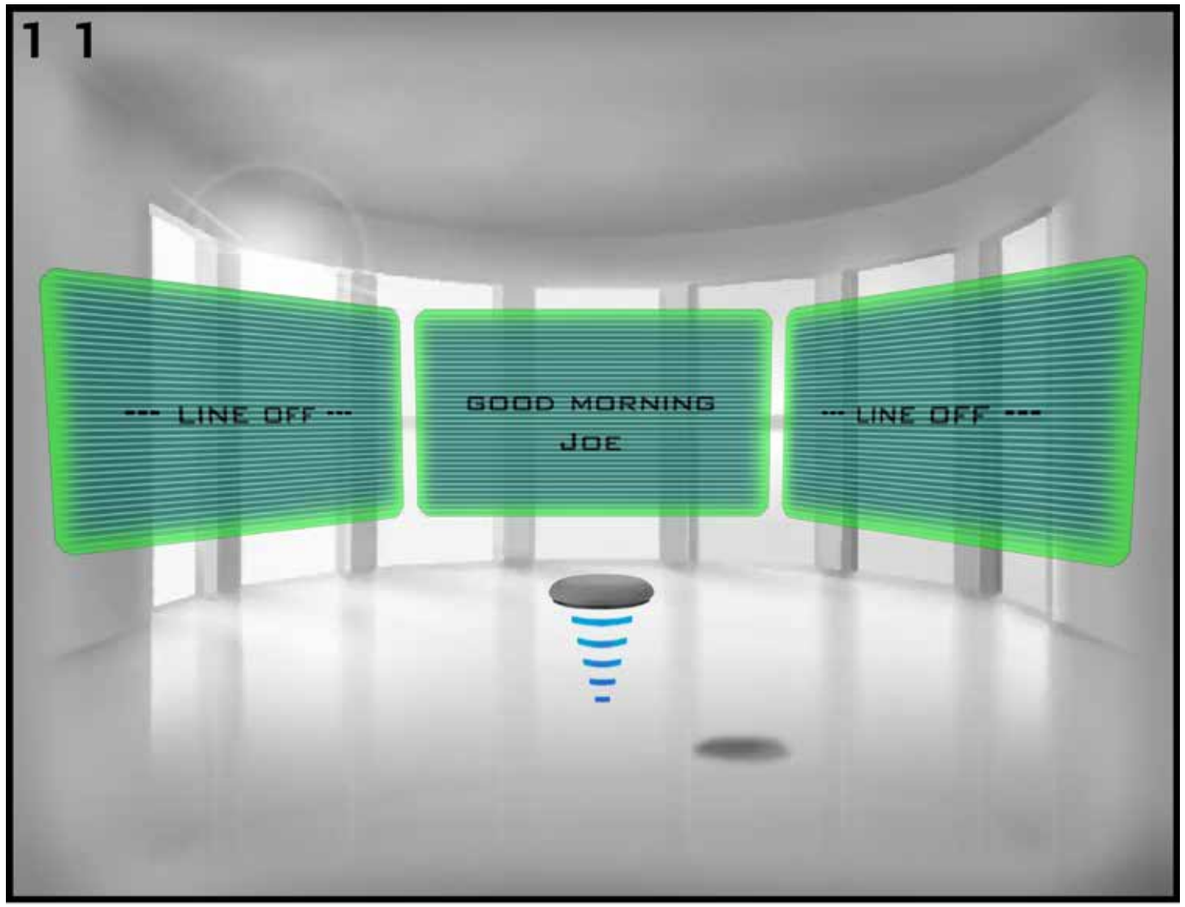


It's time to go to work, as daily scheduled.

10

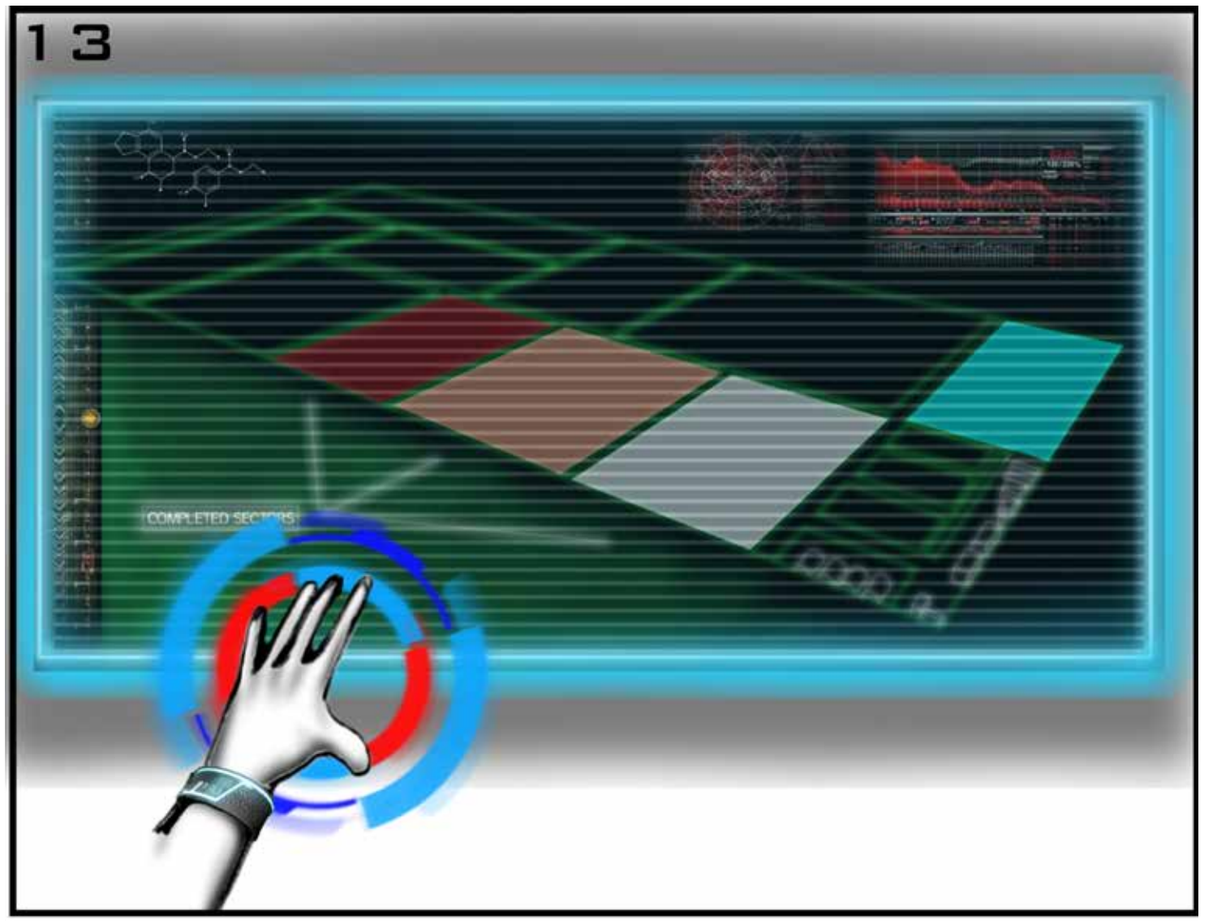


Joe access to his private control room.

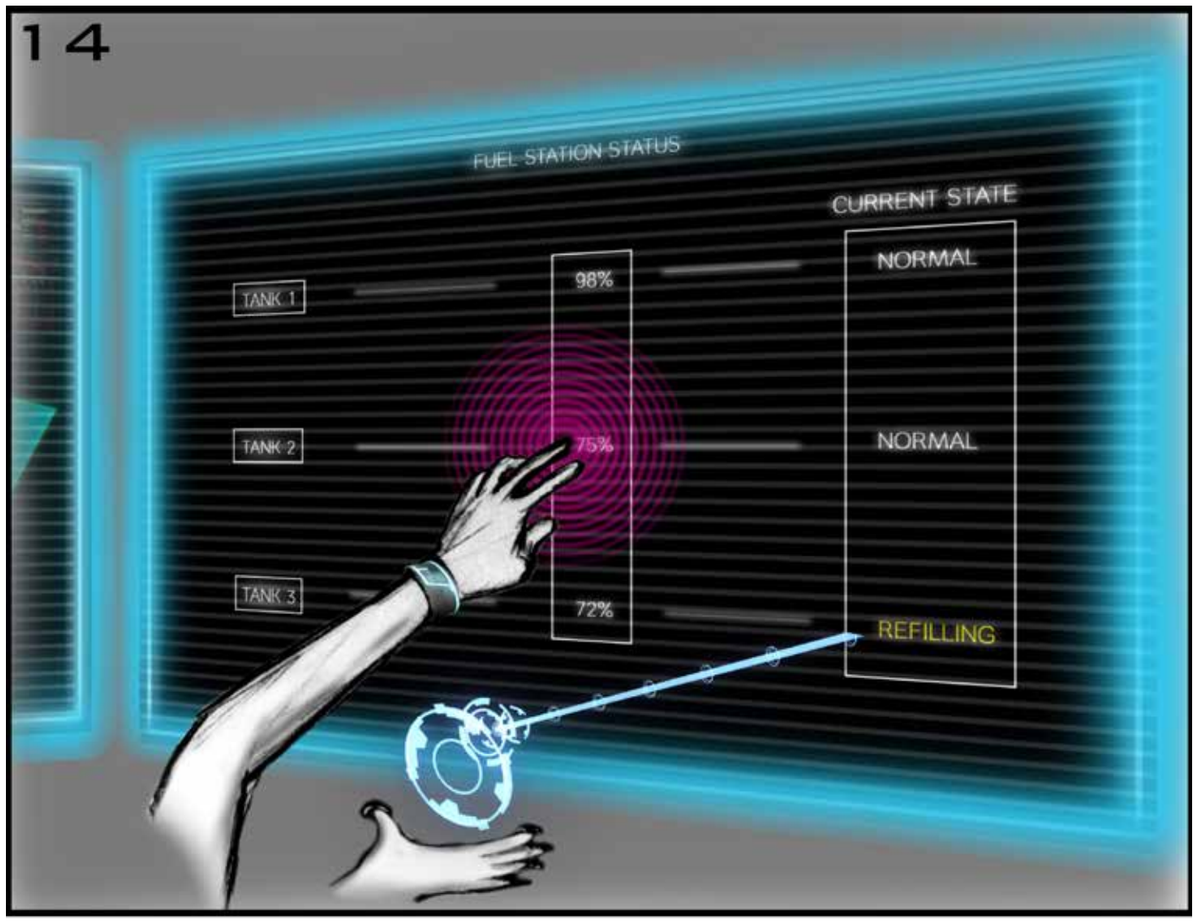


CONTROL ROOM

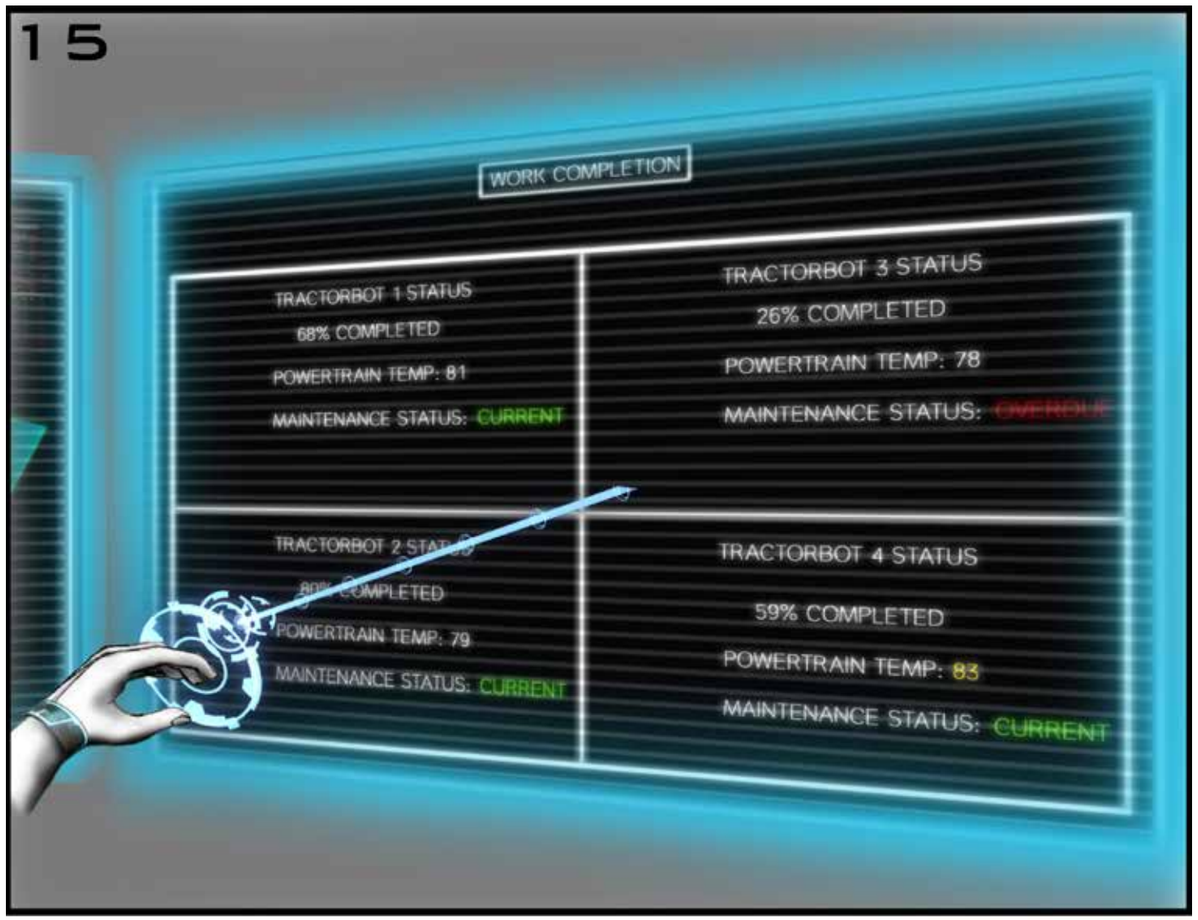
BOOTS UP HOLOGRAPHIC SYSTEM TO START WORKING
DRONE STATUS - FIEL MAP - AUTONOMUS TRACTOR



