==================================================================

(optional) Team/University Name

Team NimbRo, University of Bonn

(optional) Team location

Bonn, Germany

Which humanoid leagues have you participated in

Kid Size, Teen Size

Which servo motors have you used till now

Robotis Dynamixels

Which dynamixel motors do you use?

RX64, MX64, EX106 series

Which protocol do you prefer for communicating with the motors?

RS485

Reason for the above preference

No preference.

What kind of hardware do you use for communicating with the motors?

Robotis CM controllers, Custom Data Converter Circuit

How do you power the motors?

4 cell LiPo, the same for all motors.

Additional custom power management circuitry

Not in the NimbRo-OP, but in our other robots we use a separate circuit
and power supply for the PC, which is very helpful, because you can
switch the robot on and off and leave the PC running. An emergency switch
that doesn't kill the PC is very useful.

How often do you replace motors?

Between 3-6 months


How do you service the motors?

Self troubleshooting, replace eletctric circuit or gears


Anything important about the service issues (previous question) you'd like to expand on...

About the question how often do you replace motors, it depends strongly on the robot. Some robots require very frequent repairs, sometimes every week, some robots are more resistant. Dynaped hasn't lost a single motor in 6 years so far. Copedo lost only a few due to human error in handling. The MX motors in the NimbRo-OP need frequent repairs. Dynaped and Copedo have master slave pairs per pitch joint and are driven with a high compliance. I think these two facts combined massively prolong the lifetime of the motors.


As the motors get old, have you noted any peculiar observations?

None, Rx-28 and RX-64 start jittering after a while. EX and MX do not.


In general have you faced a peculiar problem with the motor? and how have you tackled them?

We have faced issues  with the MX motors combined with the CM730 board and ended up modifying the firmware.


Mechanically, have you made any modifications to the motor design to better fit your robot?

No


If yes, then can you briefly mention what parts of this motor can be modified?

Sometimes we take off the case of cut a piece of the case off to better fit the motor into the robot.


Lastly, is there anything that you think these motors miss out on? or any feature which is really good?

NA

Any Pro Tips you'd like to share with the community?

NA

For the advanced motors, what control mechanism do you prefer?

PID (Like in the MX 106)

==================================================================

(optional) Team/University Name

Hamburg Bit-Bots / University of Hamburg

(optional) Team location

Germany / Hamburg

Which humanoid leagues have you participated in

Kid Size

Which servo motors have you used till now

Robotis Dynamixels

Which dynamixel motors do you use?

MX28, MX64

Which protocol do you prefer for communicating with the motors?

RS485

Reason for the above preference

NA

What kind of hardware do you use for communicating with the motors?

Robotis CM controllers

How do you power the motors?

 3 Cell LiPo battery for 20-24 Motors

Additional custom power management circuitry

up until now we have used the Darwin-OP. Now the develop a solution to use 2 batteries one after another for simpler on-line replacement.

How often do you replace motors?

6 months to 1 Year

How do you service the motors?

Self troubleshooting, Online help through forums, Discard and replace with fresh motor

Anything important about the service issues (previous question) you'd like to expand on...

At the moment we are developing own Motors, electrical compatible to robotis motors

As the motors get old, have you noted any peculiar observations?

Degradation of torque, Issues with data communication, Wrong response to data

In general have you faced a peculiar problem with the motor? and how have you tackled them?

if you write to the rom an turn off the power to fast, all registers in the motor is reseted to default (including calibration and id)

Mechanically, have you made any modifications to the motor design to better fit your robot?

No

If yes, then can you briefly mention what parts of this motor can be modified?

NA

Lastly, is there anything that you think these motors miss out on? or any
feature which is really good?

- brushless motors


Any Pro Tips you'd like to share with the community?

NA


For the advanced motors, what control mechanism do you prefer?

PID (Like in the MX 106)

==================================================================


(optional) Team/University Name

Plymouth Humanoids


(optional) Team location

Plymouth UK


Which humanoid leagues have you participated in

Kid Size


Which servo motors have you used till now

Robotis Dynamixels


Which dynamixel motors do you use?

MX28, RX28/RX24


Which protocol do you prefer for communicating with the motors?

RS485


Reason for the above preference

We made the decision when we first started to use RS485 and have stuck
with it since.

What kind of hardware do you use for communicating with the motors?

Robotis USB to Dynamixel converter, Custom Data Converter Circuit

How do you power the motors?

4 Cell LiPo battery, we may be going back to 3 Cell based on the recommended voltage for the MX series.

Additional custom power management circuitry

We have our own electronics with battery protection, fuse and regulation.

How often do you replace motors?

Less than 3 months

How do you service the motors?

