



**Presentation
client
Swarm Shooters
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Introduction



Original idea / Subject of the project designed by us



Designed for defense and attack purposes against drones

Team Members



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Context



Design solution



Diagram of the robot (HW, SW)



Presentation of the test code



Design Solution

Anti-drone

Bronze Test :



- The robot is able to scan the sky and detect the target
- The robot is able to evaluate the distance to the target

Silver Test:



- The robot is able to shoot an object in the general direction of the target (not taking into account altitude)
- It is able to detect multiple targets (multiple possibilities)

Golden Test:



- The robot is able to discriminate and prioritize targets
- The robot is able to shoot the target taking into account its altitude/elevation

Robot Swarm

Bronze Test :



- Create at least 2 autonomous moving robots, measure the color of the ground and share the information wirelessly
- Robots starting point is known
- Research area is known
- Robots have to split the work and cover all the given area.
- Robot path can be hard coded

Silver Test:



- Create a third robot
- Handle the case a robot lost its connection to the network
- Handle the case a robot breaks down

Golden Test:



- Present the information collected by the 3 robots to the end user in a graphical way

Swarm Shooters

Contract : Shooting at drones with 2 robots communicating with each other (combination of the two other projects)

Bronze Test :



- Create 2 robots : 1 static master robot and 1 moving slave robot that share information
- Moving robot starting point is known
- Moving robot is able to scan the sky and detect the target
- Moving robot is able to evaluate the distance to target

Silver Test:



- Moving robot is able to shoot an object in the general direction of the target by master's instructions
- Handle the case a robot lost its connection to the network
- Handle the case a robot breaks

Golden Test:



- Master robot is able to discriminate and prioritize targets
- Moving robot is able to detect multiple targets
- Moving robot is able to shoot the target taking into account its altitude/elevation by master

Solutions

Bronze Test :



- Pixy Camera used to detect the target and evaluate the distance between robot and target
- We intend to connect the master and slave robot through Wifi
- Starting point of moving robot can be determined with a non-trivial Python function that will be implemented
- Gear wheel to perform elevation and idler wheel to rotate

Silver Test:



- Springs and locks for shooting with a motor

Golden Test:



- Solution include only software modifications (adding one function for multiple targets and prioritization)

Design :

- 2 Lego Mindstorm Brick
- 2 wheels, 3 motor s and 1 idler wheel
- 1 pixy camera
- 1 dongle WIFI
- Gear wheel

- 2 locks and springs
- 1 motor

Test Scenario

Bronze Test :



- Create a target for the detection
- Establish connection between the master and slave (the slave detect, evaluate the distance and share the information to the master)
- When the master receive it, it shows a message on brick's screen



Silver Test:



- Same steps as bronze test.
- Slave robot will shoot at the target's direction when it receive the master robot's response



Golden Test:



- Same steps as silver test
- However, they will be multiples targets and slave robot will shoot the closest one

