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(54) Abstract: A system and a method of controlling in an efficient manner at least two motors of a motorized platform for a display device such as a flat panel television. The motors of the motorized platform are controlled such that only one motor is active at a time enabling the use of a power supply dimensioned only for one power consumer, the major power consumer. A decentralized manner of control according to the invention also allows for a modularized decentralized building manner, facilitating cabling and thus also manufacture of a motorized platform.
A METHOD OF CONTROLLING A MOTORIZED PLATFORM AND A SYSTEM THEREFORE

TECHNICAL FIELD

The invention concerns a method of controlling a motorized platform and a system therefore and is more particularly directed to controlling at least two actuators/motors of a motorized platform, the motorized platform comprising a motorized tilt and/or rotation unit for a display device such as a flat panel television, the motorized tilt/rotation unit is intended to be mounted on a support structure such as a wall, a stand or a motorized lift and/or rotation stand which would then be comprised in the motorized platform.

BACKGROUND

Display devices such as televisions and computer screens have gone through a radical change in the past few years. A market dominated by cathode ray tubes since the birth of television is rapidly changing to being totally dominated by flat panel display devices of many different new technologies such as plasma and liquid crystal displays. The common feature of these new technologies is that they enable making flat panel display devices, i.e. display devices whose depth is not in a direct relation to the size of the display area of the display device but only in a limited relation to the weight of the device due to the necessary internal support structure. The limited depth on these new display devices gives new possibilities on support devices, such as motorized platforms, which in turn adds new requirements. There is room for improvements on how to control these motorized platforms.

SUMMARY

An object of the invention is to define a method and a system of controlling at least two actuators/motors of a motorized platform, especially a motorized platform of a display device.
A further object of the invention is to define a system and a method of controlling at least two actuators/motors of a motorized platform comprising a motorized tilt and/or rotation unit and/or comprising a motorized lift and/or rotation stand.

Another object of the invention is to define a system and a method of controlling at least two actuators/motors of a motorized platform comprising a motorized tilt and/or rotation unit and/or comprising a motorized lift and/or rotation stand in such a way that control electronics of an actuator/motor can be placed in the proximity of that actuator/motor.

A still further object of the invention is to define a system and a method of controlling at least two actuators/motors of a motorized platform comprising a motorized tilt and/or rotation unit and/or comprising a motorized lift and/or rotation stand in such a way that the total peak power consumption is kept as low as possible at all times.

The aforementioned objects are achieved according to the invention by a system and a method of controlling in an efficient manner at least two actuators/motors of a motorized platform for a display device such as a flat panel television. According to the invention the actuators/motors of the motorized platform are controlled such that only one actuator/motor is active, i.e. running and consuming power, at a time enabling the use of a power supply dimensioned only for one power consumer, the major power consumer. A decentralized manner of control according to the invention also allows for a modularized decentralized building manner, facilitating cabling and thus also manufacture of a motorized platform according to the invention. This can be referred to as a multi-master system.

The aforementioned objects are further achieved according to the invention by a control system arranged to control two or more actuators/motors of a
motorized flat panel display platform. According to the invention the control system is a distributed decentralized control system comprising at least two physically separate control modules. Each control module has an identity and is arranged to control one actuator/motor. An identity of a control module can for example be tilt, top rotation, lift or bottom rotation thus identifying each control module according to its function, i.e. controlling for example the actuator/motor of the tilt function of a motorized platform. A motorized platform taking full advantage of the invention will have two or more actuator/motor functions. Each control module only reacts on control commands conforming to the identity of the control module, i.e. a control command for top rotation has nothing to do with the control module handling lift. Certain control commands, such as a memory recall, could involve all connected functions and thus all control modules. The control system further comprises communication means between all of the control modules to thereby enable coordination of the actuators/motors.