Self troubleshooting, Discard and replace with fresh motor, Robotis gear replacement kit

Anything important about the service issues (previous question) you'd like to expand on...

Our robots are heavily used for teaching and school activities and therefore they fall over a lot and walk a lot.

As the motors get old, have you noted any peculiar observations?

Degradation of torque

In general have you faced a peculiar problem with the motor? and how have you tackled them?

The servo freely moves more and more as it gets older ie. starts with 2 degrees increases to 5 over time.

Mechanically, have you made any modifications to the motor design to better fit your robot?

No

If yes, then can you briefly mention what parts of this motor can be modified?

NA

Lastly, is there anything that you think these motors miss out on? or any feature which is really good?

NA

Any Pro Tips you'd like to share with the community?

NA


For the advanced motors, what control mechanism do you prefer?

PID (Like in the MX 106)

===================================================================

(optional) Team/University Name

Team AcYut

(optional) Team location

India

Which humanoid leagues have you participated in

Teen Size

Which servo motors have you used till now

Robotis Dynamixels

Which dynamixel motors do you use?

RX28/RX24, RX64, MX64, EX106 series, MX106 series

Which protocol do you prefer for communicating with the motors?

RS485

Reason for the above preference

Ex motors lack pid control. The compliance setting is useful in increasing tolerances for a smoother walk, or decreasing it for a more accurate one. Motor readings are essential for the former walk, because the errors introduced are actively corrected.

What kind of hardware do you use for communicating with the motors?

Robotis USB to Dynamixel converter

How do you power the motors?

4 cell lipo battery

Additional custom power management circuitry

We place motors in a parallel circuitry as opposed to the designated daisy chain, since too many motors in series results in severe voltage drop.
Fluctuations are a major issue, and have been dealt with using high gauge wires and regulator boards.

How often do you replace motors?

Between 1 - 2 years

How do you service the motors?

Self troubleshooting, Online help through forums, Return to robotis for service(RMA), Discard and replace with fresh motor

Anything important about the service issues (previous question) you'd like to expand on...

Motors, if not supplied the designated voltage rating without fluctuations, rapidly degrade. They are relative durable if powered appropriately.

As the motors get old, have you noted any peculiar observations?

Degradation of torque, Issues with data communication

In general have you faced a peculiar problem with the motor? and how have you tackled them?

They tend to cease communication  without any clear reason.  They occasionally also rotate without stopping which can be dangerous depending on the placement of the motor. We have no proper solution to this yet.


Mechanically, have you made any modifications to the motor design to better fit your robot?

No


If yes, then can you briefly mention what parts of this motor can be modified?

NA


Lastly, is there anything that you think these motors miss out on? or any feature which is really good?

They need to be more about certain limitations of their system. For instance, daisy chaining several motors is not an effective system.


Any Pro Tips you'd like to share with the community?

Measure the voltage pattern across the kooks on your system. Act decisively to fix the problem if an anomaly is detected.


For the advanced motors, what control mechanism do you prefer?

Compliance Slope (like the Ex 106)

==================================================================


(optional) Team/University Name

Cyberlords / Universidad La Salle


(optional) Team location

Mexico


Which humanoid leagues have you participated in

Kid Size


Which servo motors have you used till now

Kondo


Which motor do you use? Which country is the manufacturer based?

Kondo KRS-2552HV and KRS-2572HV
The manufacturer is based in Japan


How do you power the motors?

NA


How often do you replace motors?

Between 1 - 2 years


How do you service the motors?

Self troubleshooting


Anything important about the service issues (previous question) you'd like to expand on...

Usually what gets broken in these motors is either the power circuit (gets burned due to overcurrent) or the gears. For the power circuit it is relatively easy to replace it on the motor's electronic board. Replacement gears are available from some stores online, but not as easy to buy as the motors. Most stores for Kondo motors and accessories are Japanese-only.


Mechanically, have you made any modifications to the motor design to better fit your robot?

No


If yes, then can you briefly mention what parts of your motor can be modified?

NA


Lastly, is there anything that you think your motors miss out on?

Technically, Kondo motors are very good. However, there is a clear lack of documentation. The manufacturer only gives documentation in Japanese, and a lot of details get lost with automatic translations. If you are

planning to use this brand of motors be ready for a lot of
experimentation and even a bit of reverse engineering.


Any Pro Tips you'd like to share with the community?

Kondo KRS-2552HV servos are low torque (14 kg cm), so they are designed
for very light robots. Our robots' weight is in the range of 2.2kg. We
are currently upgrading with KRS-2572HV for some of the leg joints. These
motors are 25 kg cm.


How do you power the motors?

3S LiPo for all servos


For the advanced motors, what control mechanism do you prefer?