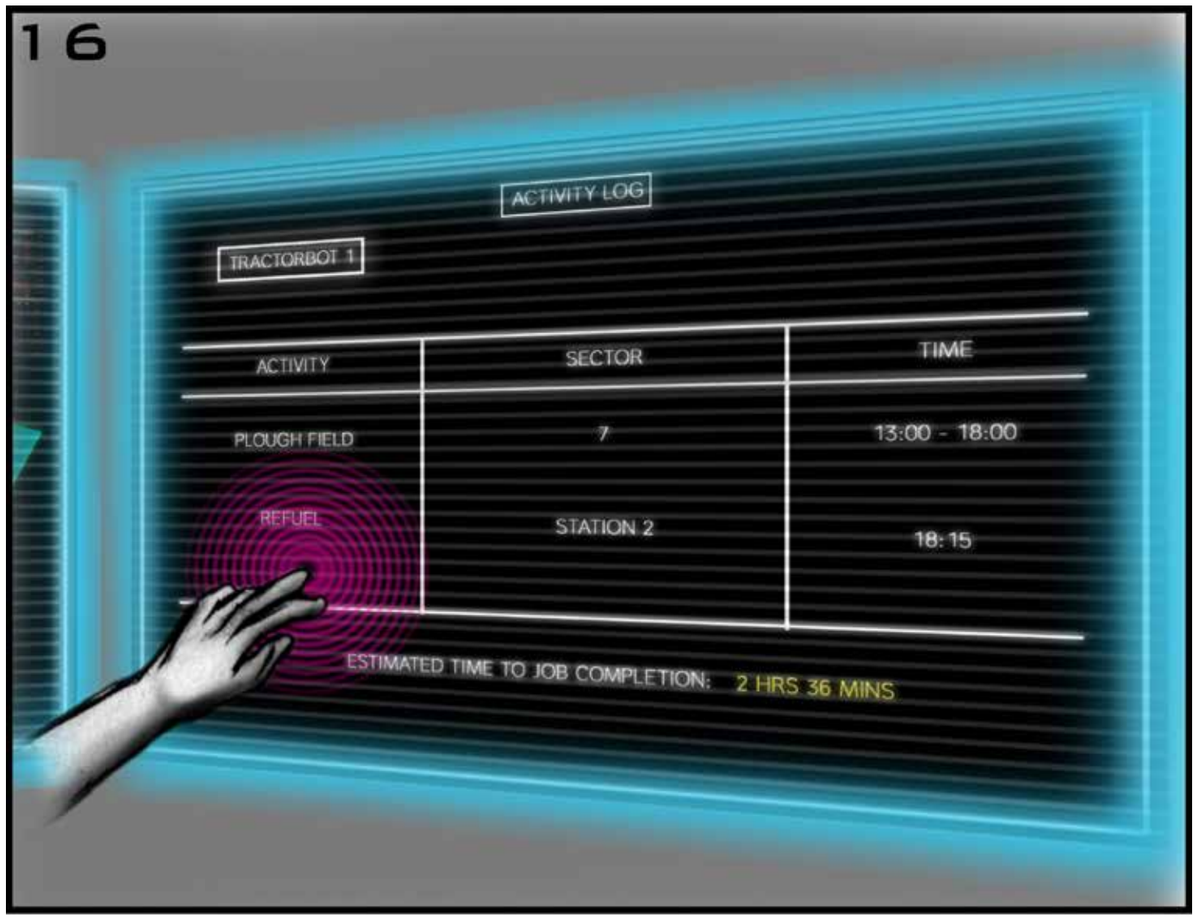
Field map evaluation
completed sectors



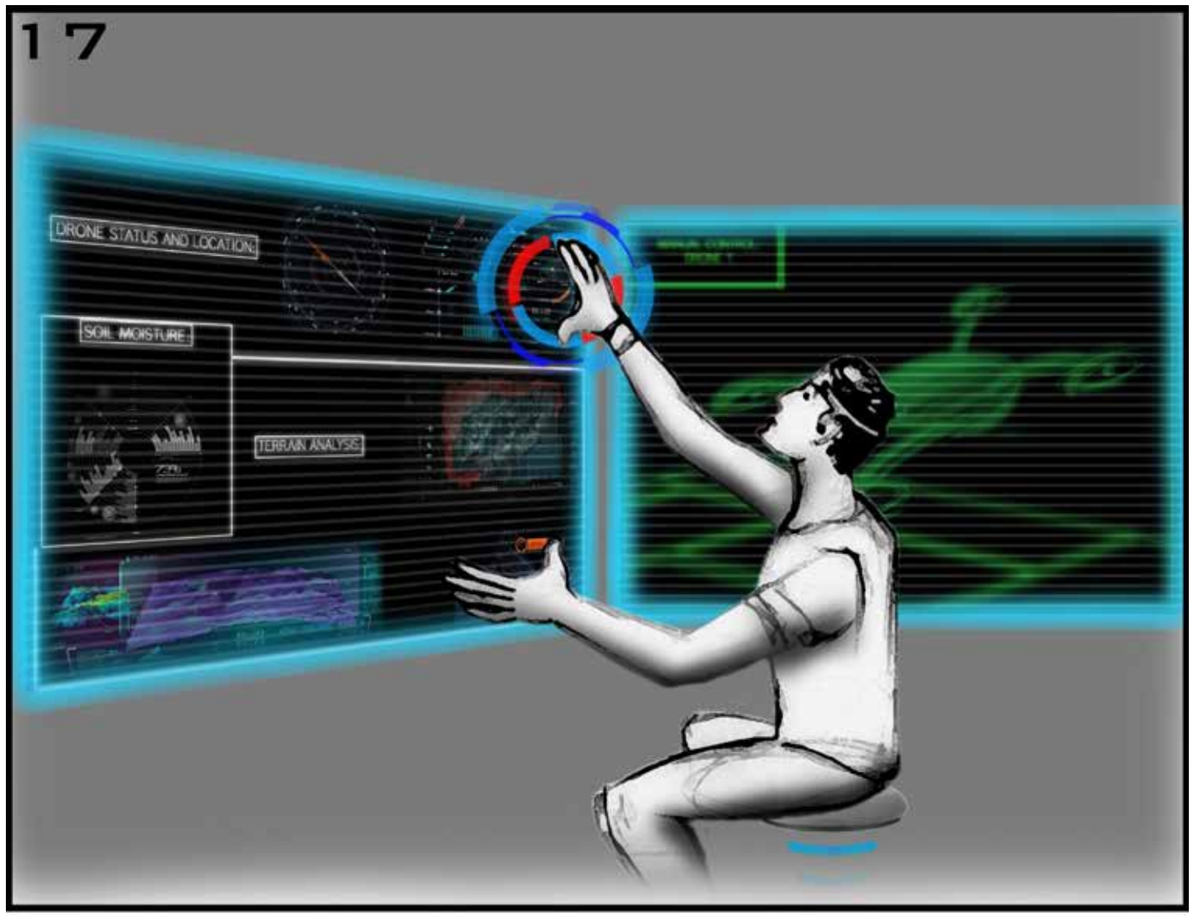
fuel station status



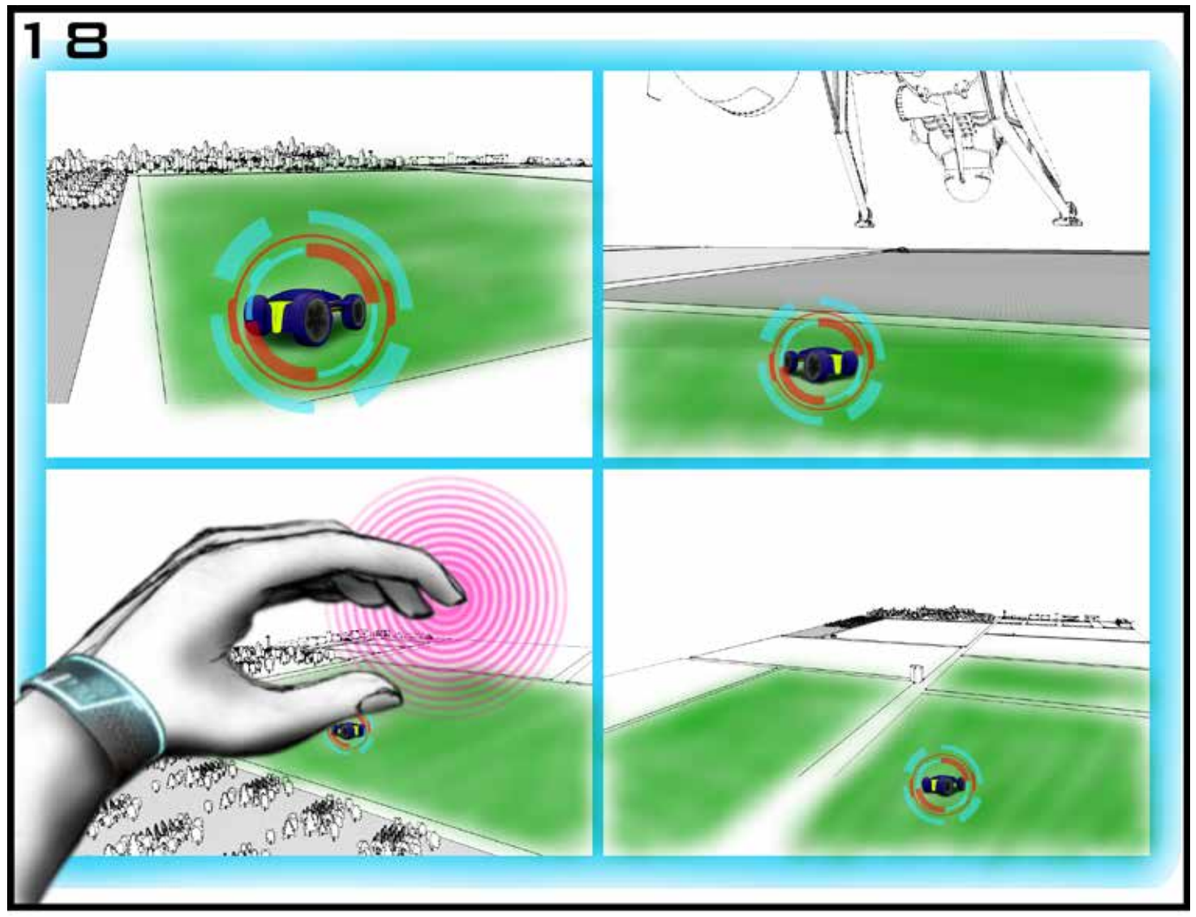
WORK COMPLETION FOR EACH TRACTORBOT



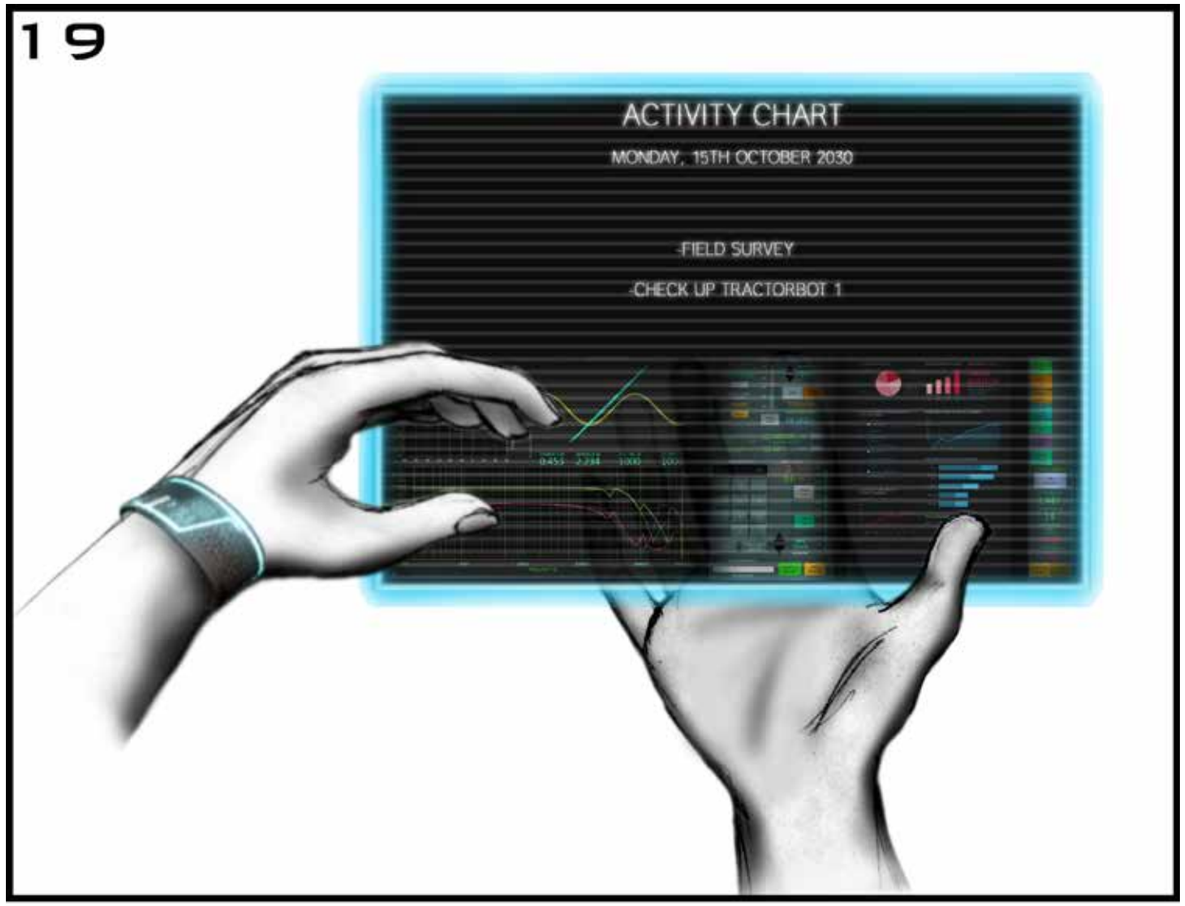
ACTIVITY LOG FOR EACH TRACTORBOT AND
ITS RESPECTIVE SECTOR OF WORK



DRONE STATUS AND LOCATION

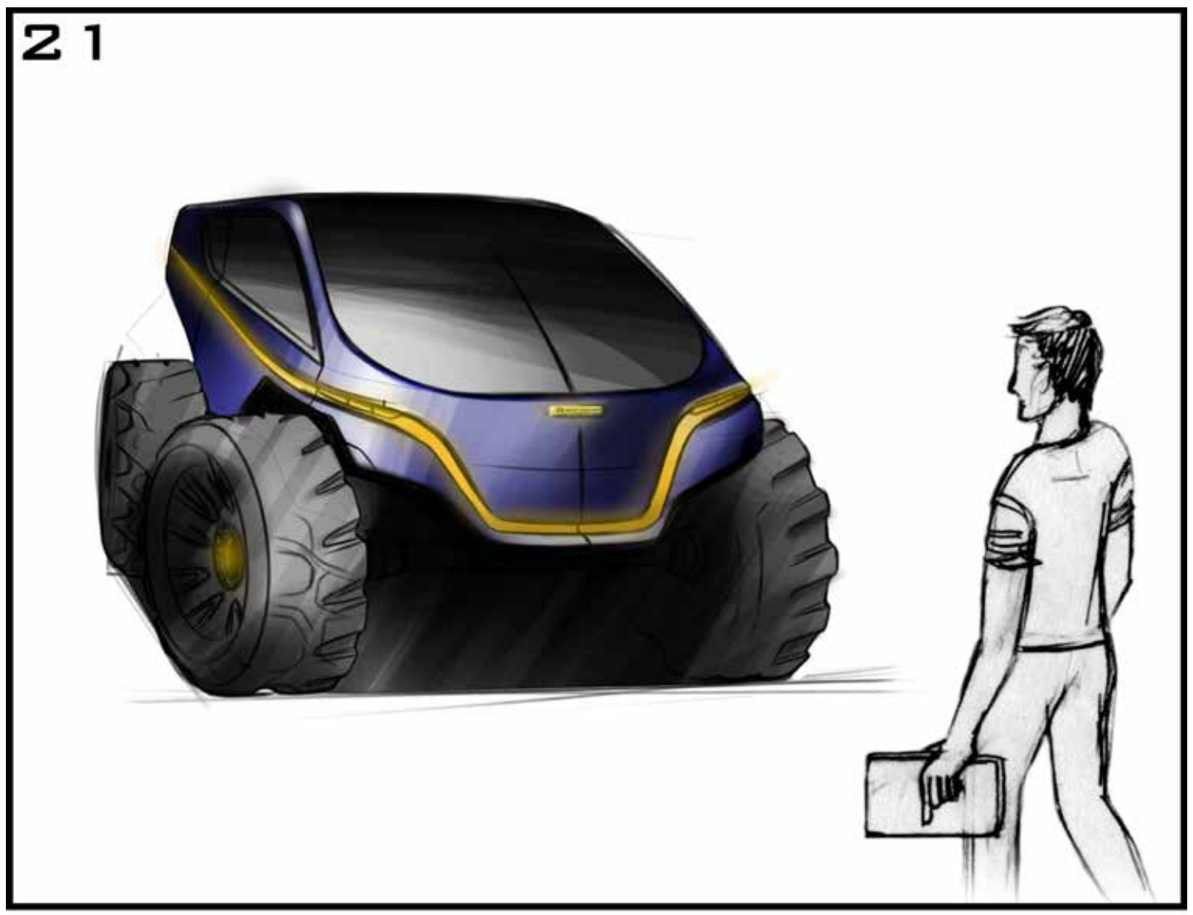


JOE CAN OBSERVE IN REAL TIME FROM THE DRONES IN HIS GORILLA-TABLET.