Advantageously the communication means comprises activity token means, which can be implemented in software or in hardware by for example a ready/busy line, and the control system is arranged to only enable one actuator/motor at a time by means of the activity token means of the communication means. By only allowing activation of one actuator/motor at a time, the power consumed is kept down and a smaller power supply can be used, thinner power cables etc. Preferably one or more of the control modules are arranged to receive commands, this can be by means of an integrated IR receiver on the concerned control modules. Each control module is then preferably further arranged to communicate any received command to the other control modules by means of the communication means. In some embodiments each control module is arranged to prioritize itself according to its identity and according to received commands. For example when there is a shut down command, meaning that the motorized platform should return to a default position when the display device is turned off, then if the identity of the control module in question is lift, then it should
preferably give itself the lowest priority, especially if the motorized platform is
returning back into a box/furniture, thus allowing the rotation and tilt to return
to their zero positions before the lift lowers the display device into the
box/furniture.

Suitably when receiving a command each control module is arranged to
determine if the command relates to the identity of the control module, and if
the command is determined for the control module and concerns controlling
the actuator/motor of the control module, then only when the activity token
means is available, the control module concerned acquires the activity token
means for a period of time the actuator/motor is actively controlled by the
control module. The control module will thus release the activity token
means at the end of the period of time the actuator/motor is actively
controlled. This will ensure that only one actuator/motor is active at a time.
The activity token means can for example be a dedicated line that signals to
all control modules if any actuator/motor is active or not. Each control
module is suitably arranged to only acquire the activity token means after the
activity token means has been available for a default delay time. Each
control module is preferably arranged with a different default delay time so
that not all the control modules will attempt to acquire the token at the same
time. The default delay time of a control module can be made dependent on
the identity of the control module.

In can be advantageous that the control modules are arranged to change
their default delay time in dependence on the received command to thereby
change their priority among the control modules. Each control module can
then be arranged to attain a high priority by having a default delay time
shorter than any other default delay time, i.e. when the token becomes
available, then with a short delay time the token will be grabbed quickly, or
first. Also each control module can then be arranged to attain a low priority
by having a default delay time longer than any other default delay time, i.e.
let everyone else grab the token first.
The different additional enhancements of the control system according to the invention can be combined in any desired manner as long as no conflicting features are combined.

The aforementioned objects are also achieved according to the invention by a method of controlling two or more actuators/motors of a motorized flat panel display platform. The method comprises distributing a separate control module close to each actuator/motor. Each control module is capable of controlling one actuator/motor. Each control module is assigned the identity of the actuator/motor it is controlling. Each control module only reacts on control conforming to the identity of the module. The method comprises coordinating the control of the actuators/motors by means of a communication link between all of the control modules. Sometimes this is referred to as a multi-master system

Suitably the communication link comprises activity token means and the method comprises only enabling one actuator/motor at a time by means of the activity token means of the communication link. Advantageously the method comprises receiving commands by means of one or more of the control modules. Each control module having received a command communicates it to the other control modules by means of the communication link between all of the control modules. This insures that all control modules receives the commands. The method can comprise each control module prioritizing itself according to the assigned identity of the control module and according to received commands. Sometimes when receiving a command the method further comprises in each control module determining if the command relates to the identity of the control module, and if the command is determined for the control module and concerns controlling the actuator/motor of the control module, then only when the activity token means is available acquiring the activity token means for a period of time the actuator/motor is actively controlled by the control module.
Suitably the acquiring of the activity token means by a control module is only done after the activity token means has been available for a default delay time. Each control module preferably then has a different default delay time. Sometimes the method further comprises the control modules changing their default delay time in dependence on the received command to thereby change their priority among the control modules. The method can then comprise a control module attaining a high priority by having a default delay time shorter than any other default delay time and a control module attaining a low priority by having a default delay time longer than any other default delay time.

