HINTS & TIPS – Advanced

Once you have some experience with building and programming Dance or Theatre robots for Robocup Junior, you will want to start creating entries that can showcase some more advanced engineering and programming skills.

Interesting movements:

Try using gears and racks, scissor lifts, pulleys, or offset cams in your robot design to give interesting movements.
This will require building skill to incorporate them in a way that is stable, sturdy and allows for reliability. Programming will also be more difficult for mechanisms that don't allow a motor to just continually spin to operate, but this can be immensely rewarding when conquered!

For ideas of interesting ways to use Lego parts, have a look at Toranomaki by Isowgawa Yoshihito.
http://www.isogawastudio.co.jp/legostudio/toranomaki/en/index.html
The PDF contains 215 pages of coloured photos of interesting Lego mechanisms to get your creative juices flowing.

An example from Toranomaki

Use of Sensors:

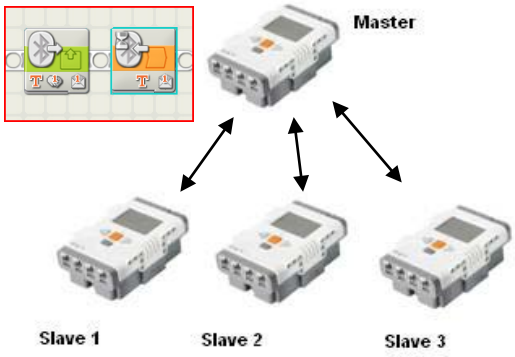
Robots and their programming can be made more complex by using sensors.
Learning to use sensors to control non-critical parts of the robots can be a way that you can experiment, without having the whole performance rely on it working perfectly every time. (Eg Non critical -having eyes flash every time the ultrasonic sensor detects another robot in close proximity, Critical: Having the robot drive at full speed to the edge of the dance floor until the light sensor detects the boundary!)
If using sensors that are affected by ambient readings (eg. light & sound sensors), it's important to know how to calibrate them for conditions on the day. For example a light sensor that works well at detecting a black line on a white background in a bright classroom, may not be able to detect the difference between the two colours in a dimly lit Dance area on competition day.
The background noise on competition day may be greater than the threshold value set on a Sound sensor while practising in a classroom, leading to great frustration when your robot starts it's dance moves to audience mutterings, rather than on your clap. Manually calibrate after taking maximum and minimum sensor readings at the competition, or write a calibration routine into your program, so that you calibrate on the dance floor after starting your program.

You can have a lot of fun experimenting with using other types of sensors in your performance:
Colour Sensor : Program different movements for when your robot crosses different coloured lines on your custom floor.
Gyro Sensor (EV3): Program robot movement to measured angles.
Touch Sensor: Build Bumpers with a touch sensor in to your robot design and have it interact with a solid prop.
Sound Sensor (NXT): Try datalogging your audience's reactions to your performance to see when you received the loudest applause!

Multiple Processor Robots:

Robots can be built to contain more than one processor. Two NXT or EV3 bricks within one robot will allow you to control 6 to 8 motors (or outputs including lamps) and 8 sensors. This can allow very interesting designs with many different types of movement. The Program on each processor will run independently, but can be synchronised at different points of the program using Sensor inputs or Bluetooth communication.

Bluetooth Communication:



The NXT and EV3 allows communication via Bluetooth between processors. This can be an excellent way of synchronising multiple robots, or multiple processors within a robot.
One Brick is required to be the Master, and there can be up to 3 slaves. The Master can send and receive messages to every slave. A slave can only send and receive to the master, not to each other.
The simplest way to use Bluetooth in a NXT-G program is to have the Master use a Send message block, together with a WAIT block, set to sensor: Receive message within the slave's program.
You will need to allow at least 1 second between sending messages to different NXTs to allow the processor time to change channels.
Dr Damien Kee has produced excellent video tutorials on how to set up bluetooth communication between NXTs.
http://www.damienkee.com/home/2013/2/22/nxt-nxt-bluetooth-tutorial.html

Let your imagination run riot! Dance and Theatre are challenges which allow for ultimate creativity and can be as simple or complex as you choose.

Document successes and failures in your Log Book or journal and share your record of learning with others.