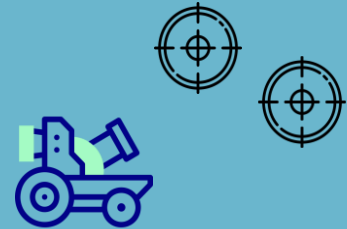
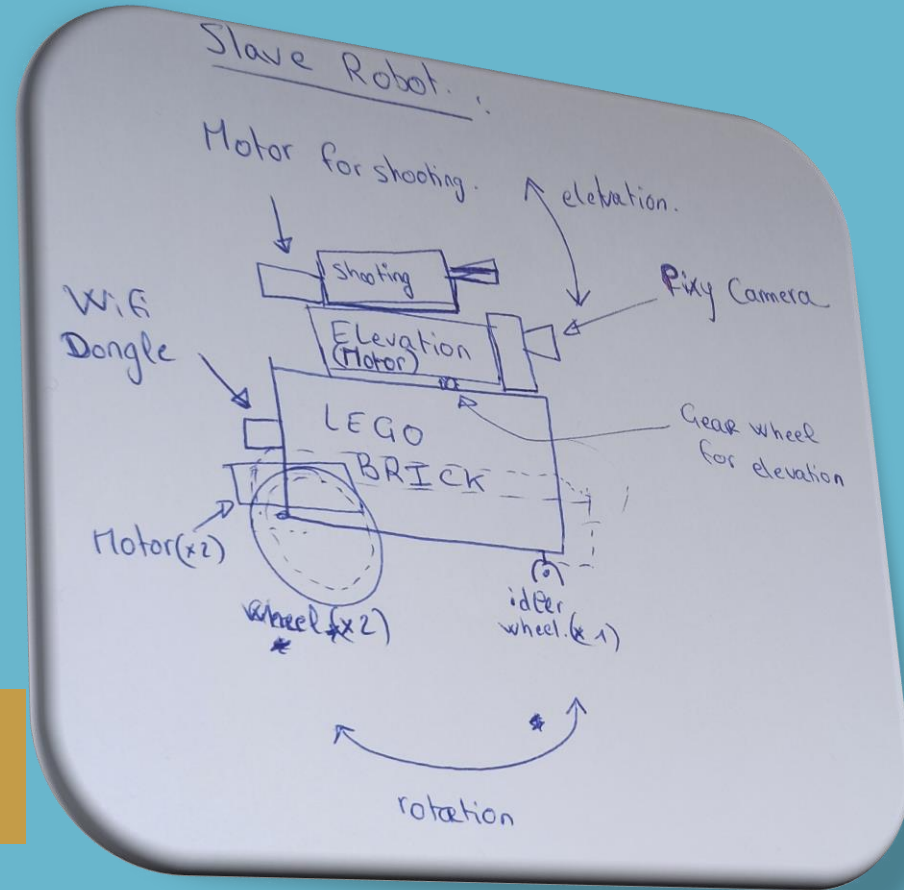
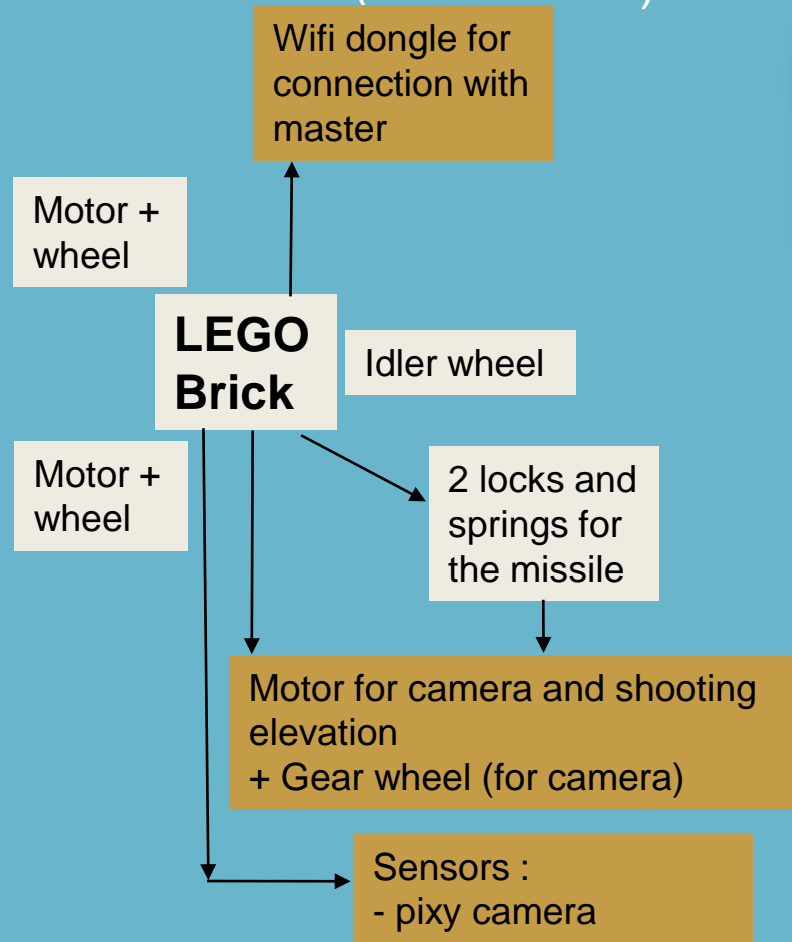