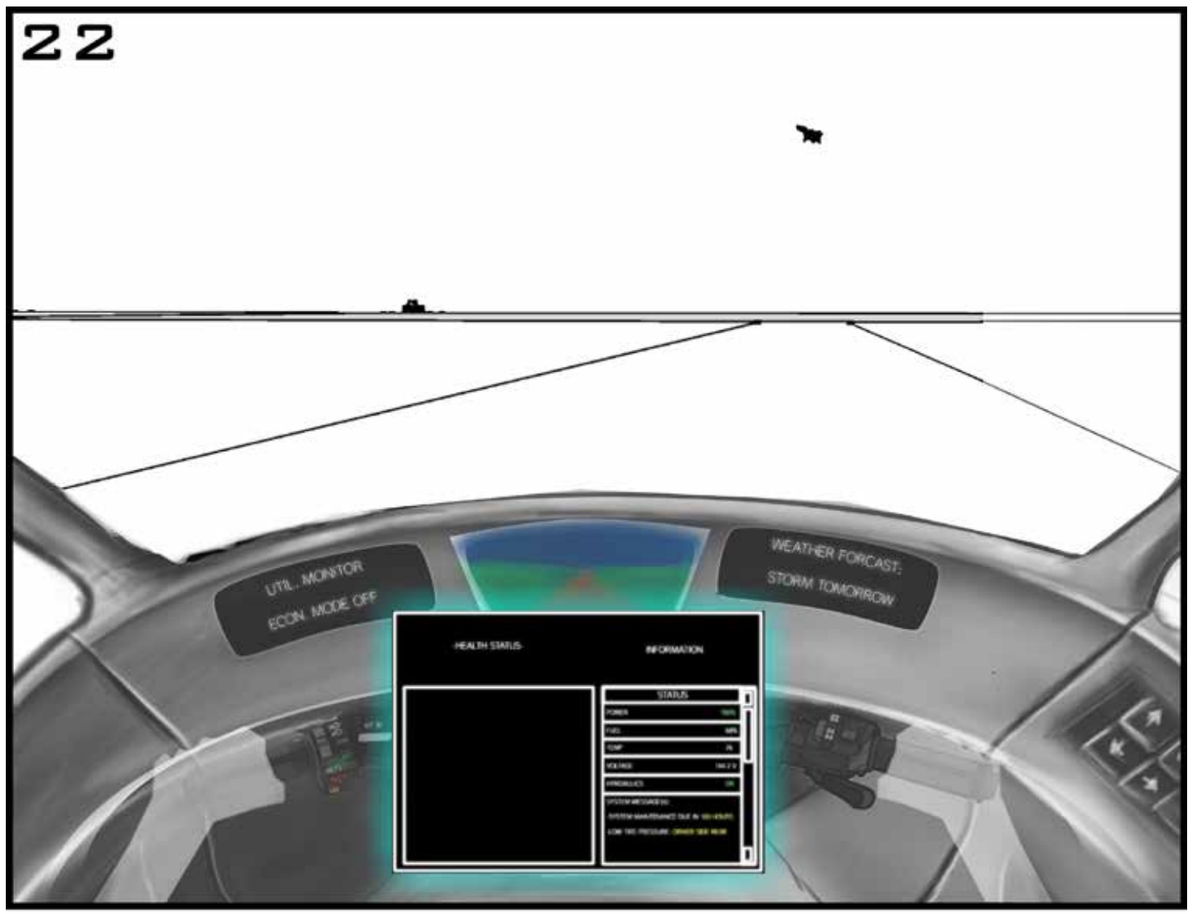


CHECKS THE ACTIVITY CHART ON HIS GORILLA-TABLET
BEFORE HE GOES TO THE FIELD

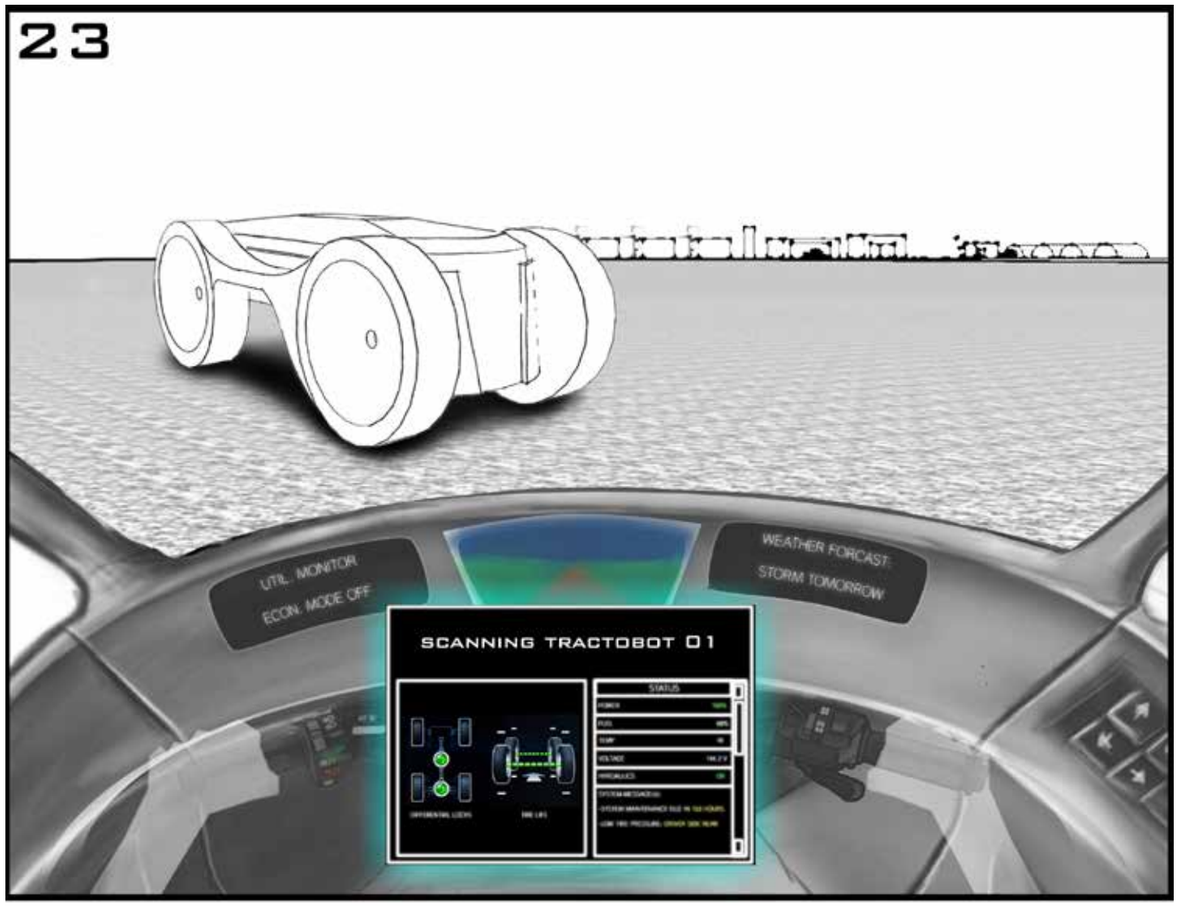
GRABS HIS HEAVY DUTY BOOTS



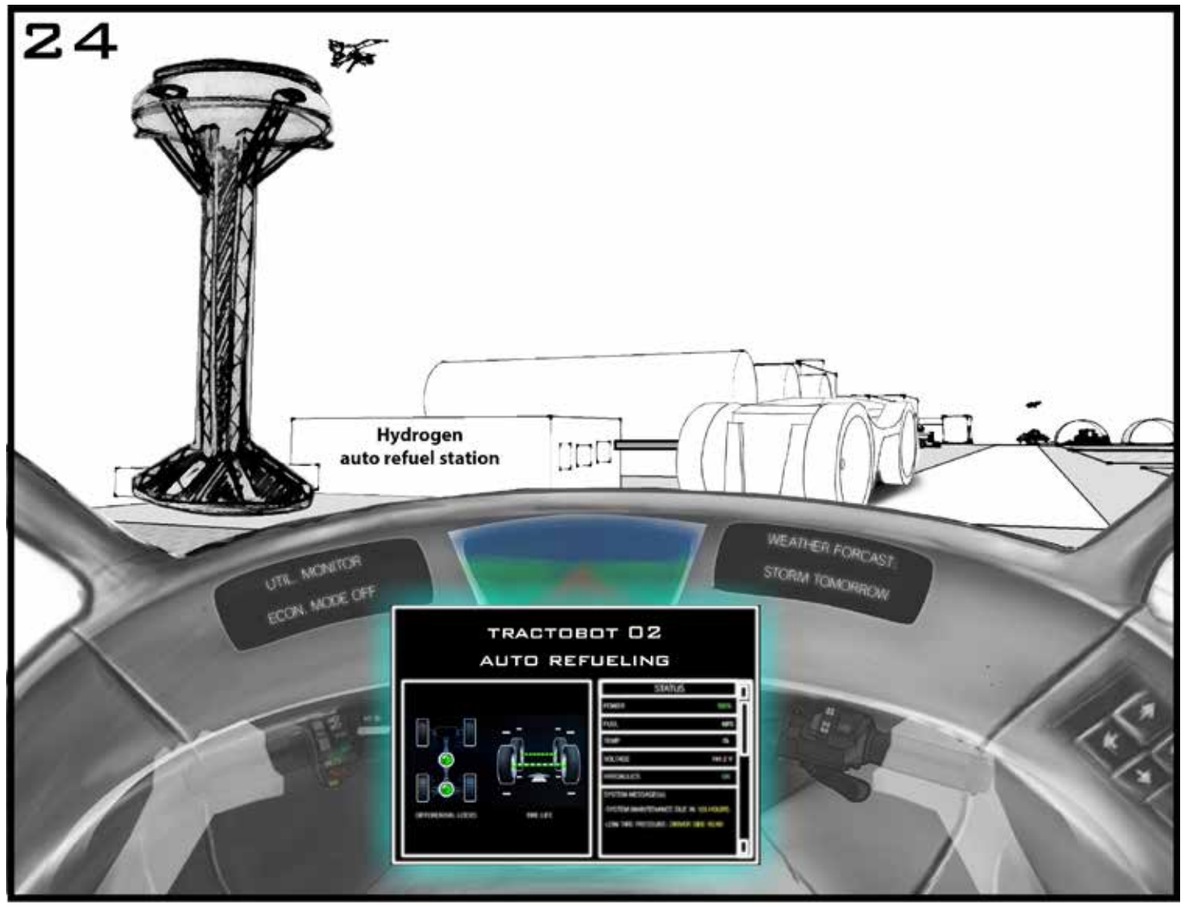
GETS IN HIS DIRT-SPLITTER



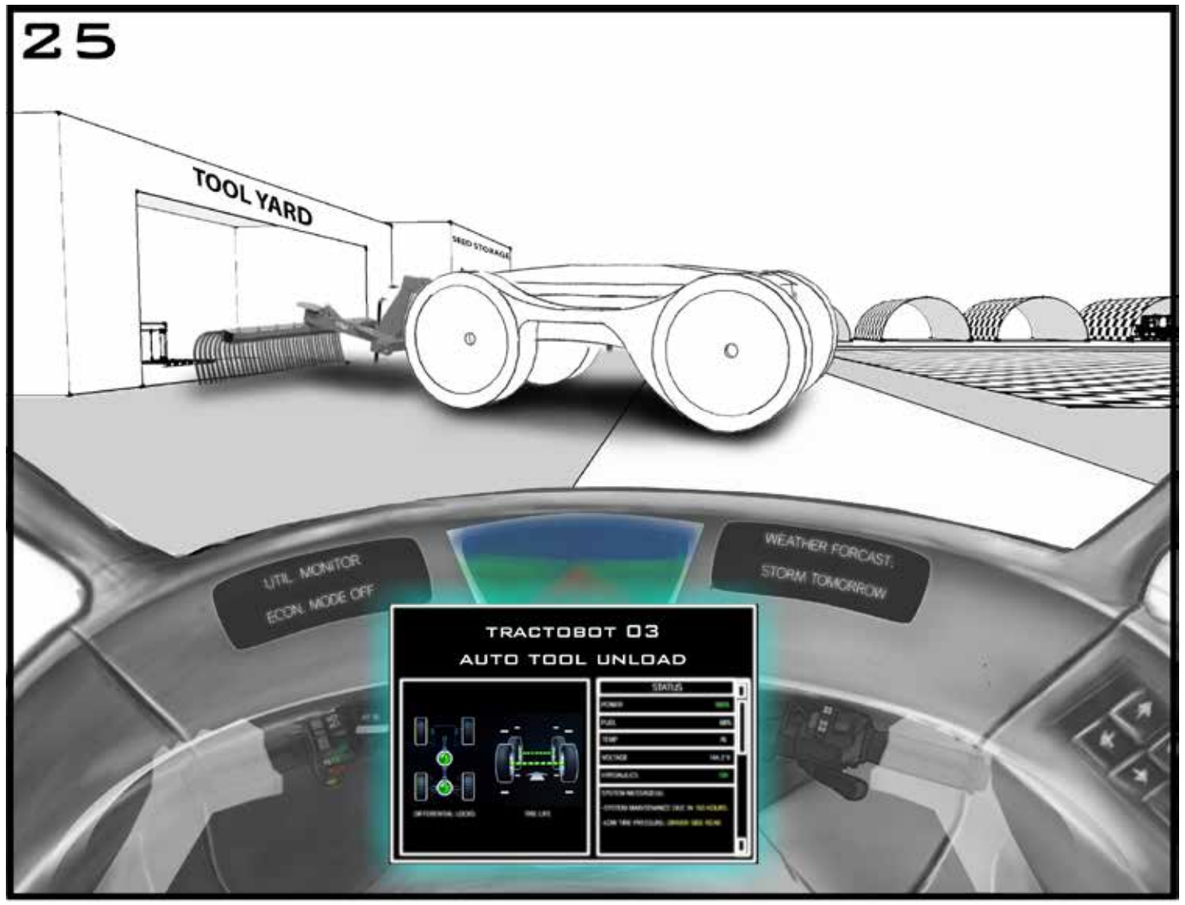
DRIVES INTO THE FIELD AND SPOTS ONE OF THE DRONES FLYING IN THE SKY.



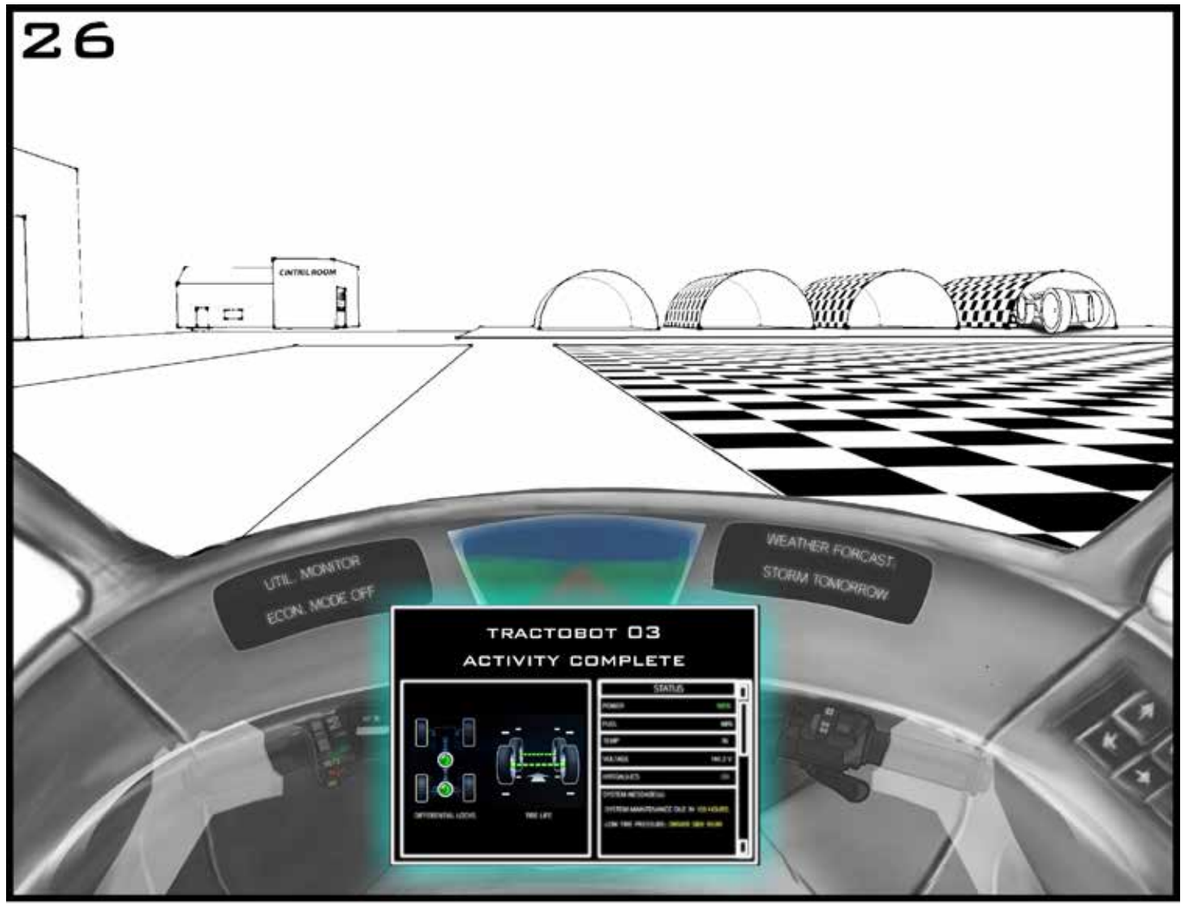
SCANS TRACTORBOT 01 - EVERYTHING IS OK.



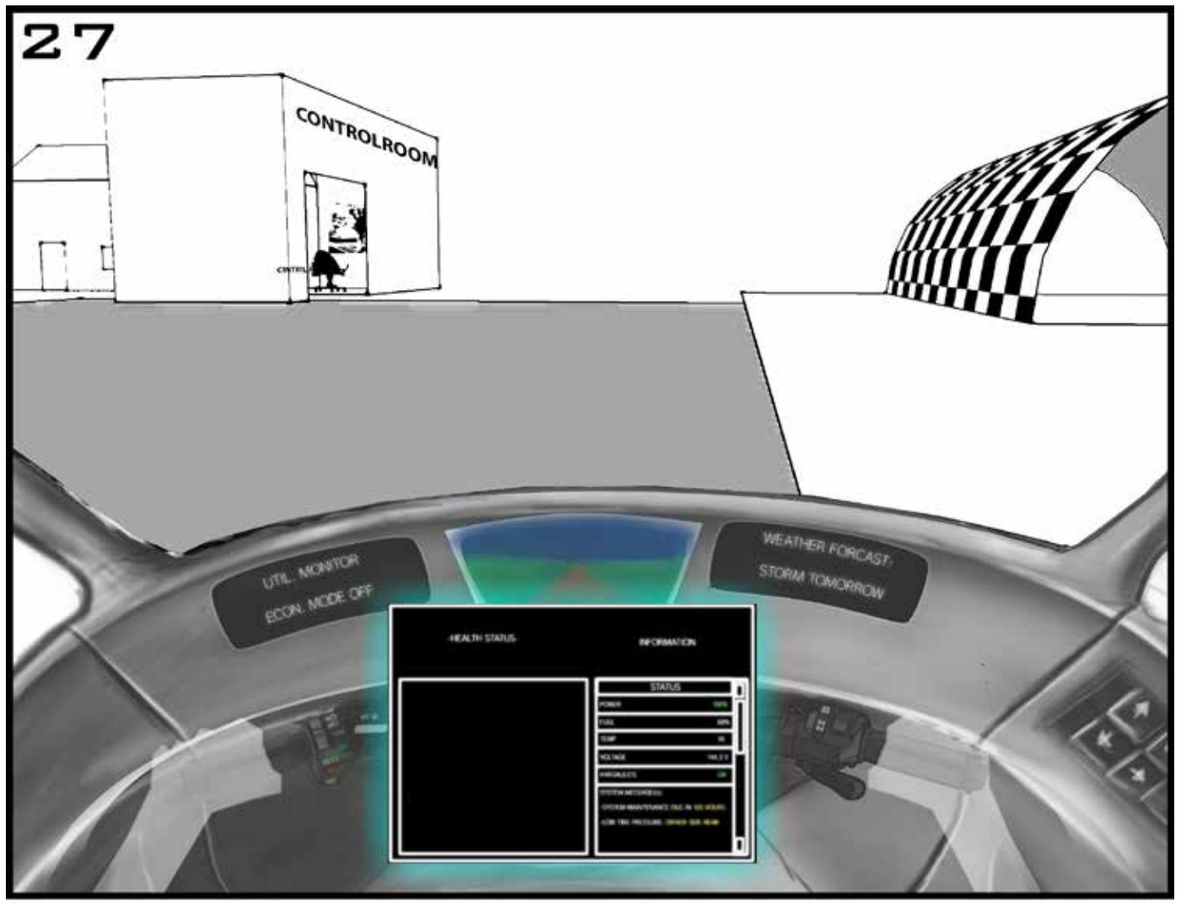
TRACTOBOT 02 IS AUTO REFUELING
THE FLYING DRONES ARE ALSO RECHARGING IN THEIR "HOME TOWER"