By providing a method and a unit for controlling at least two actuators/motors of a motorized platform for a display device such as a flat panel television, by means of a decentralized distributed control structure and local control modules close to the actuators/motors connected by simple communication means according to the invention a plurality of advantages over prior art methods and systems are obtained. A primary purpose of the invention is to provide an improved manner of manufacturing a complete motorized platform with two or more functions from the group of bottom rotation, lift, top rotation and tilt, for a display device. This is obtained according to the invention by having structuring the control around a plurality of control modules, which modules can be the same, thus lowering manufacturing costs, that are close to the actuators/motors, thus requiring simple wiring. Further by only allowing one actuator/motor to be active at a time, simplifies the wiring further because it can be daisy chained with simple wires instead of having to have power cables from each unit to a central power supply. Other advantages of this invention will become apparent from the detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS
The invention will now be described in more detail for explanatory, and in no sense limiting, purposes, with reference to the following figures, in which
Fig. 1A-C illustrates examples of a typical utilization of the invention in connection with a flat panel television on a motorized platform.

Fig. 2 illustrates a schematic layout of a circuit arrangement according to the invention,

Fig. 3 illustrates a flow diagram of a method according to the invention,

DETAILED DESCRIPTION

In order to clarify the method and system according to the invention, some examples of its use will now be described in connection with Figures 1A to 3.

The present invention relates to a method of and a control system for controlling at least two motors of a motorized platform comprising a motorized tilt and/or rotation unit and/or comprising a motorized lift and/or rotation stand. The invention enables a control module of a motor to be placed in the proximity of that motor. This is achieved according to the modular structure of the control system according to the invention where the control system is built up of a plurality of control modules that communicate with each other. There is no central control board or center, the control system according to the invention is decentralized and built on decentralized control with adequate processing power in each control module and a cooperation between the modules. The invention further controls the at least two motors in such a way that the total power consumption is kept as low as possible at all times. This is achieved according to the invention by only allowing one actuator/motor being active/running at a time.

Figures 1A, 1B, and 1C illustrate different views of an example of a typical utilization 100 of the invention in controlling the movement of a flat panel display device 110 mounted on a motorized rotation/tilt unit 130 attached to a motorized lift/rotation stand 120. Figure 1A illustrates a side view of the flat
panel display device 110 being tilted down and turned toward a viewer. Figure 1B illustrates a side view of the flat panel display device 110 being tilted down only. The motorized rotation/tilt unit 130 can tilt 155 around a tilt axis 132. The motorized lift/rotation stand 120 can lift 158 the flat panel display device 110 up and down along the stand 120. Figure 1C illustrates a top view of the flat panel display 110 being turned only. The motorized rotation/tilt unit 130 can rotate 152 around a rotation axis 135. This is also sometimes called top rotation. The motorized lift/rotation stand 120 can rotate 150 the flat panel display device 110 around a rotation axis 125. This is also sometimes called bottom rotation.

The invention involves a system and a method of controlling in an efficient manner at least two actuators/motors of a motorized platform such as the one described above in relation to Figures 1A, 1B and 1C, for a display device such as a flat panel television. According to the invention the actuators/motors of the motorized platform are controlled such that only one actuator/motor is active at a time enabling the use of a power supply dimensioned only for basically one power consumer, the major power consumer and the idle power consumption of the other control modules. A decentralized manner of control according to the invention also allows for a modularized decentralized building manner, facilitating cabling and thus also manufacture of a motorized platform according to the invention.

