AN OFFLINE SYSTEM FOR AIRBOAT

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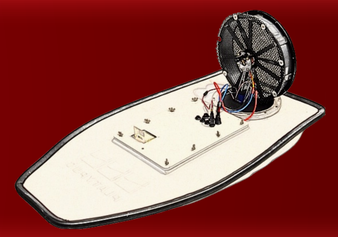
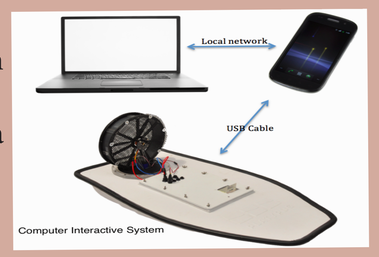


Introduction

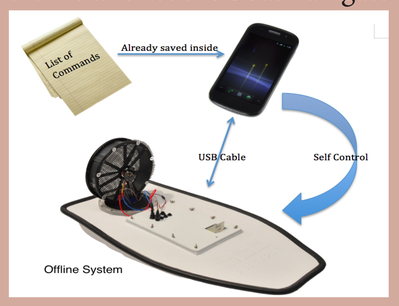
Airboat is a low cost robotic watercraft autonomously create detailed spatiotemporal maps of water quality parameters such as specific conductivity, dissolved oxygen, temperature and pH.

A computer interactive system is used to control airboats. We put a cell phone inside the boat and use it to control the propellers, sensors and pumps. And a laptop is used to connect the cell phone through local network and give introductions.



So here comes the problem, all the local networks have a range. If a boat is going out of range, we will lose the control of it. Therefore this offline system came out.

Offline system is an android app that can make boat control itself without help from computers. We can pre-store a sequence of commands in a txt file and let the boat navigate all by itself.



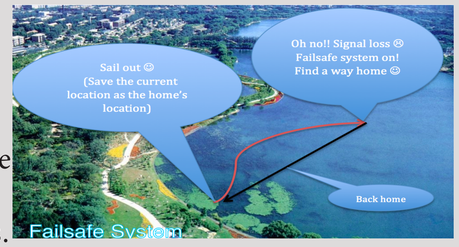
In this case, airboats can do self-driving without the limitation of the local network's range.

Method

Failsafe System:

Failsafe system is a system that run in the condition that the boat cannot connect the labtop. Mostly it is because the boat is out of the local network's range. The Failsafe system will let the boat find it way back home or to some spots that it will surely get connection again.

This system will make boat more reliable on the water. We don't need to face the risk that we will lose one single boat because of signals loss.



Offline System:

Pre-saving a sequence of commands and leting the boat follow these commands so it can navigate barely based on GPS without the help of computers.

One of the main challenges is how to turn the system on at first place. The cell phone is inside of boats so it is impossable to click a bottom to start up. And it is hard to calculate how long it takes to set up the whole airboat firmware thus we cannot add a timer.

The solution is that we use the orientation senser inside the cell phone and write an algorithm to make airboats auto-start after manually spining boats for 3 round.

Result

The airboat runs perfect with the offline system in the river and the failsafe system increase the reliability of the voyage.

However, the boat cannot distinguish whether a command is doable in the offline system part and it cause some problems.

Conclusion

Self-navigate is doable for airboats. We can make it more smart in the future.

On one hand, we may find an easier way to send command. Currently, we type commands, save it as txt file and send it to cell phone through bluetooth. In the future, we can just sit in a sofa, send commands though an e-mail and the boat will follow these commands.

On the other hand, we can make the failsafe system more useful. For example, currently the system will only be triggered when a boat lose its WIFI signals. We may make the system on as well as send some warnings in the circumstances like something wrong with the propeller or batteries almost died, which will make boats more reliable.