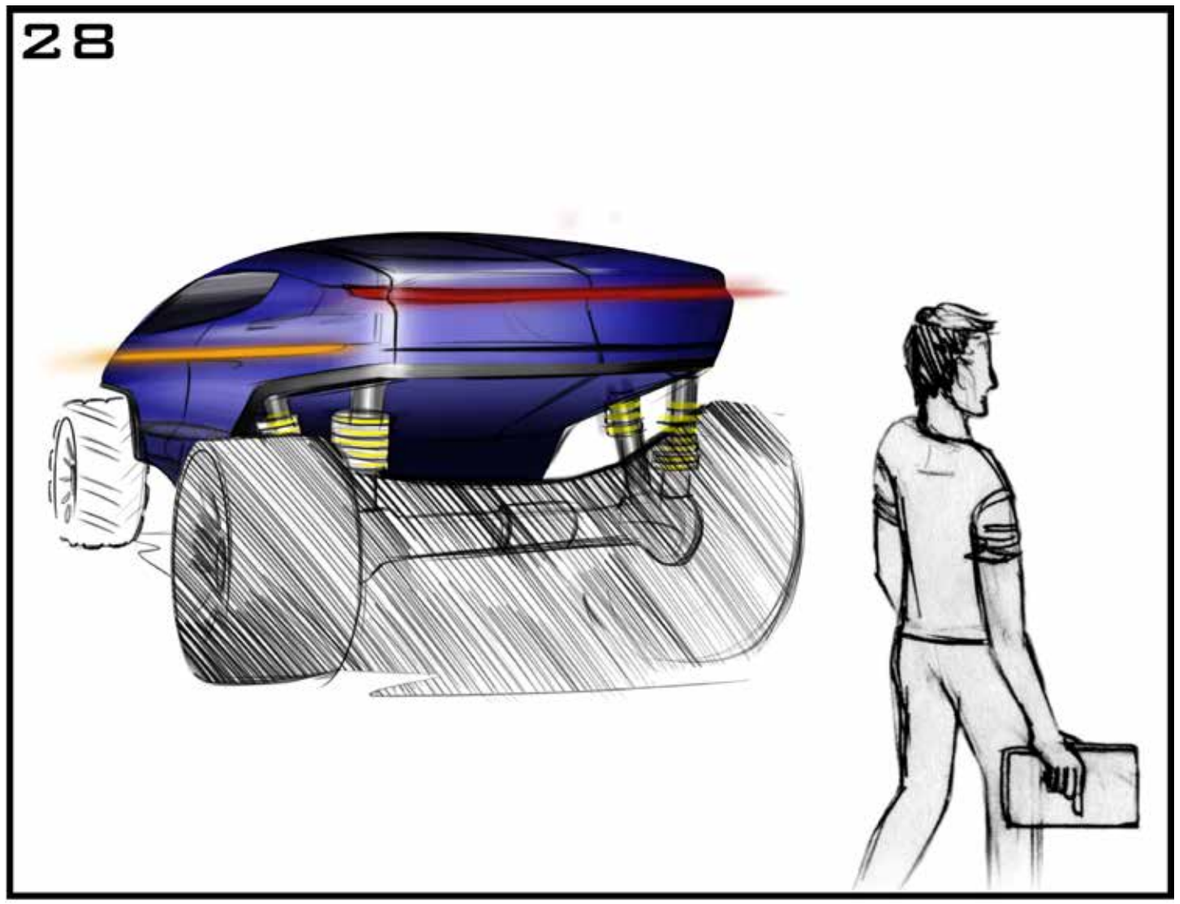
TRACTOBOT 03 IS AUTOMATICALLY UNLOADING A TOOL.



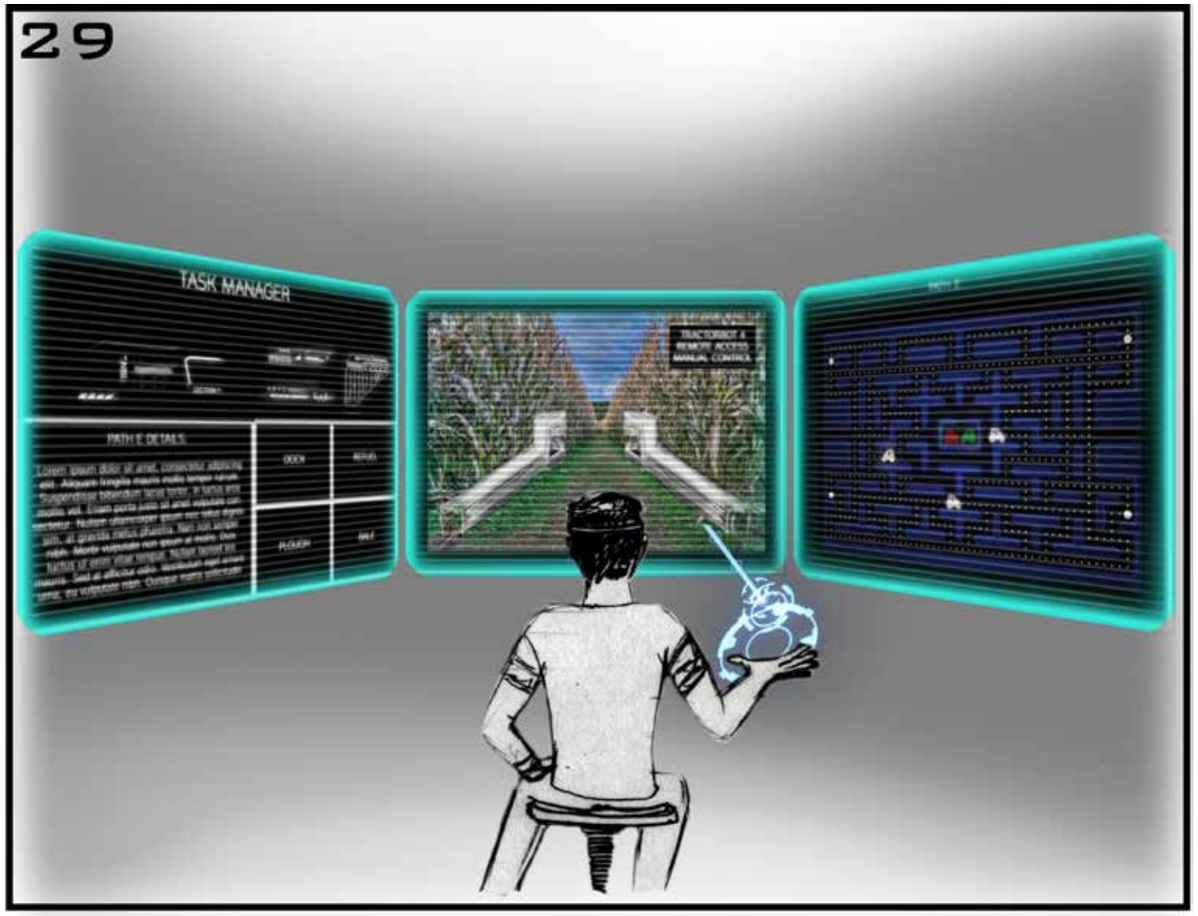
TRACTOBOT 04 HAS FINISHED WITH ALL OF THE DAY'S TASKS.



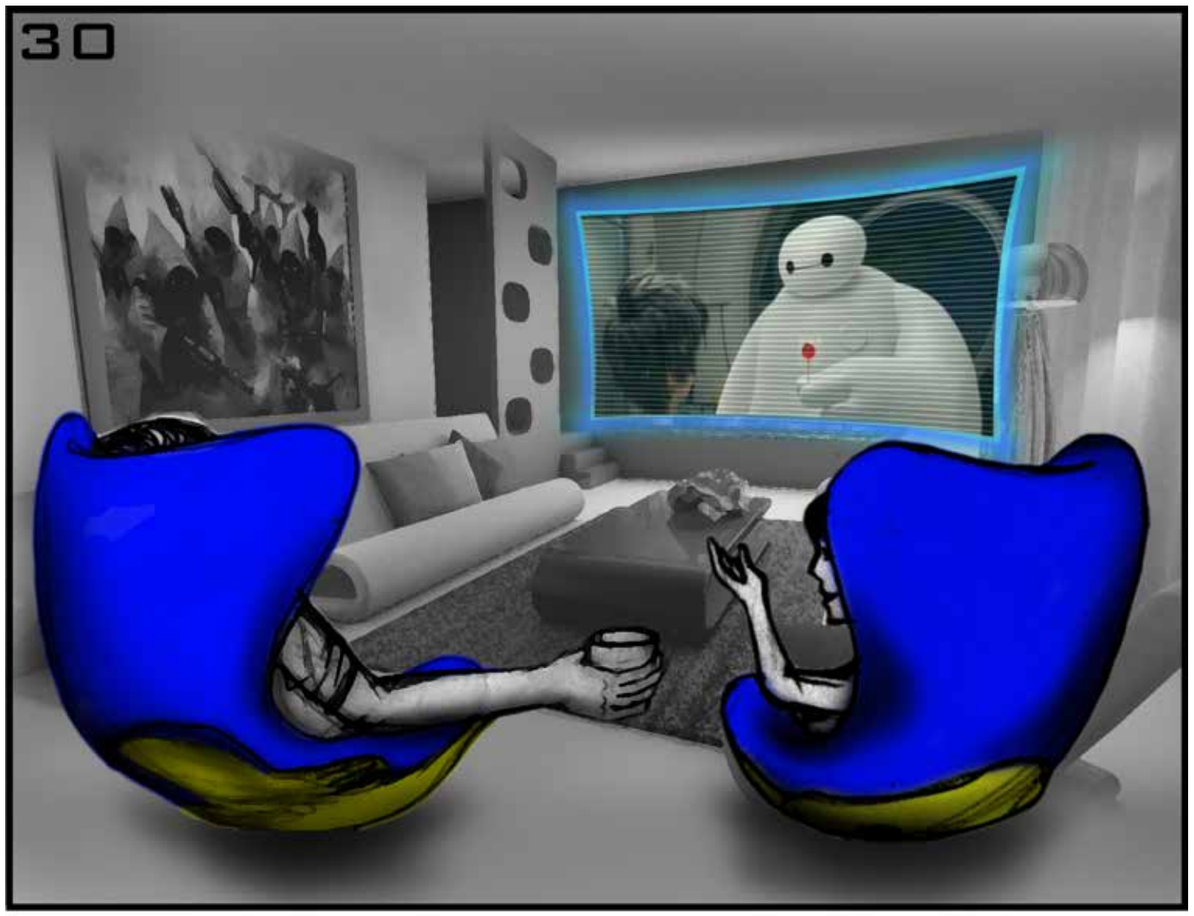
AFTER THE FIELD INSPECTION
JOE DRIVES BACK TO THE CONTROL ROOM.



PARKS THE DIRT-SPLITTER AND HEADS BACK TO THE
HOLOGRAPHIC COMPUTER.



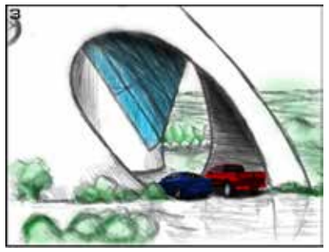
REVIEWS THE TASK MANAGER ONE LAST TIME AND TAKES MANUAL CONTROL OF ONE OF THE TRACTOBOTS FOR MAKING A SPECIAL "HUMAN-PRECISE" OPERATION.
LET THE PROGRAM “TRAC-MAN” FINISH THE WORK OF ALL TRACTOBOTS.

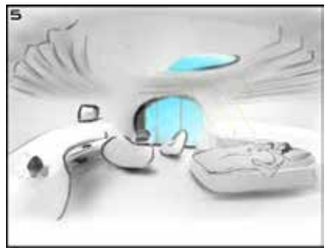


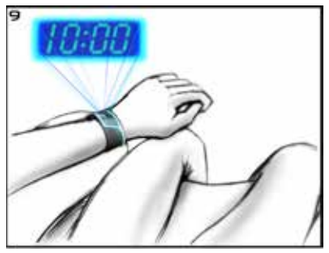
JOE RETURNS TO THE FAMILY ROOM TO JOIN HIS WIFE WATCHING TV.