Figure 2 illustrates a schematic example of a control system according to the invention with a first and a second control module 210, 220 and a further optional control module 230. The invention is configured around decentralized control modules comprising integrated control routines. Each control module 210, 220, 230 preferably comprises an I.R. receiver to receive control commands, memory to store program and data such as one or more possibly programmable preset positions of an associated motor/actuator 215, 225, 235, motor drive circuitry, and enough processing power to handle internal module needs and communication with other modules of the system.
A control system according to the invention can optionally comprise an additional IR receiver 212, possibly with code translator/converter to enable to use for example a remote control of a flat panel television to also control the motorized platform carrying the television. Another manner of acquiring control commands is to have an optional interface module 240 to an external control system such as a television receiving IR signals and then transmitting them via for example $i^2$C 242 to the interface which then converts the control signals to those used internally within the system. If the control system communicates internally via $i^2$C instead of the illustrated bus-system, then it is easier to connect the two systems. The identity of each control module 210, 220, 230, i.e. if it is a tilt control module, a top-rotation control module, a lift control module or a bottom rotation control module, can either be pre-programmed, hard-wired, strap-selected, or done by automatic identification of the motor/actuator coupled to it or through which connection it is coupled. The decentralized control modules 210, 220, 230 are in this example interconnected with a simple connection structure comprising a power line 296, a bi-directional data line 290, a ready/busy line 292 and a ground line 294. The ready/busy line 292 is a hardware solution, another method is to use a token. The data communication can also follow a wired or wireless industry standard such as $i^2$C, CAN BUS, or Bluetooth. Power is provided by a power supply system module 250, which can suitably be an external transformer to keep the system as a low-voltage system. The power supply system module 250 only needs to be of such a size that it can sufficiently supply enough power to supply all idle boards of the system at the same time as the most power consuming board with associated actuator/motor is active. This is due to the invention of only allowing one control module 210, 220, 230 to be active with one actuator/motor 215, 225, 235 at a time. The ready/busy line 292 is used to indicate that an actuator/motor 215, 225, 235 is active and as long as the ready/busy line 292 indicates that an actuator/motor 215, 225, 235 is active,
then no other actuator/motor 215, 225, 235 will be allowed to become active. To avoid any competition problems between the control modules 210, 220, 230 it is preferable that the different modules have different default delay times before taking hold of the ready/busy line and activating its associated actuator/motor 215, 225, 230.

In at least some embodiments of the invention it is advantageous that one or more of the controller modules 210, 220, 230 can attain a higher and/or lower priority. For example a lift controller module, which controls the height of an attached flat panel display device, could in some embodiments have the highest priority during a lift up operation, especially if it is a move to a preset value, which then might also involve a turn and a tilt as well. This is very important if the motorized stand is built into a box/furniture, and the flat panel display device has to lift out of the box before a turn and/or tilt is possible without crashing into the box. To attain the highest priority the delay time to grab hold of the ready/busy line 292 has to be shorter than the shortest default delay time. If the lift controller module receives a lowering down command, especially if it is a move to a preset value, then suitably the lift controller module should have the lowest priority. A lowest priority is attained if the delay time to grab hold of the ready/busy line 292 is longer than the longest default delay time.

In some embodiments a lift controller module will retain hold of the ready/busy line 292, or token, below a certain predetermined position, the predetermined position for example being a position just entering the box/furniture, to thus avoid any rotation or tilt when the flat panel display unit is partially or completely within the box/furniture. If the box is ceiling mounted then it will be above a certain predetermined position that the lift controller module keeps the ready/busy line 292 to thus avoid any rotation or tilt.

Figure 3 illustrates a simplified flow diagram of a method of giving priority according to the invention by means of a Ready/Busy line or a token,
exemplified from a lift control module perspective. In a first step 310 it is
determined if a command is received or not. A command can be received
either by the IR receiver on the control module or via the bi-directional data
time. If no command is received, then the process loops to itself. If a
command is received then the process continues with a second step 320. In
the second step 320 it is determined if the received command is a store
command. If the received command is a store command then the procedure
continues with a third step 325. If the received command is not a store
command, then the process continues with a fourth step 330. In the third
step 325 the current position of the actuator/motor is registered. The
actuator/motor will have some kind of means of keeping track of where it is,
this can for example be a potentiometer or dead counting of the number of
revolutions the motor is turning. By storing this value or values, the control
module can control the actuator/motor back to the same position.