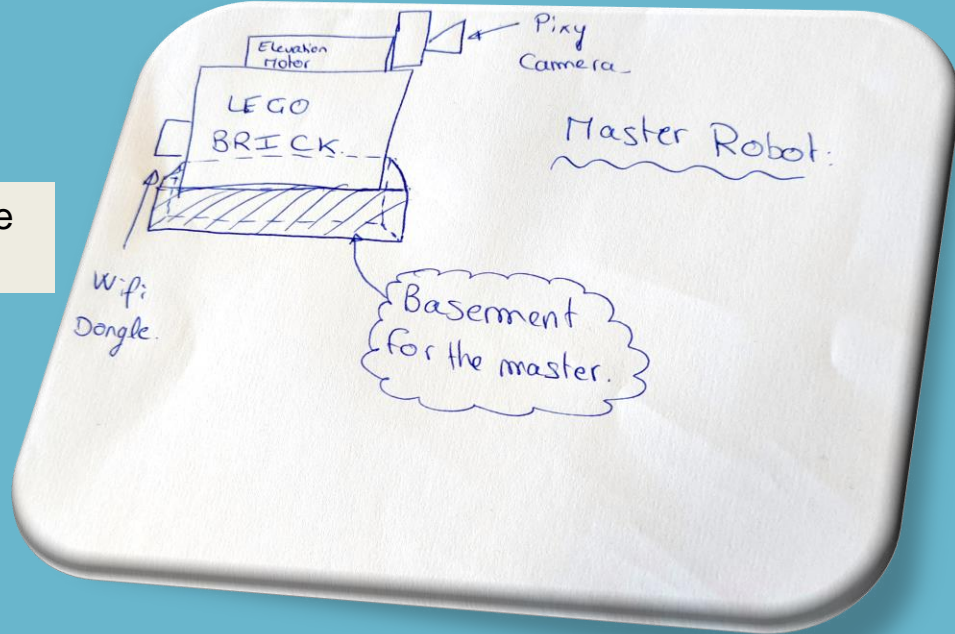
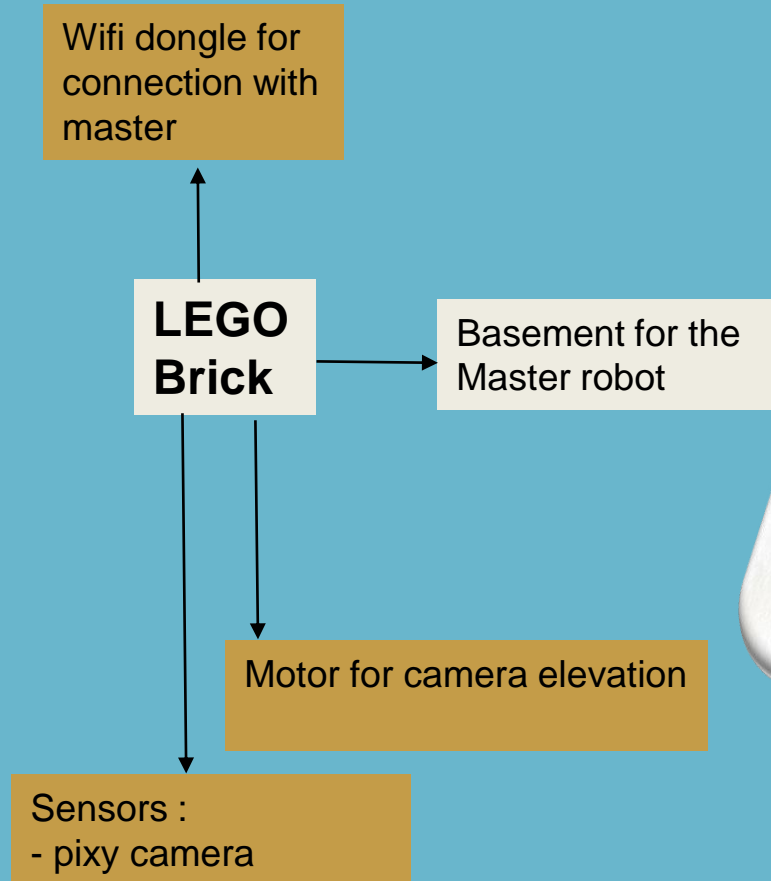


Diagram of the robot
(Hardware & Software)

Hardware (Slave robot)



Hardware (Master robot)



Software Diagram (Bronze, Silver, Gold)

 Bronze

 Silver

 Gold

 is called

Master Robot

Distance function who will estimate the current distance between slave robot and the target, using target's picture from pixy camera. This function also count the number of targets on the image and call multiple target function if needed. Distance estimation done according to the size of the target on the camera.

Input : Image of pixy camera
Output : dictionary of numbers such as distance, coordinates of target

Multiple target function who will be called if more than one target is detected, distance estimation of all the detected targets to pick the closest one for shooting

Communication / socket function

Main function who will wait slave message and pixy image to run calculations. Send performed calculations to slave

Slave Robot

Pattern moving function who will determine the pattern moves of the slave robot while searching targets (only if pixy camera on slave robot.)

Communication function who will be used to send informations in both ways (master to slave, slave to master)

Pixy camera function who will detect targets and send to the master one image of it. So it means that in the image, there is at least one targets but the count is done by master.

Odometry function who will know the slave robot position

Main function who will do multithreading performing moving until a object is detected by the pixy camera and proceeds to estimate the distance right after.

Movement function who will turn 2 motor of slave robot's wheels to adjust position according to calculations sent by master and perform shooting by turning motor of gear wheel and motor of spring/lock.
Input: output of distance function



Presentation of test code



Thanks!