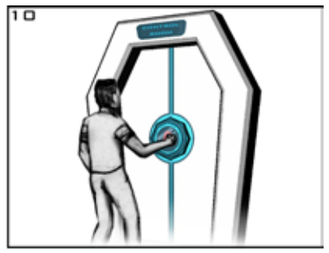
THE END

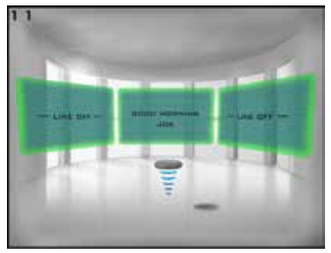
STORY BOARD

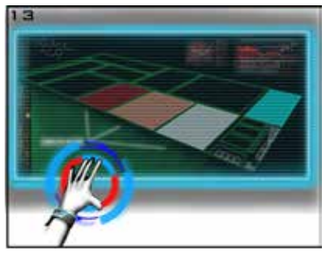


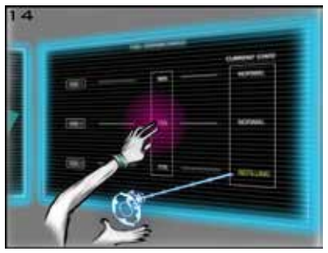


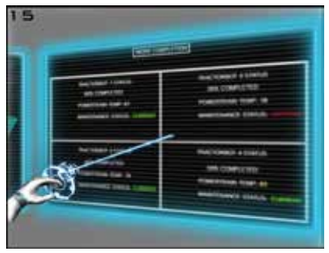


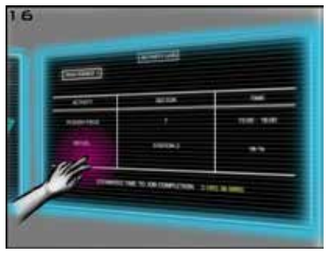


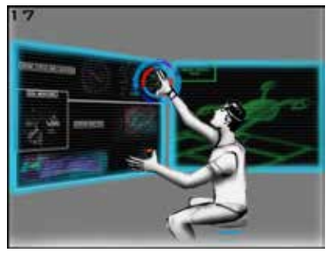


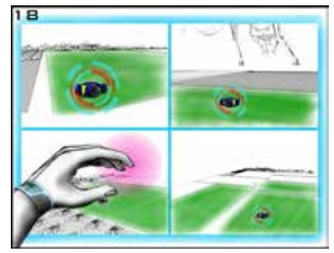


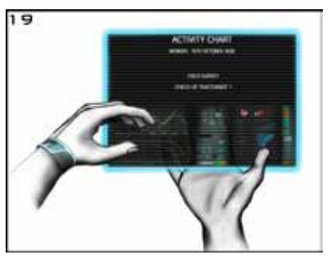


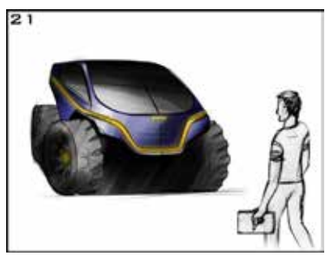


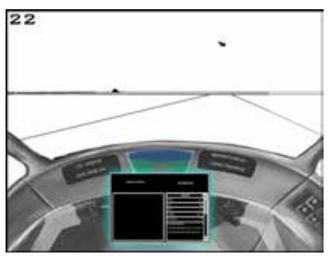


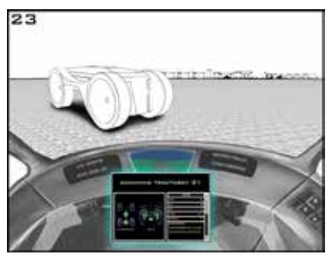


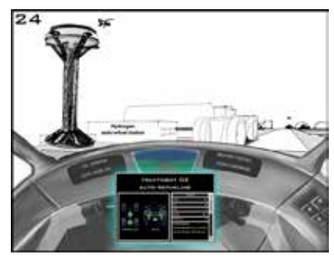


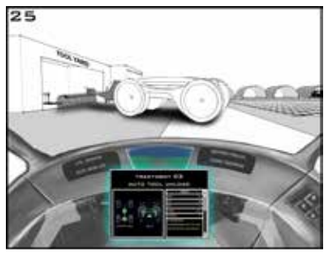


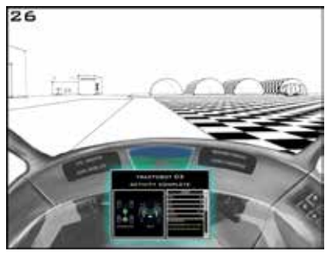


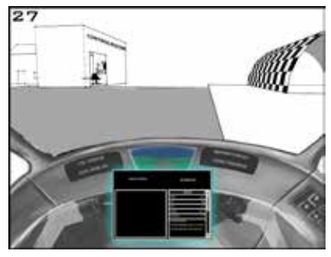


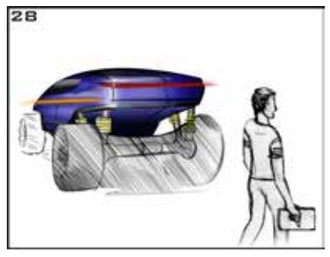








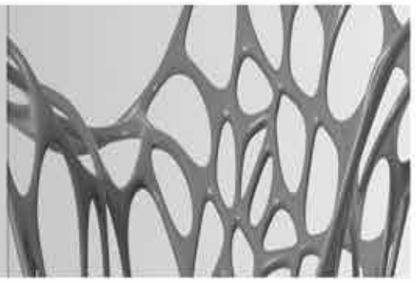




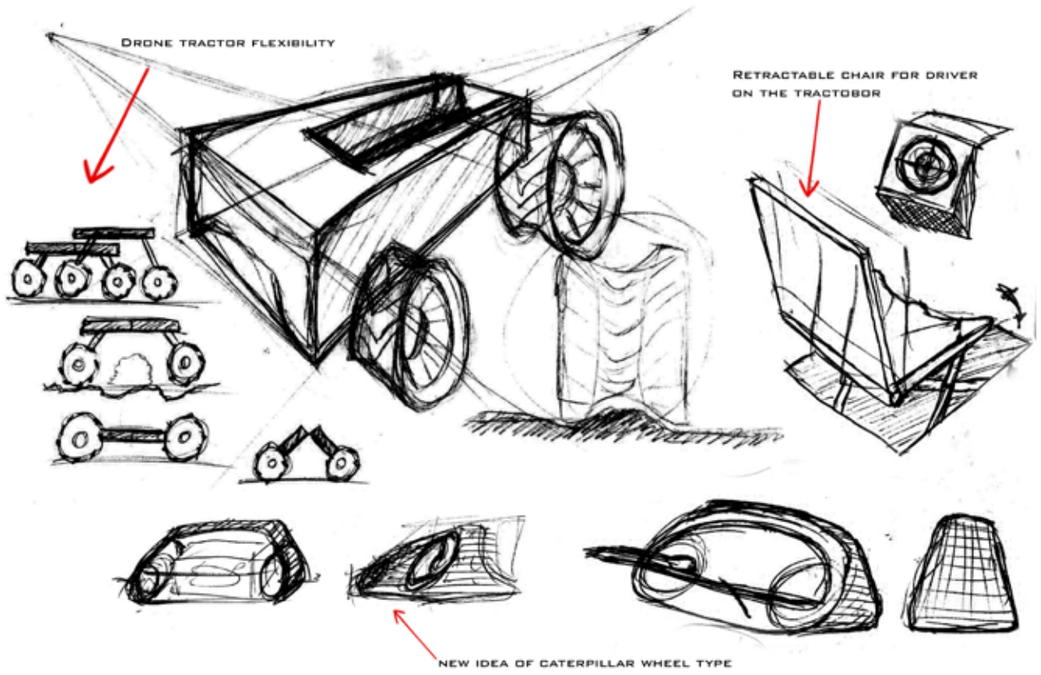
THE END

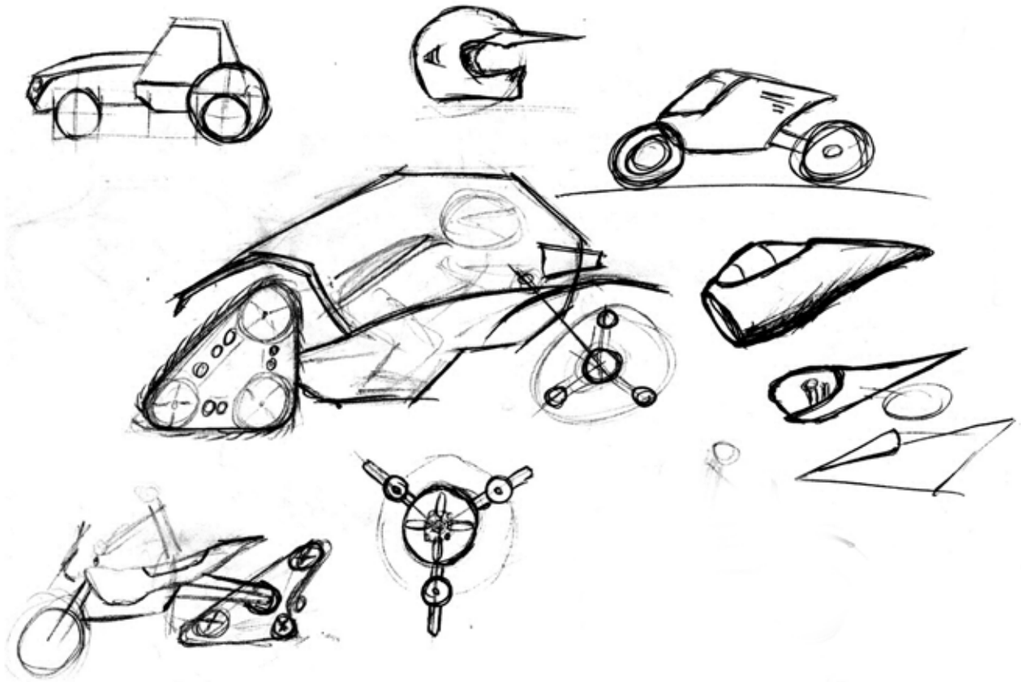
NEW HOLLAND AGRICULTURE

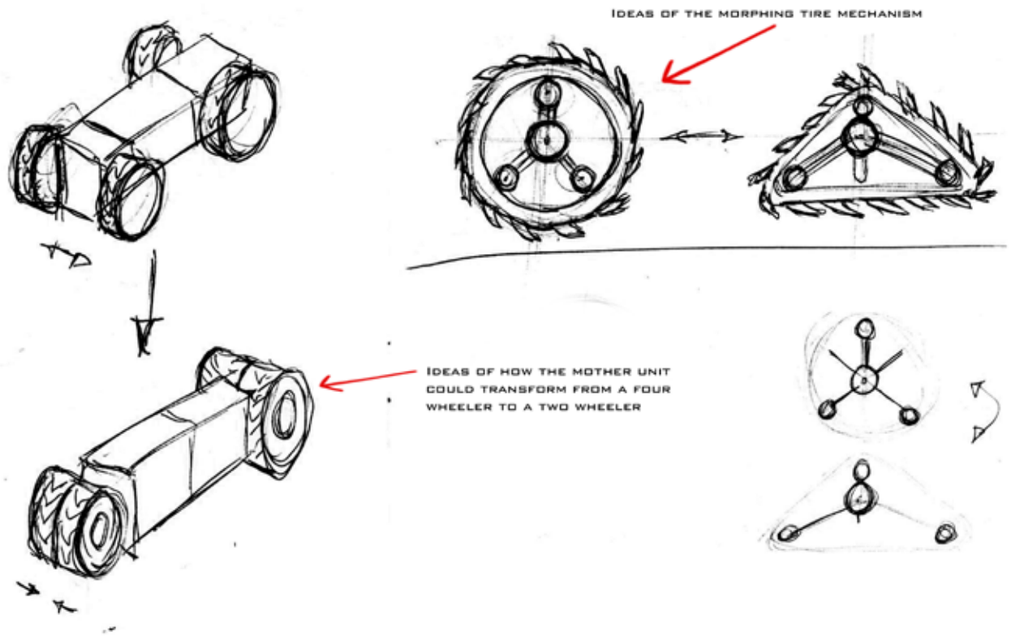
PRODUCTS

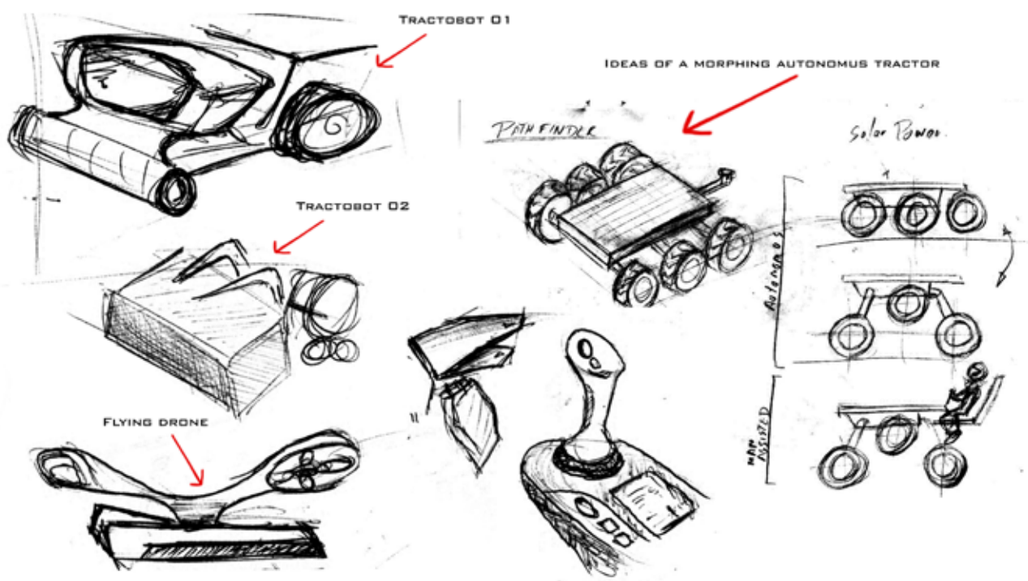
INSPIRATIONS	ICONS	KEYWORDS	NAME OF CONCEPTS	USER'S EXPECTATIONS
SPORT CAR		existing layout ,aerodynamic speed ,communicative color stylish	Sportrac	To drive on farm and on city To outstand from the rest
BIONIC STRUCTURE 3D PRINTED		ecological react biology and technology together monoblock chasis,3D printing	Eve	Ergonomic
MULTIPURPOSE MODULARITY		transformation , functionality adaptable,modularity, autonomous,drone tractor evolutionary	Tractobot	to have all in one functions 200% Efficiency of production
MOTOCROSS LIGHTNESS		adrenaline,leisure,lifestyle slim performance, practical structure more compact,thin,light	Dirt splitter	New fun way to farm
FUTURABLE		hydrogen fuel cell inbuilt - chassis,visibility dynamic ,fluidic ,cabin space control everyone	I Tech Grand	Surpass all expectations of today s stereotypes tractors

EXPLORATIVE SKETCHES- WHEELS

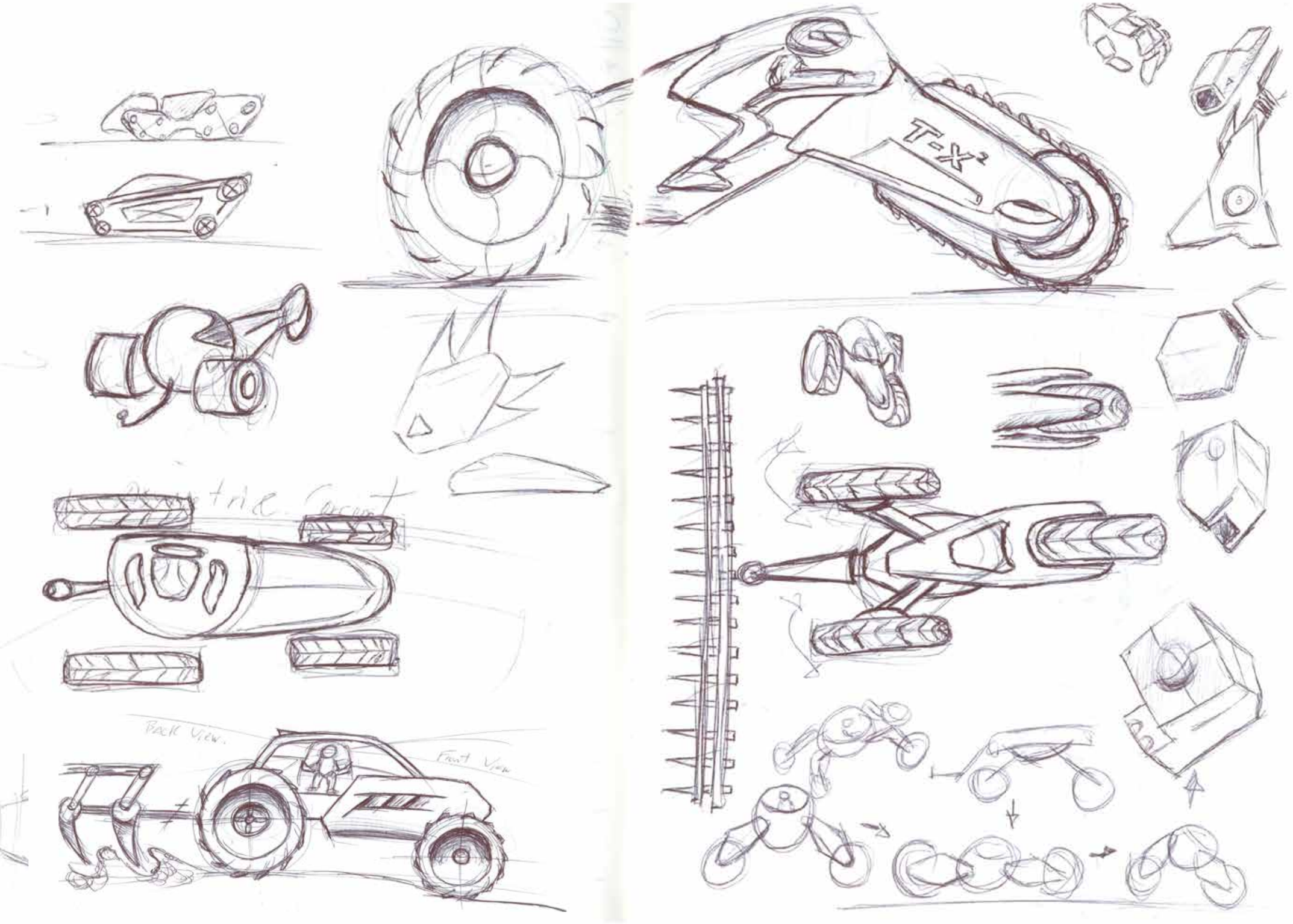






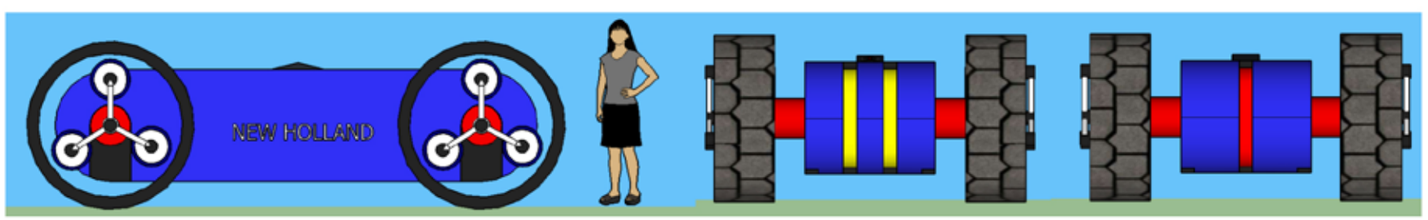


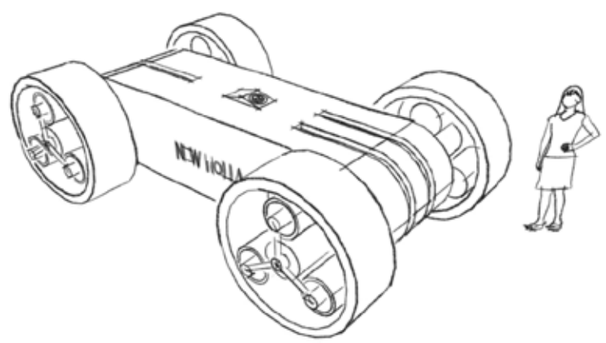
EXPLORATIVE SKETCHES- WHEELS



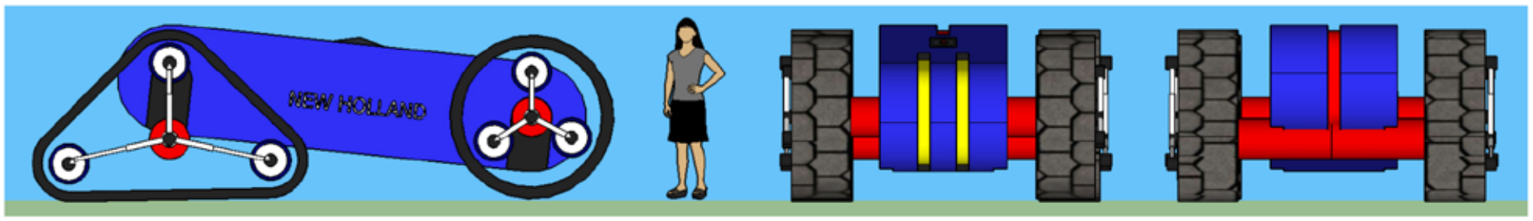
Automated Tractor. Compact and slim but being capable of any hard work. Thanks to its morpho-wheels it can enter to work early on the field even if its not completley dry or uneven

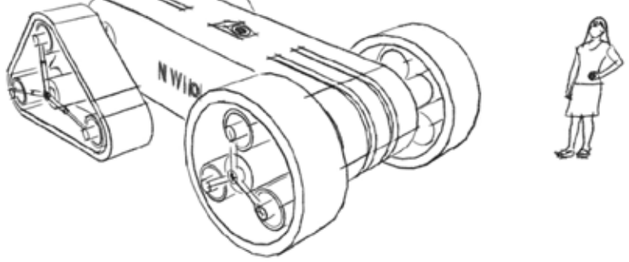
Normal - mode: Can operate in any type of land.



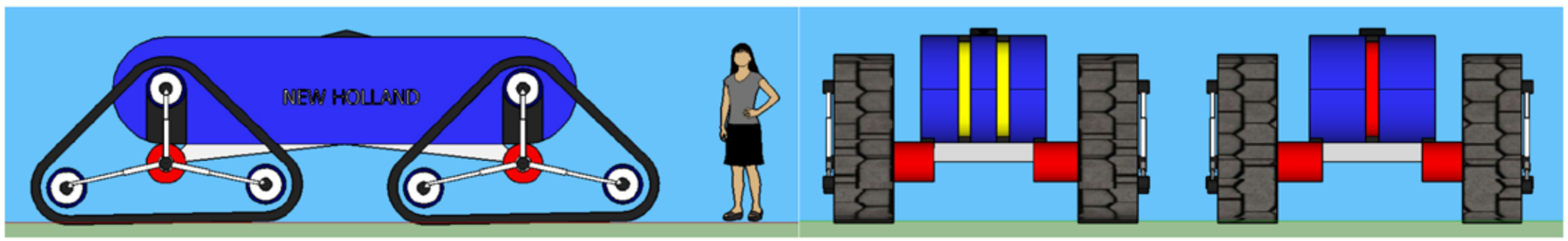


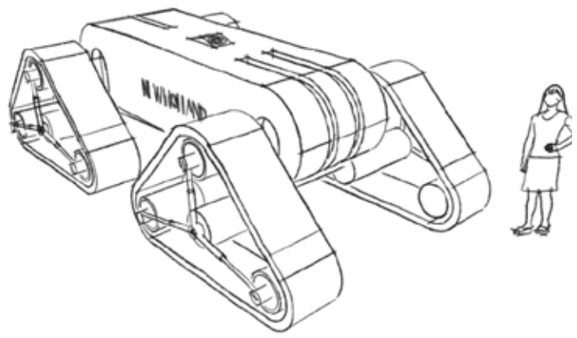
Hybrid - mode: it gives a more acurrate driving, specially in the turning of the vehicle. Better turning radius, more short.