In the fourth step 330 it is determined if the command is recall/goto memory
position, if it is then the process will continue with a fifth step 332, if not then
the procedure will continue with a sixth step 352. In the fifth step 332 it is
determined if the lift has to travel up or down, this will be in dependence on
the current position and the memory position. If the current position is higher
than the memory position then the lift has to travel down and the procedure
continues with a seventh step 334. If the current position is lower than the
memory position then the lift has to travel up and the procedure continues
with an eighth step 336. In the sixth step 352 will test and execute other
commands such as lift up or lift down. The execution of these commands will
also include all the checks to ensure that only one actuator/motor is active at
a time.

In the seventh step 334 the priority of the lift control module is set to the
lowest, preferably by setting the delay time longer than the longest default
delay time. The procedure will continue with the ninth step 340. In the eighth
step 336 the priority of the lift control module is set to the highest, preferably
by setting the delay time shorter than the shortest default delay time. The
procedure will continue with the ninth step 340.

In the ninth step 340 it is determined if the ready/busy line or the token is free
or not. If the ready/busy line or the token is not free, then the procedure goes
to the fifth step 332 to reset the delay times of the priorities. If the
ready/busy line or the token is free, then the procedure continues with a tenth
step 342. In the tenth step 342 it is determined if the delay is zero. If it is not
zero, then the procedure continues with a twelfth step 344. If the delay is
zero, then the procedure continues with a thirteenth step 346. In the tweleth
step 344 the delay is decreased by one and then the procedure goes back to
the ninth step 340.

In the thirteenth step 346 the ready/busy line or token is acquired by the lift
control module, the lift control module activates the actuator/motor
concerned, waits until the position movement is ready, then the ready/busy
line or token is released and the procedure continues with the first step 310.

The invention is not restricted to the above-described embodiments, but may
be varied within the scope of the following claims.
FIGURES 1A, 1B, and 1C - illustrate examples of a typical utilization of the invention in controlling the movement of a display device mounted on a motorized platform comprising a motorized rotation/tilt unit attached to a motorized lift/rotation stand.

**FIGURE 1A** illustrates a side view of the flat panel display being tilted down and turned toward a viewer,

**FIGURE 1B** illustrates a side view of the flat panel display being tilted down only,

**FIGURE 1C** illustrates a top view of the flat panel display being turned only.

Display device on a motorized rotation/tilt unit with a motorized lift/rotation stand,

Display device,

Motorized lift/rotation stand,

Rotation movement axis of motorized lift/rotation stand,

Motorized rotation/tilt unit,

Tilt movement axis of motorized rotation/tilt unit,

Rotational movement of motorized lift/rotation stand, rotational axis 125,

Rotational movement of motorized rotation/tilt unit, rotational axis 135,

Tilt movement of motorized rotation/tilt unit, rotational axis 132,

Lift movement of motorized lift/rotation stand.

**FIGURE 2** - illustrates a schematic example of a control system according to the invention with optional units,

First controller module

Optional additional IR receiver, possibly with code translator/converter
Actuator/motor of the first controller module, possibly with one or more position/end-stop sensors,
Second controller module
Actuator/motor of the second controller module, possibly with one or more position/end-stop sensors,
Optional third controller module
Actuator/motor of the third controller module, possibly with one or more position/end-stop sensors,
Optional interface module to an external control system such as a television receiving IR signals and then transmitting them via for example I2C to the interface which then converts the control signals to those used internally within the system
Optional communication link between the interface and an external system
Power supply system
Bi-directional data line
Ready/Busy line
Ground
Power

FIGURE 3 illustrates a simplified flow diagram of a method of giving priority according to the invention by means of a Ready/Busy line or a token, exemplified from a lift control module perspective, a first step of determining if a command is received, a command can be received either by the IR receiver on the control module or via the bi-directional data line. If no command is received, then the process loops to itself. If a command is received then the process continues with a second step 320.

after the first step 310, if a command is received: then in the second step it is determined if the received command is a store command. If the received command is a store command then the procedure continues with a third step 325. If the received
command is not a store command, then the process continues
with a fourth step 330.

325 after the second step if a store command is received, then in the
third step the current position of the actuator/motor is registered.

