

Hovercraft protocol

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Document Purpose

In this document, there will be explanation about communication between different parts of hovercraft will be discussed as well as the communicational between PC to hovercraft.

Change history

25/03 : The first version of the document containing the prototype of communication protocol is created. This document will be presented in the test and integration meeting on 26/03 to get some feedbacks.

26/03 : The protocol was explained and discussed in the test and integration meeting. There has been some changes in the binary which is sent and received. The general idea is to tag each message to its value.

28/03 : There has been changes in the value of some messages. For example: the fan forward speed, instead of getting the exact speed value, gets increase and decrease speed message. The latest version of the protocol will be discussed in test and integration meeting held on 29/03 in order to get some feedback.

29/03 : The document has been reviewed by Stephan, PC test and integration responsible. The current version of the protocol is confirmed and the implementation of coding and decoding the binary messages would be based on the current protocol.

Hovercraft protocol

Fan forward speed: 3bits 111 = 7 110=6 101=5 ...
With 3 bits, we can cover from 0 to 7

Fan hovering speed: 2bits 11 = 3 10 = 2 01 = 1 00=off
With 2 bits, we can cover from 0 to 3

Ruder Direction: 2bits 11= Left 10= Right 01=Straight forward
With 2 bits, we can cover left, right, and straight

Hovercraft Speed: 4bits 1111= 15 1110=14 1101=13 ...
with 4 bits, we can cover the speed of 0 to 16 (I think this would be the maximum speed...)

Hovercraft Pressure: 2bits 11= high 10= normal 01= low 00=off
with 2 bits, we can cover 4 levels (high, normal, low, off)

Battery level: 2 bits 11= 3 (full) ... 000= 0 (empty)

First Scenario:

Fan forward speed: off

Fan hovering speed: off

Ruder direction: left

- 1) The number 58 is sent by PC part (The number range is **0 – 255**)
- 2) On hovercraft, one binary is received (**58** or in binary **00110110**)
The binary would be considered as following picture:

Ruder Direction		Fan hovering speed			Fan forward speed		
0	0	1	1	0	1	1	0

- 3) The following information will be discovered by parsing the binary:
 1. The fan forward speed is : 6
 2. Fan hovering speed is: 2 (normal)
 3. Ruder direction: 1 (straight forward)

- 4) The following binaries will be sent back to the PC as a result:

Battery level		Hovercraft Pressure		Hovercraft Speed					Ruder Direction		Fan hovering speed		Fan forward speed		
1	0	1	0	1	1	1	0	0	0	1	1	0	1	1	0

Hovercraft protocol 0.2

Description:

One binary containing the message type and it's value will be received on PC or Hovercraft receive. The binary contains 8 bits. The 4-bits with more value in the binary will be the message type and the 4-bits with less value will be the message value. For example:

The following binary is sent from PC to Hovercraft

00001100 (12 in Dec)
The message is Fan Forward Speed 0000
The value is 1100

0000	Fan Forward Speed
0001	Fan Hovering Speed
0010	Ruder Direction
0011	Hovercraft Speed measured by sensors on hovercraft.
0100	Hovercraft Pressure
0101	Battery Level
0110	Connection Request? :-)
0111	
1000	
1001	
1010	
1011	
1100	
1101	
1110	
1111	

Hovercraft protocol 0.3

Description:

There has been some discussion on increasing and decreasing the speed based on the previous version. The idea is, the user should be able to increase and decrease the fan forward speed by sending change message instead of sending the exact value. For example, if the current speed is 13, the user should be able to send the decrease message then the speed should be changed to 12.

The messages will be very closed to the previous messages but for speed messages they will be changed to increase and decrease instead of exact value.

One binary containing the message type and it's value will be received on PC or Hovercraft receive. The binary contains 8 bits. The 4-bits with more value in the binary will be the message type and the 4-bits with less value will be the message value. For example:

The following binary is sent from PC to Hovercraft

00000000 (12 in Dec)

The message is Fan Forward Speed 0000

The value is 0000 which means increasing the fan forward speed.

Message	Description	Value	Description
0000	Fan Forward Speed	1 000	Increasing speed
		1 001	Decreasing speed
		0000 - 0111	Set speed to 0 – 7 in Scale.
0001	Fan Hovering Speed	1 000	Increasing speed
		1 001	Decreasing speed
		0000 - 0111	Set speed to 0 – 7 in Scale.
0010	Ruder Direction	0000	Close
		0001	Hard Left
		0010	Soft! Left
		0011	Forward
		0100	Soft Right
		0101	Hard Right
0011	Hovercraft Speed measured by sensors on hovercraft.	0000 - 1111	The speed is 0 - 16
0100	Hovercraft Pressure	0000 - 1111	The pressure is 0 - 16
0101	Battery Level	0000 -	The speed is 0 - 16

		1111	
0110	Connection Request !!!??? :-)		
0111	-		
1000			
1001			
1010			
1011			
1100			
1101			
1110			
1111			

The document is uploaded on the project wiki :

[http://129.16.157.207/redmine/projects/semb2012/wiki/Communication Protocol for sending and receiving on Hovercraft and PC](http://129.16.157.207/redmine/projects/semb2012/wiki/Communication_Protocol_for_sending_and_receiving_on_Hovercraft_and_PC)