Concept Generation

Team 516

RoboBoat and Drone

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The process used to refine our concepts was based off of available hardware and practicality. We are not going to waste time redesigning aspects of this project that previous teams have already designed that are functional. In our concept selection diagram, the concepts with a green background are preferred concepts while the concepts with a red background are undesirable concepts. The concepts without any background color need further analysis and will be evaluated throughout the span of our project.

General Improvements	Boat to Drone Communication	Object Detection	Boat Control
Lighter materials to save weight	Use onboard drone camera on different connection	Lidar	PID control
Remove bulky or unimportant parts	Communicate with drone on a different connection	Two camera (depth perception)	Remote control
Adjust placement of items to increase neutral buoyancy	Obtain new camera and new connection system just for camera	Sonar	GPS
Improve casing for computer hardware (more aesthetically pleasing)	Landing drone (QR code on top of box)	Tactile Sensor	2D graph of surrounding
Removeable hardware for easy transportation	Bluetooth	Actuators	Use rudders
Streamline body	Use sonar to detect distance	Half Effect Sensors	Motor rotation with PWM control
Mechanical wireless off switch	Lidar on drone to detect proximity	Bounding Boxes	Air boat fan
Streamline code	Radio control steering	API object detection	Sail
Implement Lidar sensor	Wi-fi Steering		

Excluded Ideas	**Reason**
Lighter materials to save weight	Base body complete, not necessary to meet key goals
Streamline body	Base body complete, not necessary to meet key goals
Radio control steering	Due to noisy surroundings during competition it would not be reliable
Communicate with drone on a different connection	Extra electrical and signal interference may disturb working systems
Actuators	Require physical contact with obstacles, and the competition requires to avoid them
Half Effects Sensors	This would need magnets to be placed through the course
Use rudders	Only work when the boat is moving, which does not allow for good maneuverability
Air boat fan	Noisy and power hungry, as well as too large
Sail	Uncertainties of weather do not allow for this
Included Ideas	**Reason**
Mechanical wireless off switch	Required by competition to compete
Streamline code	Make it simpler to read and modify for future improvements
New camera connection system	Allows for separate image processing and steering. Allowing the drone to function efficiently
QR Code for drone landing	Unique appearance. Many resources online about identifying and processing QR codes.
Drone sonar distance	Allows for precise height readings when compared to ground
Lidar drone	Allows for precise height readings when compared to ground
Wi-fi Drone Control	Easy to connect with computer on the boat, allows quick transmission of images, works well in a lot of external noise
Lidar Boat	Allows object detection, can implement in junction with camera
Two Cameras	Have an additional webcam available in stock. Two cameras at different perspectives can be used for depth detection.
PID Boat Motor Control	Increases efficiency in steering.

Block Diagram