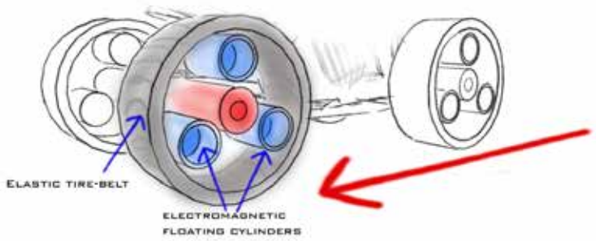


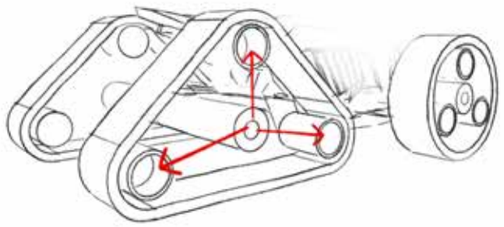
Floating - mode: this special mode permits the entering of the vehicle in wet land without damaging it. it gives a high productivity.

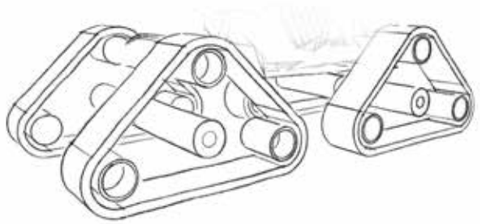




ELECTROMAGNETIC TRANSFORMING WHEEL



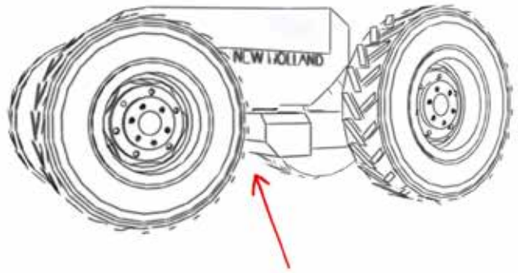




transforming wheel for autonomus tractor

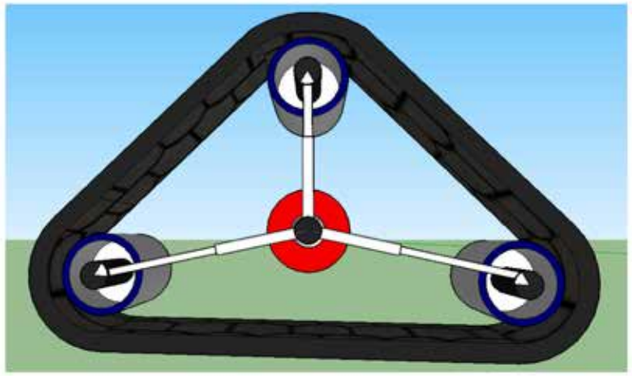
the transformation of the wheel is supported by electro magnetics cylinders that dont touch each other... they float. inspirated by the Hankook tire.

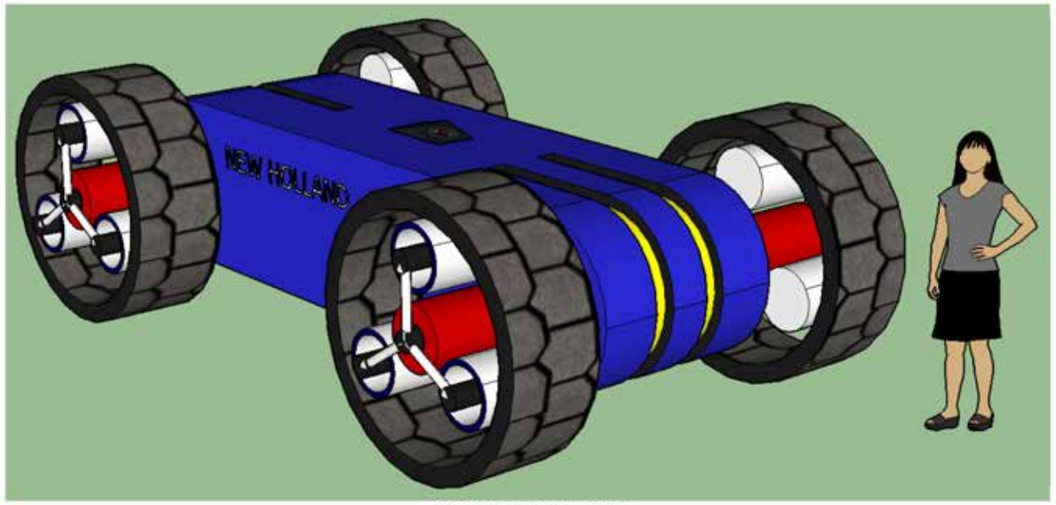
https://www.youtube.com/watch?v=7Zu7GVfx6Ng



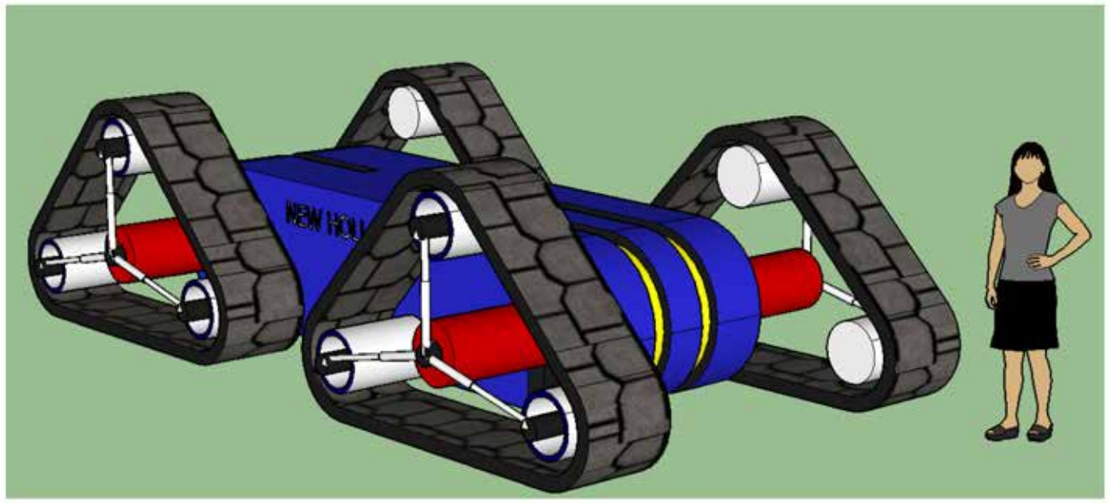
First idea of autonomus tractor... need to change traditional wheels and round off body

Detail of morphing tire



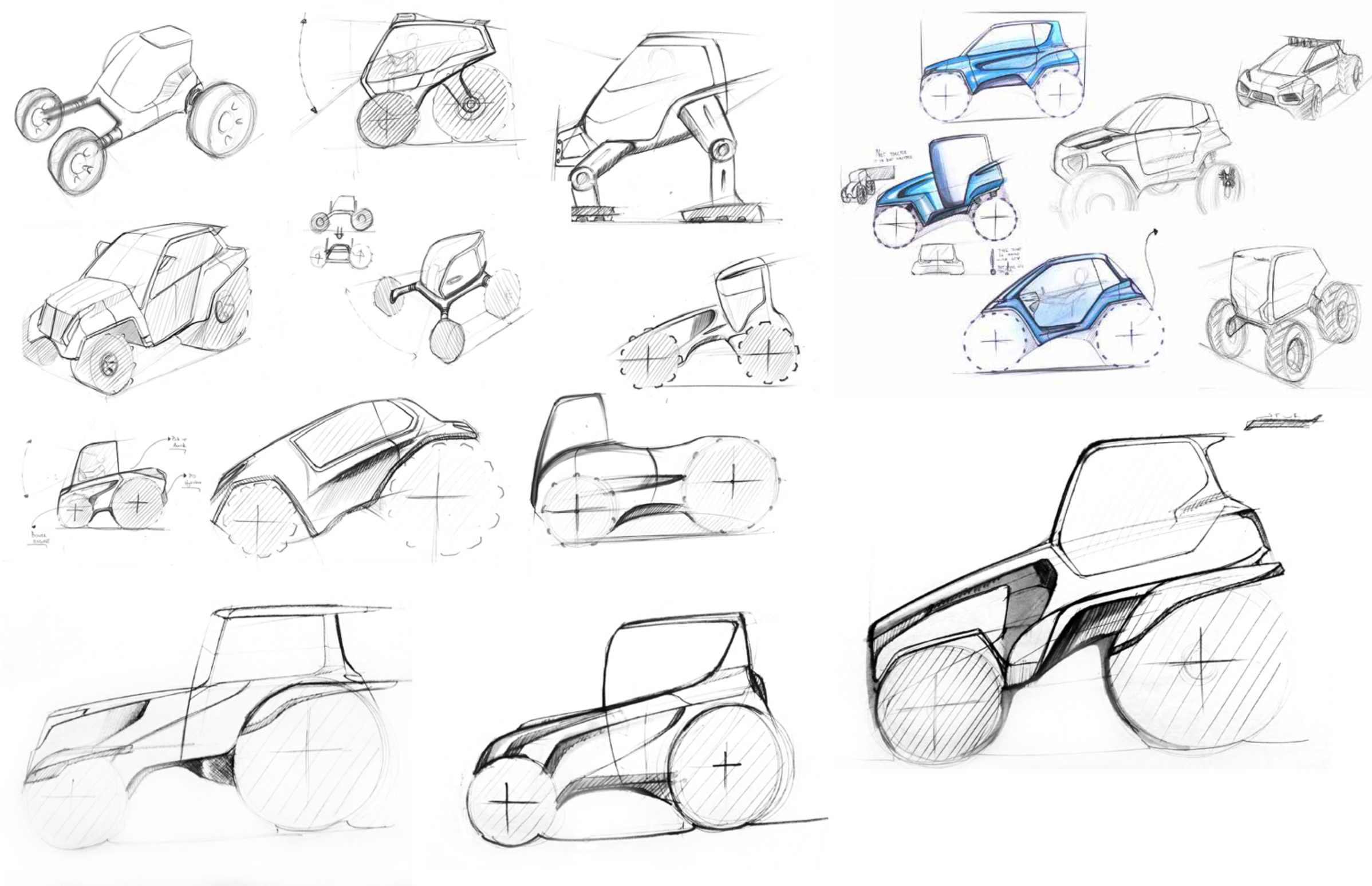


Tractobot Type NH-01

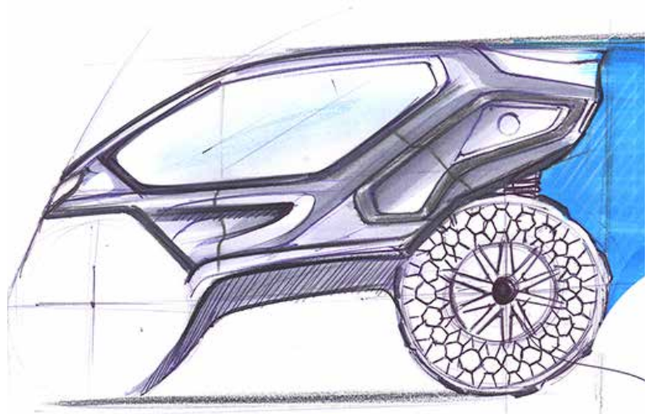


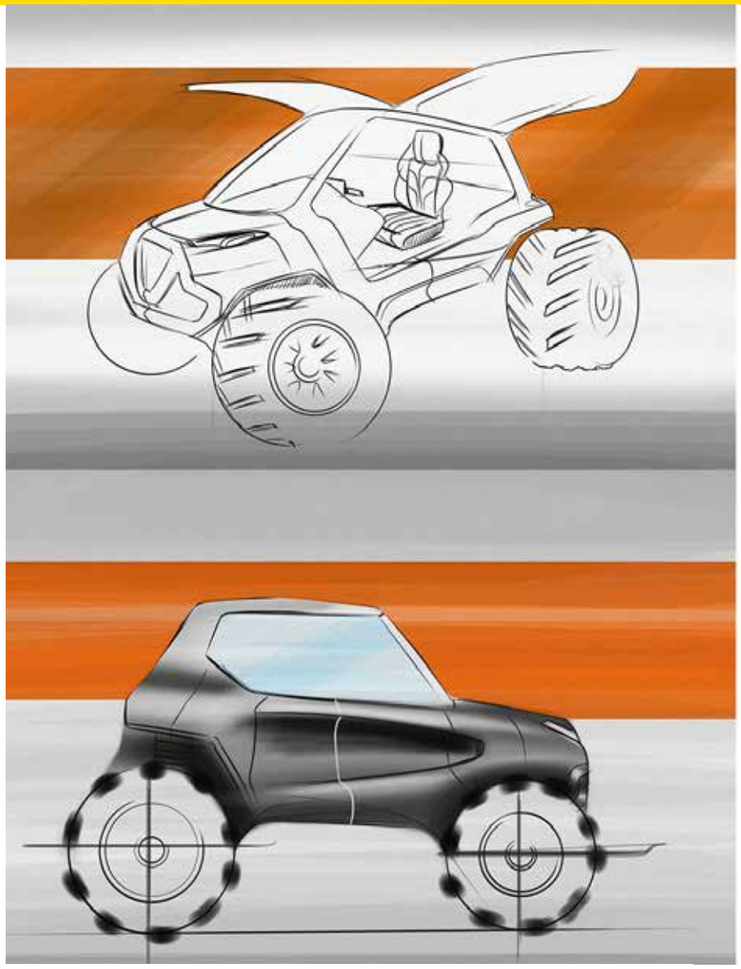
Tractobot Type NH-04

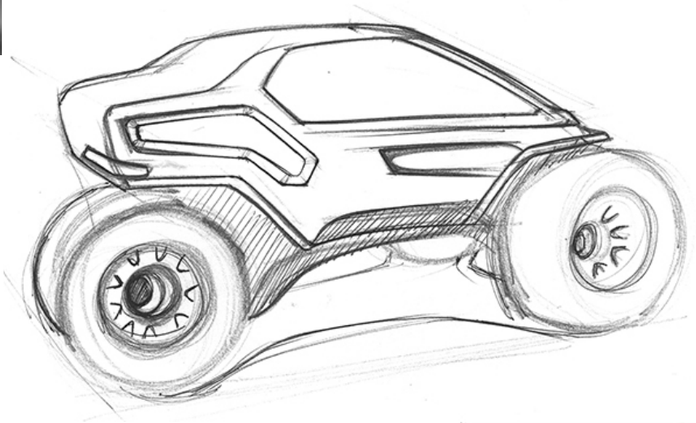
EXPLORATIVE SKETCHES- DIRT SPLITTER:

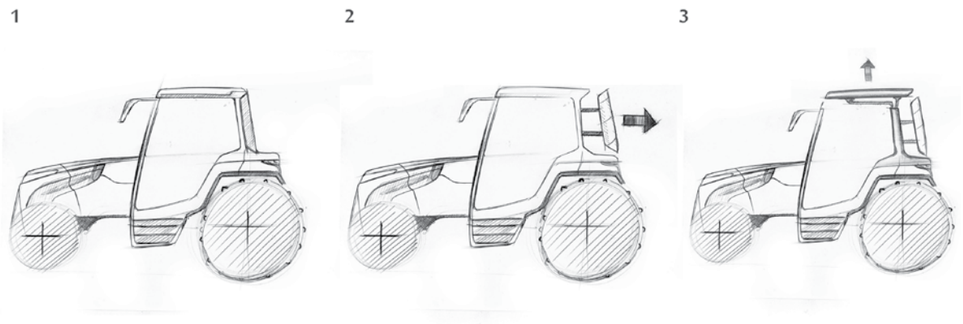


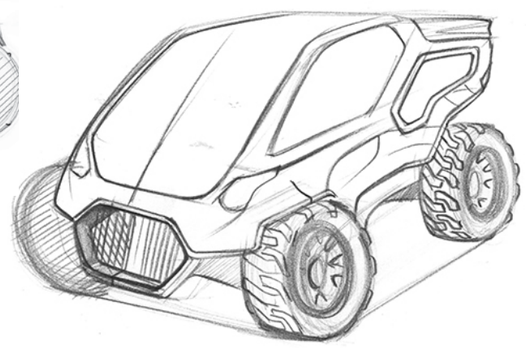
EXPLORATIVE SKETCHES- DIRT SPLITTER:

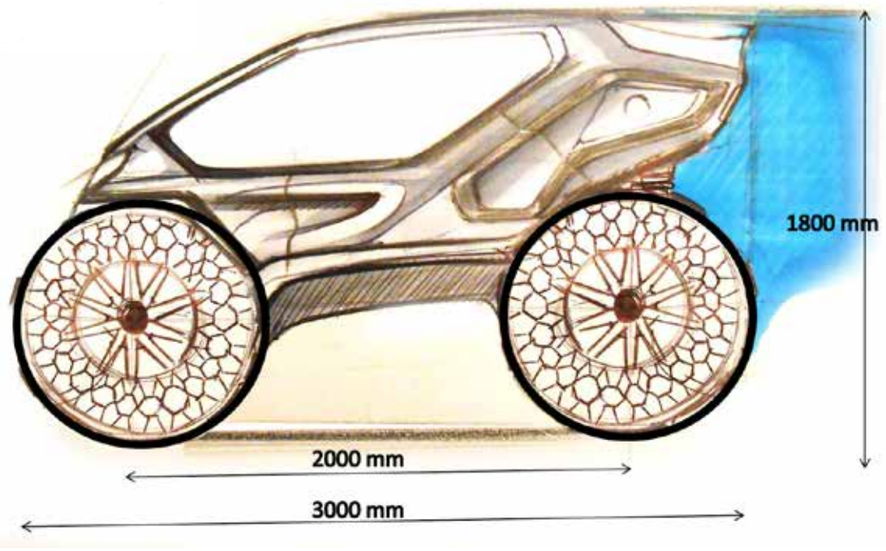




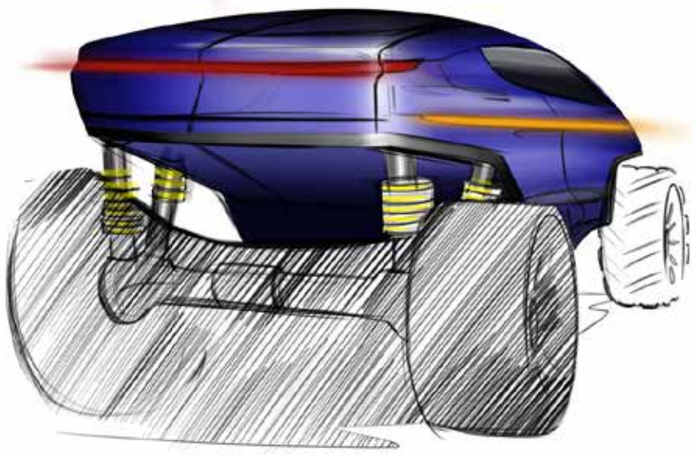


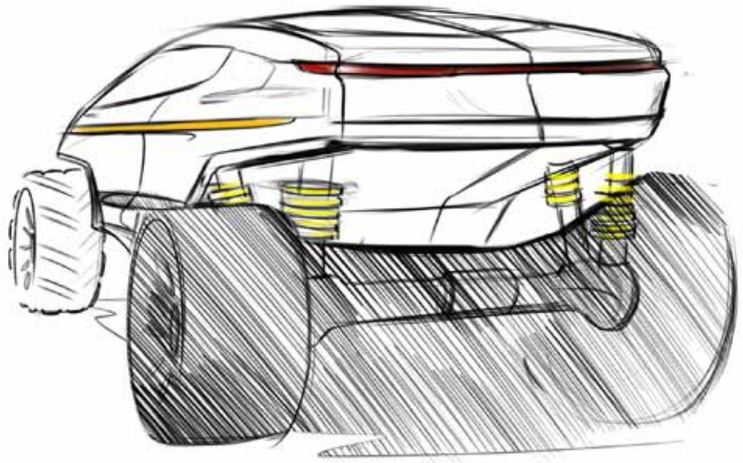


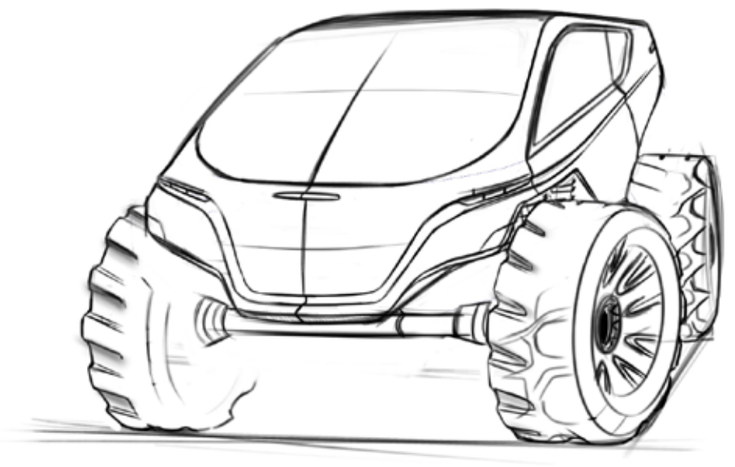




FINAL SKETCHES- DIRT SPLITTER:

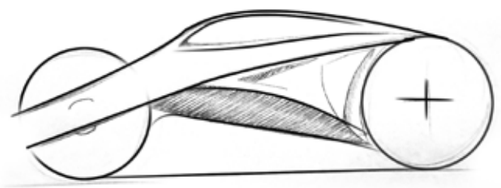


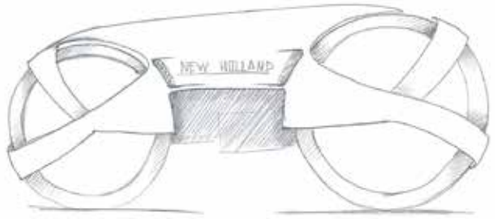


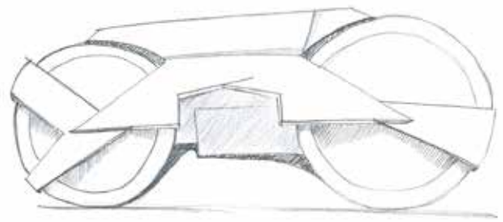


EXPLORATIVE SKETCHES- AUTONOMOUS:

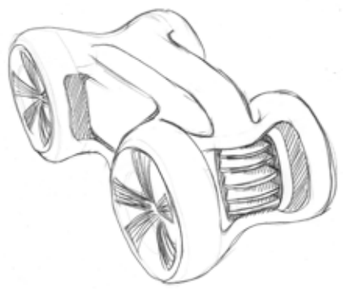
PROTECTION OF WHEELS

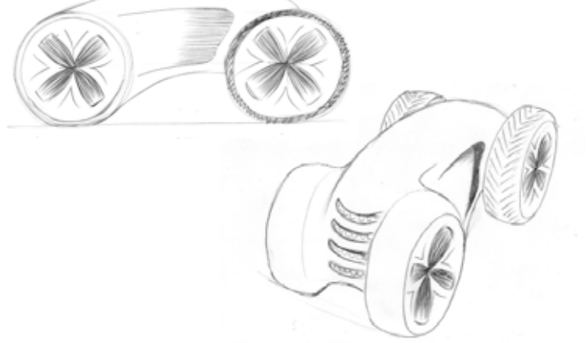


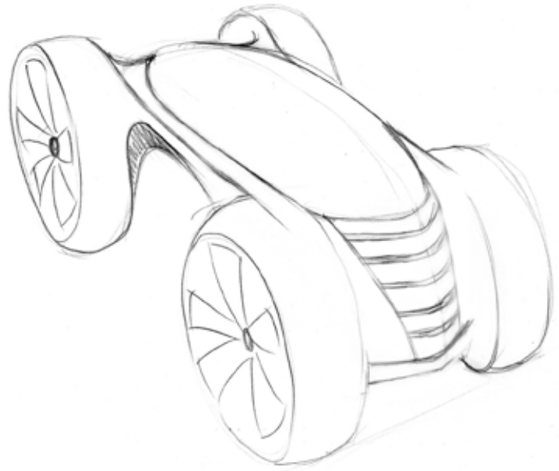




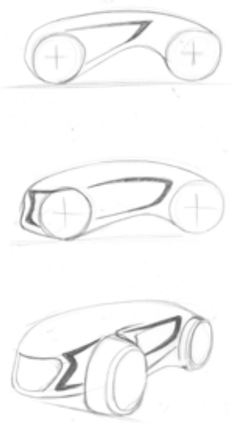
FUTURISTIC

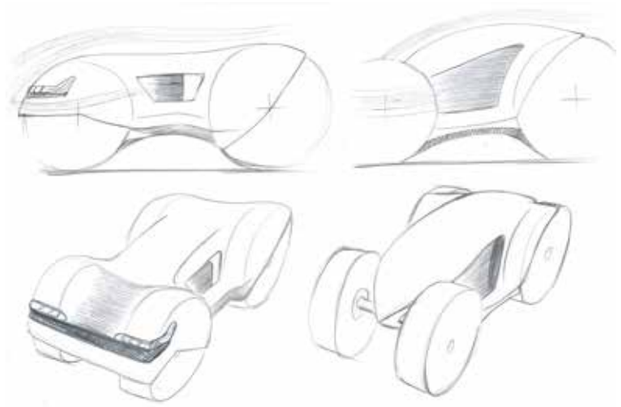


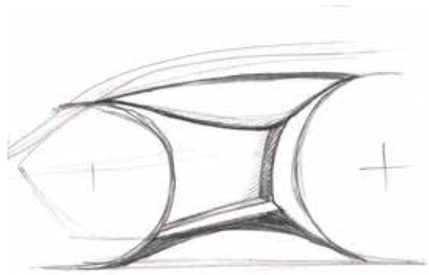


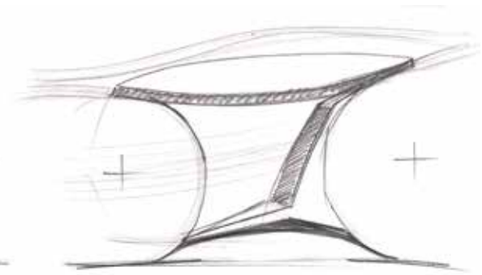


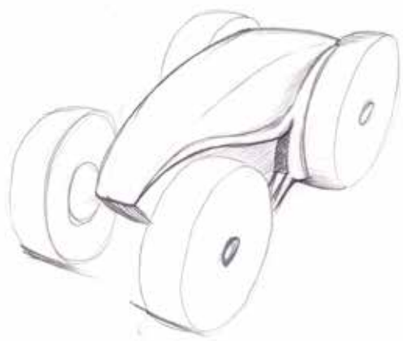
BIONIC SHAPES

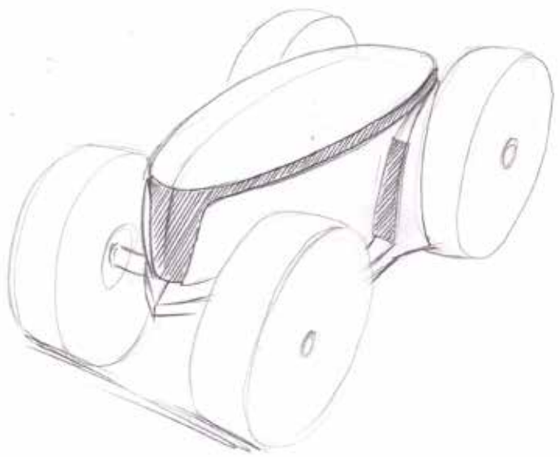


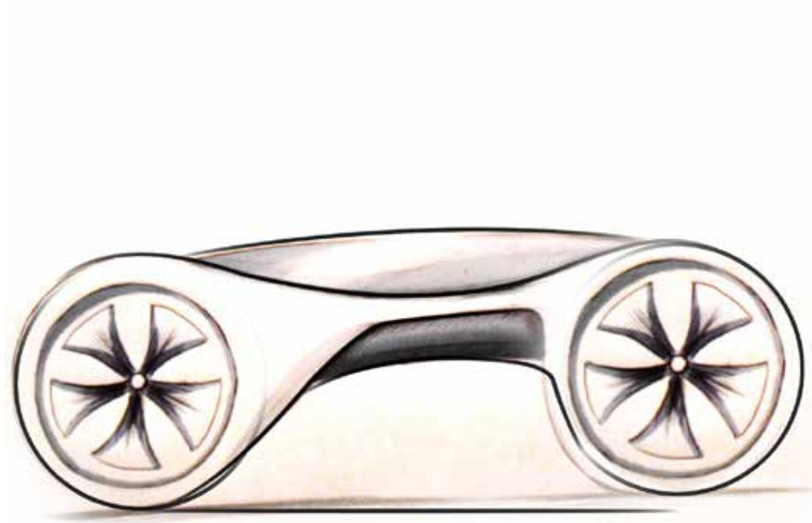


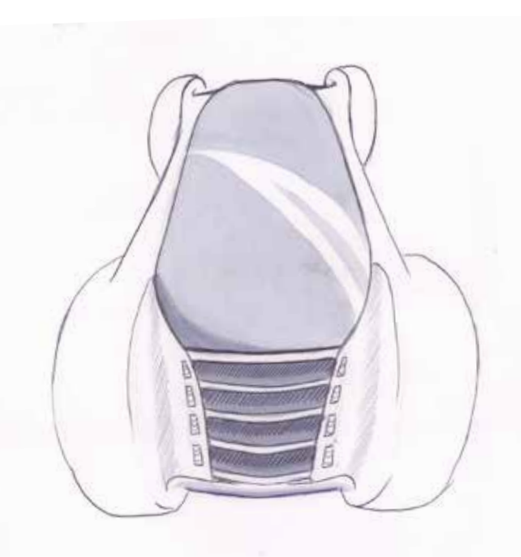


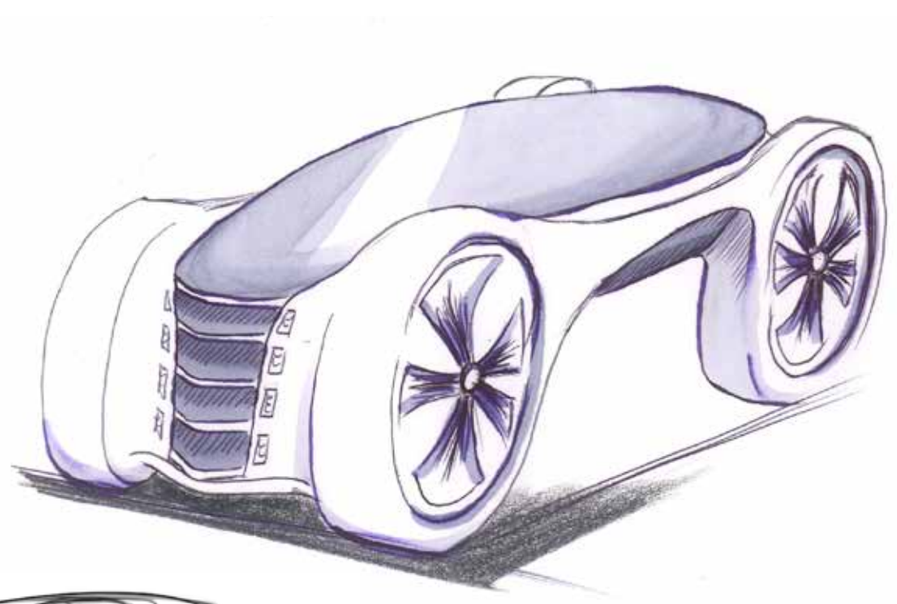


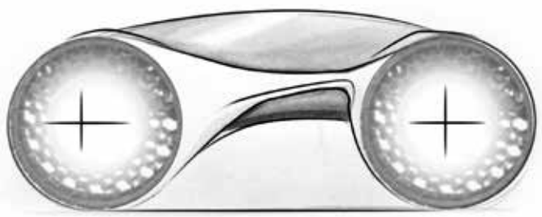


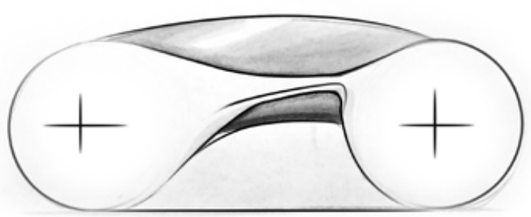


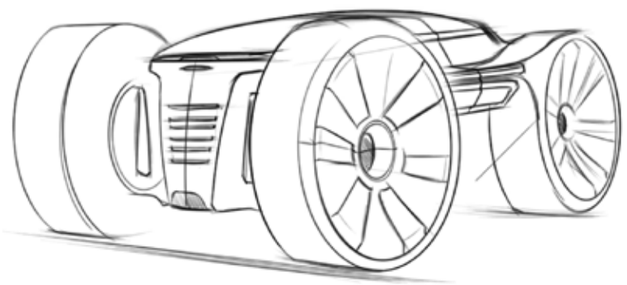


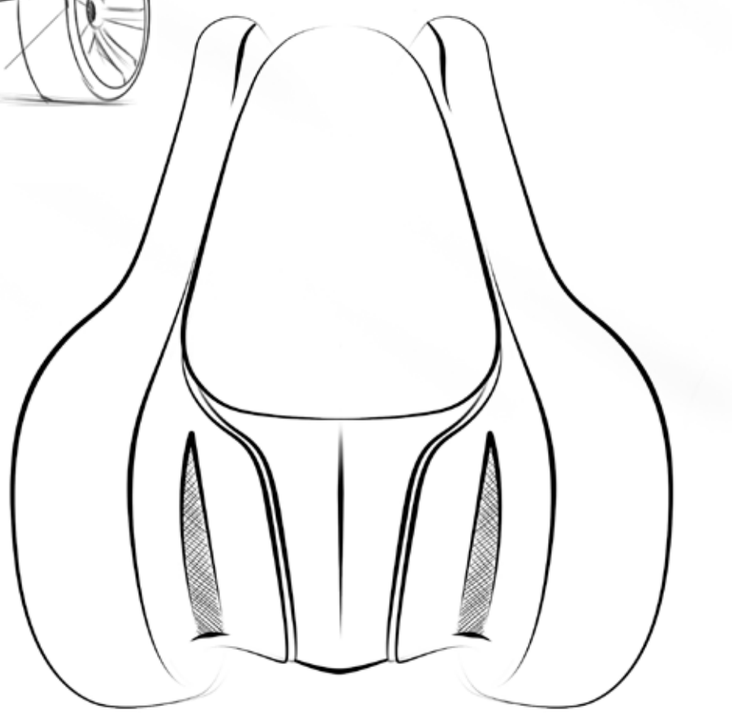


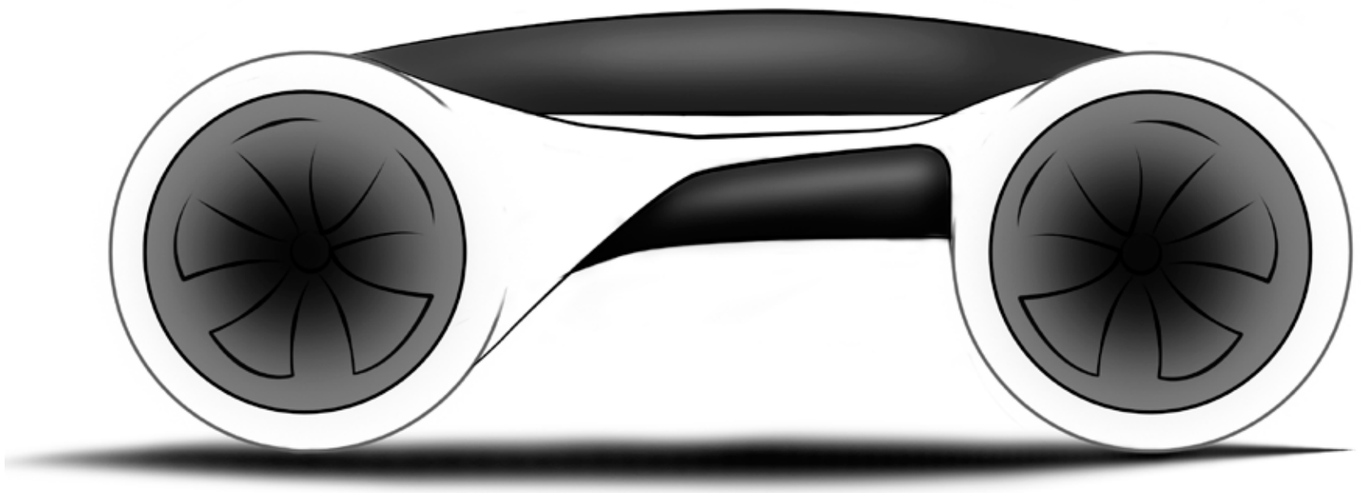




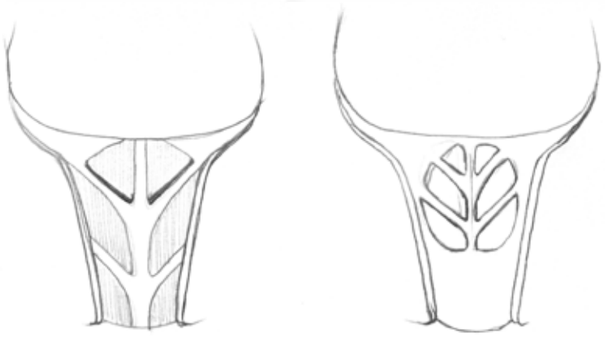


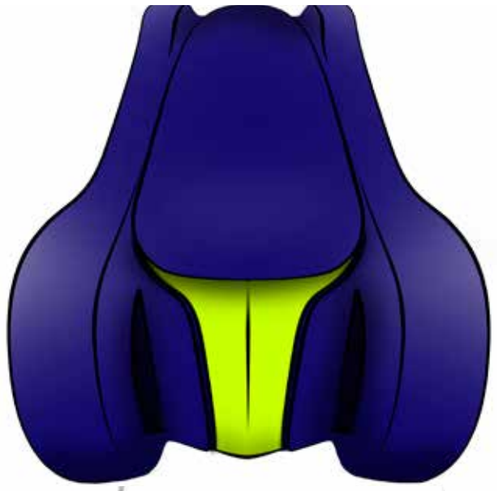


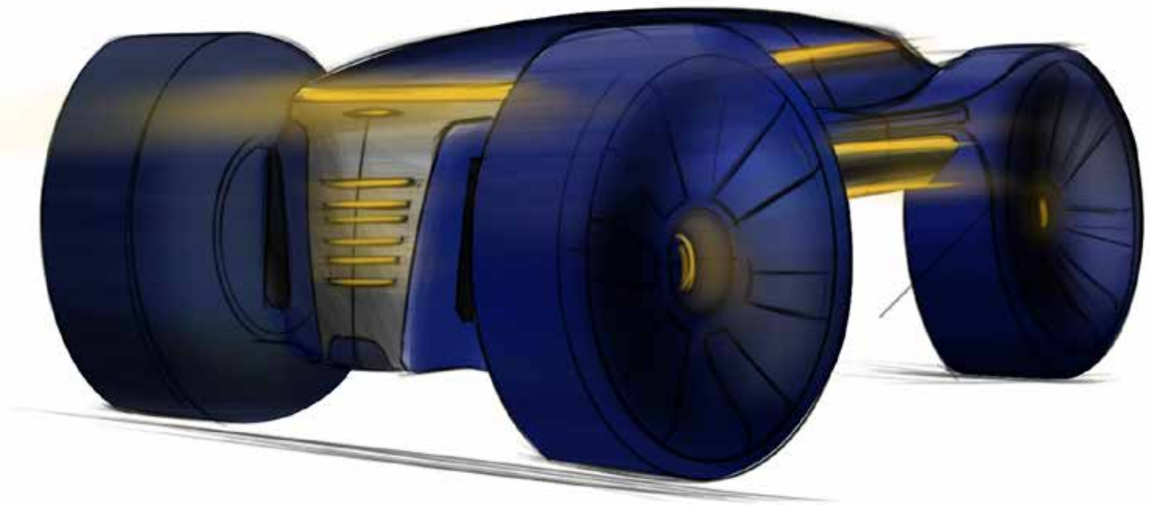


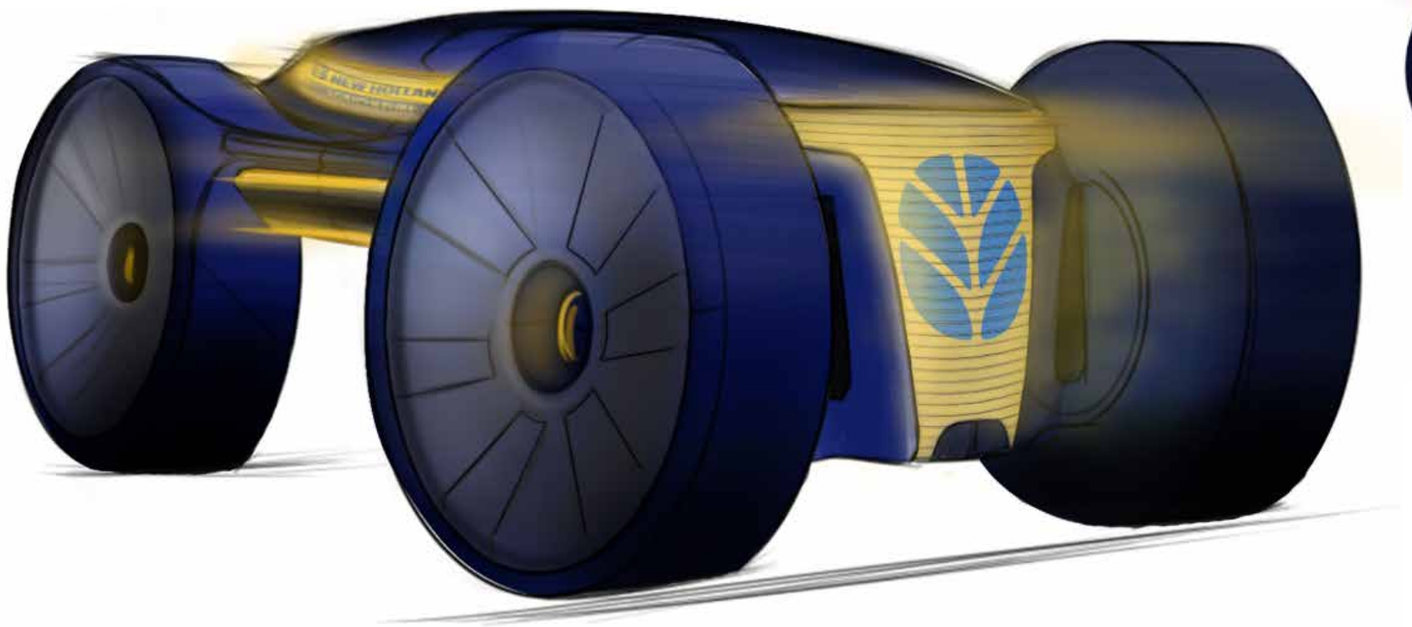


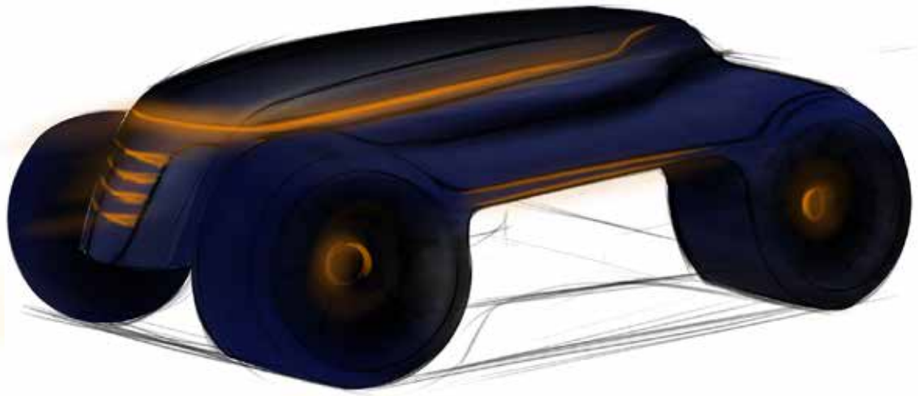
FINAL SKETCHES- AUTONOMOUS:



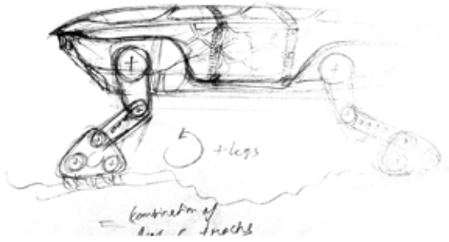


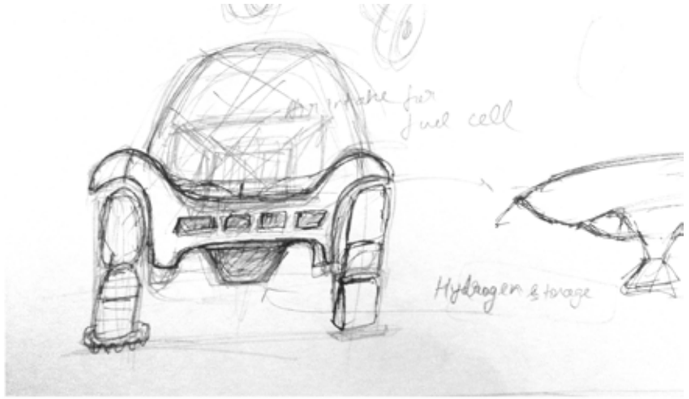


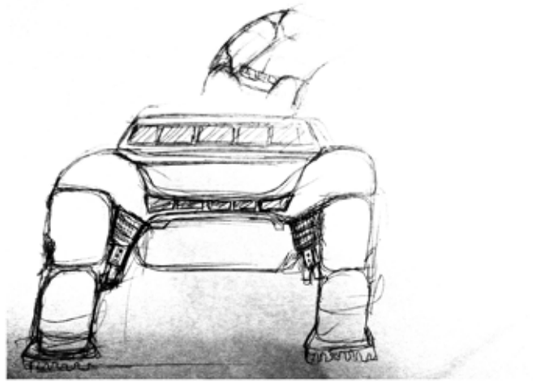


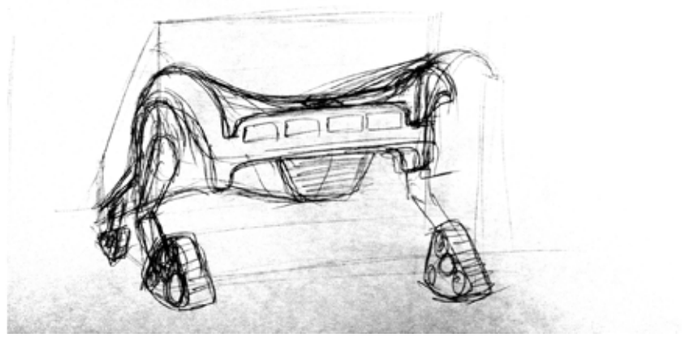


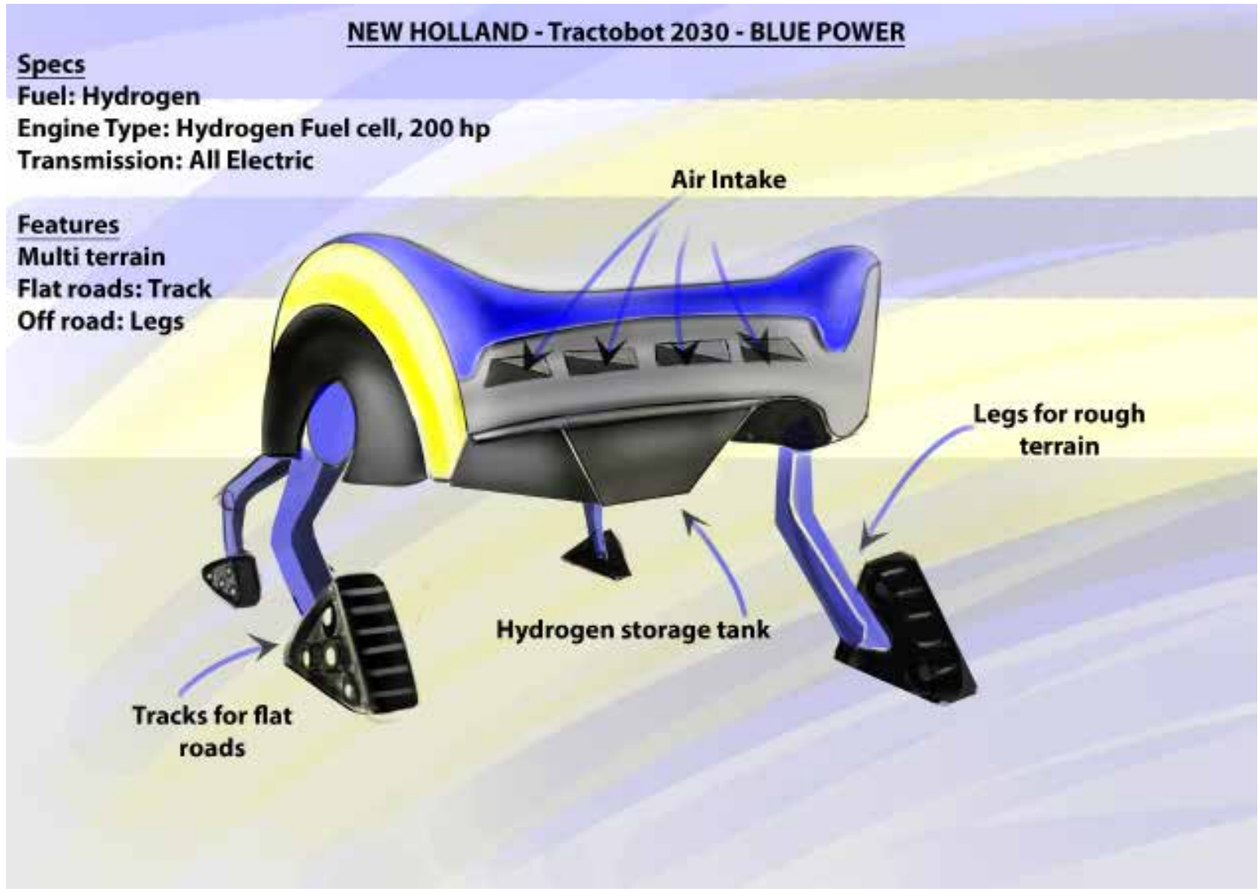
EXPLORATIVE SKETCHES- AUTONOMOUS (robot with legs):



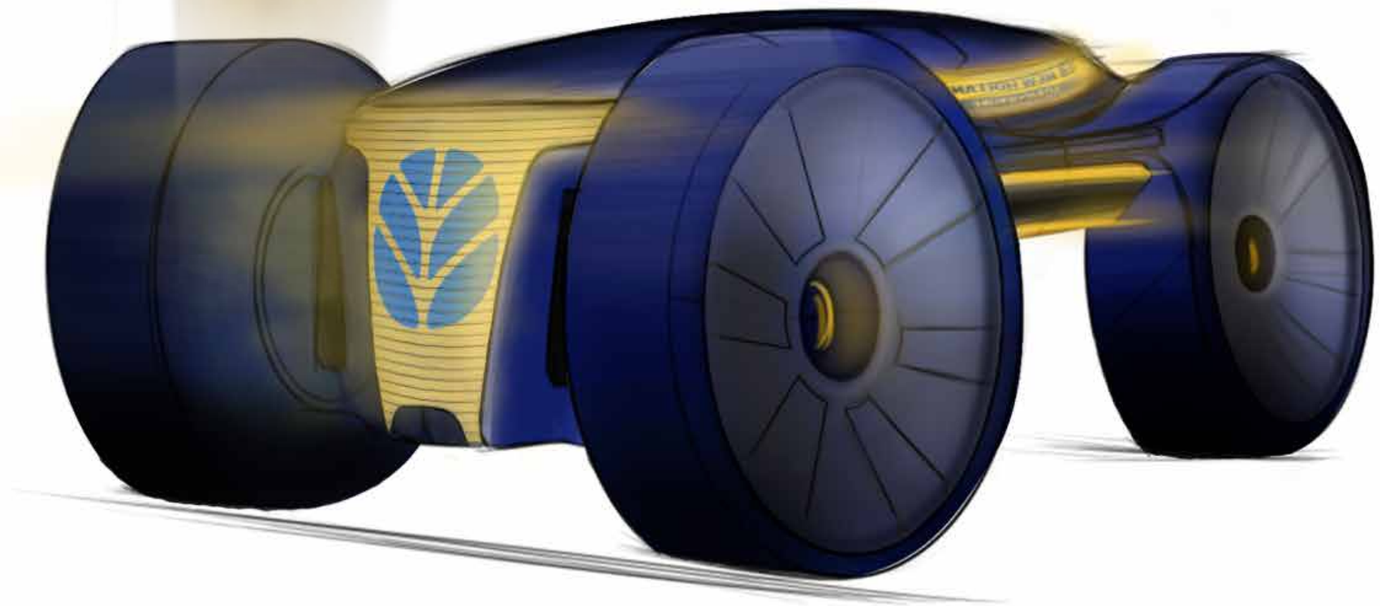








FINAL SKETCHE - DRONE:



I-TECH GRAND

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Thank you!