The actuator/motor will have some kind of means of keeping track
of where it is, this can for example be a potentiometer or dead
counting of the number of revolutions the motor is turning.

330 after the second step 320 if the command was not store, then in
the fourth step it is determined if the command is recall/goto
memory position, if it is then the process will continue with a fifth
step 332, if not then the procedure will continue with a sixth step
352.

332 after a ninth step 340 or after the fourth step 330 if the command
is recall/goto memory position, then in the fifth step it is
determined if the lift has to travel up or down, this will be in
dependence on the current position and the memory position. If
the current position is higher than the memory position then the lift
has to travel down and the procedure continues with a seventh
step 334. If the current position is lower than the memory position
then the lift has to travel up and the procedure continues with an
eighth step 336.

334 After the fifth step 332 if the lift has to travel down, then in the
seventh step the priority of the lift control module is set to the
lowest, preferably by setting the delay time longer than the longest
default delay time. The procedure will continue with the ninth step
340.

336 after the fifth step 332 if the lift has to travel up, then in the eighth
step the priority of the lift control module is set to the highest,
preferably by setting the delay time shorter than the shortest
default delay time. The procedure will continue with the ninth step
340.
After the seventh step 334, the eighth step 336 or a eleventh step 344, then in the ninth step it is determined if the ready/busy line or the token is free or not. If the ready/busy line or the token is not free, then the procedure goes back to the fifth step 332 to reset the priorities. If the ready/busy line or the token is free, then the procedure continues with a tenth step 342.

After the ninth step 340, in the tenth step it is determined if the delay is zero. If it is not zero, then the procedure continues with a twelfth step 344. If the delay is zero, then the procedure continues with a thirteenth step 346.

After the tenth step if the delay is not zero, then in the twelfth step the delay is decreased by one and then the procedure goes back to the ninth step 340.

After the tenth step 342 if the delay is zero, then in the thirteenth step 346 the ready/busy line or token is acquired by the lift control module, the lift control module activates the actuator/motor concerned, waits until the position movement is ready, then the ready/busy line or token is released and the procedure continues with the first step 310.

After the fourth step 330 if the command was not a recall/goto memory position, then the sixth step will test and execute other commands such as lift up or lift down. The execution of these commands will also include all the checks to ensure that only one actuator/motor is active at a time.
CLAIMS

1. A method of controlling two or more actuators/motors of a motorized flat panel display platform, characterized in that the method comprises distributing a separate control module close to each actuator/motor, each control module being capable of controlling one actuator/motor, assigning each control module the identity of the actuator/motor it is controlling, each control module only reacting on control conforming to the identity of the module, and in that the method comprises coordinating the control of the actuators/motors by means of a communication link between all of the control modules.

2. The method of controlling two or more actuators/motors of a motorized flat panel display platform according to claim 1, characterized in that the communication link comprises activity token means and in that the method comprises only enabling one actuator/motor at a time by means of the activity token means of the communication link.

3. The method of controlling two or more actuators/motors of a motorized flat panel display platform according to claim 2, characterized in that the method comprises receiving commands by means of one or more of the control modules, each control module having received a command communicates it to the other control modules by means of the communication link between all of the control modules.

4. The method of controlling two or more actuators/motors of a motorized flat panel display platform according to claim 3, characterized in that the method comprises each control module prioritizing itself according to the assigned identity of the control module and according to received commands.
5. The method of controlling two or more actuators/motors of a motorized flat panel display platform according to claim 3 or 4, characterized in that when receiving a command the method further comprises in each control module determining if the command relates to the identity of the control module, and if the command is determined for the control module and concerns controlling the actuator/motor of the control module, then only when the activity token means is available acquiring the activity token means for a period of time the actuator/motor is actively controlled by the control module.

6. The method of controlling two or more actuators/motors of a motorized flat panel display platform according to claim 5, characterized in that the acquiring of the activity token means by a control module is only done after the activity token means has been available for a default delay time.