NA

====================================================================


(optional) Team/University Name

RoboFEI


(optional) Team location

Brazil


Which humanoid leagues have you participated in

Kid Size


Which servo motors have you used till now

Robotis Dynamixels


Which dynamixel motors do you use?

RX28/RX24


Which protocol do you prefer for communicating with the motors?

RS485

Reason for the above preference

Our first robot was built with servo RX28, so we decided to keep this motor in the other robots in order to keep interchangeability.


What kind of hardware do you use for communicating with the motors?

Custom Data Converter Circuit


How do you power the motors?

LiPo battery - 5 cells 2000mAh


Additional custom power management circuitry

We are just using diodes in order to protect the servos.


How often do you replace motors?

Between 3-6 months


How do you service the motors?

Self troubleshooting


Anything important about the service issues (previous question) you'd like to expand on...

Actually, we haven't been replacing the motors. As our main problem are the gears, we have tried to replace only the gear set.


As the motors get old, have you noted any peculiar observations?

Gears constantly break.


In general have you faced a peculiar problem with the motor? and how have you tackled them?

Once we bought the RX24 in order to test and we couldn't achieve the specified torque. We compared the RX28 with the RX24, both in 12V. According to the manuals, torques should be almost the same: approx. 2.7Nm to RX28 and approx. 2.6Nm to RX24, but this just didn't happen.

We complained to Robotis, but their explanation was not conclusive for us.

Mechanically, have you made any modifications to the motor design to better fit your robot?

No


If yes, then can you briefly mention what parts of this motor can be modified?

NA


Lastly, is there anything that you think these motors miss out on? or any feature which is really good?

NA


Any Pro Tips you'd like to share with the community?

NA


For the advanced motors, what control mechanism do you prefer?

NA

==================================================================

(optional) Team/University Name

Baset


(optional) Team location

Iran


Which humanoid leagues have you participated in

Kid Size, Teen Size


Which servo motors have you used till now

Robotis Dynamixels


Which dynamixel motors do you use?

MX28, MX64, MX106 series


Which protocol do you prefer for communicating with the motors?

RS485


Reason for the above preference

NA


What kind of hardware do you use for communicating with the motors?

Custom Data Converter Circuit


How do you power the motors?

Usually, 3 Cell LiPo battery
Depending on the situation we are also using 4 Cell LiPO battery.


Additional custom power management circuitry

There is always a circuit between battery and motors which controls the
voltage and the maximum current flow to the motors.

We never connect the battery directly to the actuators.


How often do you replace motors?

Between 1 - 2 years


How do you service the motors?

Self troubleshooting


Anything important about the service issues (previous question) you'd
like to expand on...

NA


As the motors get old, have you noted any peculiar observations?

Mechanical issues

In general have you faced a peculiar problem with the motor? and how have you tackled them?

NA


Mechanically, have you made any modifications to the motor design to better fit your robot?

Yes


If yes, then can you briefly mention what parts of this motor can be modified?

NA


Lastly, is there anything that you think these motors miss out on? or any feature which is really good?

NA


Any Pro Tips you'd like to share with the community?

NA


For the advanced motors, what control mechanism do you prefer?

PID (Like in the MX 106)

================================================================


(optional) Team/University Name

Institute of technology San Martin texmelucan


(optional) Team location

Mexico


Which humanoid leagues have you participated in

Kid Size


Which servo motors have you used till now

Robotis Dynamixels

Which dynamixel motors do you use?

AX12/AX18 series, MX28, MX64, MX106 series


Which protocol do you prefer for communicating with the motors?

TTL


Reason for the above preference

NA


What kind of hardware do you use for communicating with the motors?

Robotis CM controllers, Robotis USB to Dynamixel converter


How do you power the motors?

im usign the lipo bateries 3 cell for the all motors


Additional custom power management circuitry

we are doing a circuit for battery saving separation of engines and computing


How often do you replace motors?

6 months to 1 Year


How do you service the motors?

Self troubleshooting


Anything important about the service issues (previous question) you'd like to expand on...

NA


As the motors get old, have you noted any peculiar observations?

Degradation of torque, Issues with data communication, Wrong response to data

In general have you faced a peculiar problem with the motor? and how have you tackled them?

NA


Mechanically, have you made any modifications to the motor design to better fit your robot?

NA


If yes, then can you briefly mention what parts of this motor can be modified?

NA


Lastly, is there anything that you think these motors miss out on? or any feature which is really good?

NA


Any Pro Tips you'd like to share with the community?

NA


For the advanced motors, what control mechanism do you prefer?

PID (Like in the MX 106)

==================================================================


(optional) Team/University Name

FUmanoids


(optional) Team location

Berlin, Germany


Which humanoid leagues have you participated in

Kid Size


Which servo motors have you used till now

Robotis Dynamixels


Which dynamixel motors do you use?

RX28/RX24, RX64


Which protocol do you prefer for communicating with the motors?

RS485


Reason for the above preference

Our servos only speak RS485.


What kind of hardware do you use for communicating with the motors?

http://www.fumanoids.de/hardware/erolf/


How do you power the motors?

4 cell LiPo battery (2200mAh) powering 10 RX64 and 10 RX28


Additional custom power management circuitry

We use our own board (http://www.fumanoids.de/hardware/powerboard).

Additionally the last servos in each chain are equipped with a small PCB
(http://www.fumanoids.de/hardware/schluecki) that in combination with the
power board prevents damage to the RX28/64's MAX485 chips in case of
short-circuits in the cables (vcc to data).


How often do you replace motors?

6 months to 1 Year


How do you service the motors?

Self troubleshooting


Anything important about the service issues (previous question) you'd
like to expand on...

Using http://www.fumanoids.de/hardware/schluecki and sensible settings in
the Dynamixel (temperature control, etc) we hardly ever have any
circuitry issues anymore.

Main issue are the gears, which we replace when needed (we do not really keep track of the average time, as this is quite different depending on the joint). This is the main reason we "replace" a servo.

We also upgraded our RX servos a few years ago with a custom add-on, replacing the potentiometer with a hall sensor, eliminating the other main issue with the Dynamixel RX servo line.


As the motors get old, have you noted any peculiar observations?

NA


In general have you faced a peculiar problem with the motor? and how have you tackled them?

Our main issues (except wear and tear) were short-circuits in the servo cables, causing the MAX485 transceivers to be blown. For the Dynamixel RX we solved this issue using http://www.fumanoids.de/hardware/schluecki together with a power board that will shut-down in case of short circuits.

For the RX line the potentiometers were another issue, this should be replaced by hall sensor if possible (we did our own design, but there's also e.g. the DDServo project that replaces the complete RX28/64 circuitry).


Mechanically, have you made any modifications to the motor design to better fit your robot?

No


If yes, then can you briefly mention what parts of this motor can be modified?

NA


Lastly, is there anything that you think these motors miss out on? or any feature which is really good?

NA


Any Pro Tips you'd like to share with the community?

To limit the wear on gears, we do not use aggressive compliance margin/slope values but rather try to compensate in software. We also make sure the robot detects falls and takes a certain posture to limit

the damage to gears on impact. The robot will also turn certain servo motors off (e.g. in the arms) before impact to prevent gears to break.

Overheating and similar issues can be addressed in software (the Dynamixels allow to set an "alarm", turning the servos off before they are damaged).

==================================================================

(optional) Team/University Name

Bold Hearts

(optional) Team location

London, UK

Which humanoid leagues have you participated in

Kid Size

Which servo motors have you used till now

Robotis Dynamixels

Which dynamixel motors do you use?

MX28

Which protocol do you prefer for communicating with the motors?

NA

Reason for the above preference

NA

What kind of hardware do you use for communicating with the motors?

Robotis CM controllers, Robotis USB to Dynamixel converter

How do you power the motors?

NA

Additional custom power management circuitry

NA


How often do you replace motors?

Between 1 - 2 years


How do you service the motors?

Self troubleshooting, Online help through forums, Discard and replace
with fresh motor


Anything important about the service issues (previous question) you'd
like to expand on...

NA


As the motors get old, have you noted any peculiar observations?

NA


In general have you faced a peculiar problem with the motor? and how have
you tackled them?

We're pretty much a standard Darwin team, with a background in software.
The biggest issue we've seen has been motors fusing (due to labouring in
a 'stuck' pose -- which was fixed in software) and gear teeth shearing
off (due to unreasonable motion planning and hard falls -- which were
also mostly fixed in software).


Mechanically, have you made any modifications to the motor design to
better fit your robot?

No


If yes, then can you briefly mention what parts of this motor can be
modified?

NA


Lastly, is there anything that you think these motors miss out on? or any
feature which is really good?

I'd really like to be able to rearrange the control table on the MX28 to more effectively bulk read/write the values I want. The Dynamixel Pro series support writing an address mapping into EEPROM. Don't think the MX28 have enough free EEPROM slots, but I'd be happy to do this at boot time and write into volatile memory. This would allow better utilisation of the motors' capabilities whilst still hitting the 125Hz update rate I currently maintain.

Any Pro Tips you'd like to share with the community?

NA

For the advanced motors, what control mechanism do you prefer?

PID (Like in the MX 106)