7. The method of controlling two or more actuators/motors of a motorized flat panel display platform according to claim 6, characterized in that each control module has a different default delay time.

8. The method of controlling two or more actuators/motors of a motorized flat panel display platform according to claim 6 or 7, characterized in that the method further comprising the control modules changing their default delay time in dependence on the received command to thereby change their priority among the control modules.

9. The method of controlling two or more actuators/motors of a motorized flat panel display platform according to claim 8, characterized in that the method comprises a control module attaining a high priority by having a default delay time shorter than any other default delay time.

10. The method of controlling two or more actuators/motors of a motorized flat panel display platform according to claim 8 or 9, characterized in that
the method comprises a control module attaining a low priority by having a default delay time longer than any other default delay time.

11. A control system arranged to control two or more actuators/motors of a motorized flat panel display platform, characterized in that the control system is a distributed decentralized control system comprising at least two physically separate control modules, each control module having an identity and being arranged to control one actuator/motor, each control module only reacting on control commands conforming with the identity of the control module, the control system further comprises communication means between all of the control modules to thereby enable coordination of the actuators/motors.

12. The control system according to claim 11, characterized in that the communication means comprises activity token means and in that the control system is arranged to only enable one actuator/motor at a time by means of the activity token means of the communication means.

13. The control system according to claim 12, characterized in that one or more of the control modules are arranged to receive commands, each control module is further arranged to communicates any received command to the other control modules by means of the communication means.

14. The control system according to claim 13, characterized in that each control module is arranged to prioritizing itself according to its identity and according to received commands.

15. The control system according to claim 13 or 14, characterized in that when receiving a command each control module is arranged to determine if the command relates to the identity of the control module, and if the command is determined for the control module and concerns controlling the actuator/motor of the control module, then only when the activity token
means is available, the control module concerned acquires the activity token means for a period of time the actuator/motor is actively controlled by the control module.

16. The control system according to claim 15, characterized in that each control module is arranged to only acquire the activity token means after the activity token means has been available for a default delay time.

17. The control system according to claim 16, characterized in that each control module is arranged with a different default delay time.

18. The control system according to claim 16, characterized in that the default delay time of a control module is dependent on the identity of the control module.

19. The control system according to any one of claims 16 to 18, characterized in that the control modules are arranged to change their default delay time in dependence on the received command to thereby change their priority among the control modules.

20. The control system according to claim 19, characterized in that each control module is arranged to attain a high priority by having a default delay time shorter than any other default delay time.

21. The control system according to claim 19 or 20, characterized in that each control module is arranged to attain a low priority by having a default delay time longer than any other default delay time.
A. CLASSIFICATION OF SUBJECT MATTER

According to International Patent Classification (IPC) or to both national classification and IPC:

INV. G05B19/418 F16M11/00 H04N5/64 G06F1/16 B60N2/04
A47B81/06

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G05B F16M H04N G06F B60N A47B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched:

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No</th>
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<tr>
<td>A</td>
<td>paragraphs [0002], [0046], [0069]; figures 3,4</td>
<td>2-9, 11-21</td>
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<td>A</td>
<td>US 5 457 370 A (EDWARDS JOHN R [AU]) 10 October 1995 (1995-10-10) the whole document</td>
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D

Further documents are listed in the continuation of Box C

[X] See patent family annex

* Special categories of cited documents

A* document defining the general state of the art which is not considered to be of particular relevance

E* earlier document but published on or after the international filing date

L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

O* document referring to an oral disclosure, use, exhibition or other means

P* document published prior to the international filing date but later than the priority date claimed

T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X* document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y* document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other documents, such combination being obvious to a person skilled in the art

&* document member of the same patent family

Date of the actual completion of the international search

5 December 2007

Date of mailing of the international search report

14/12/2007

Name and mailing address of the ISA/

European Patent Office, P B 5818 Patentlaan 2 NL- 2280 HV Rijswijk
Tel (+31-70) 340-2040, Tx 31 651 epo nl,
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