JAVA in LEGO Robotics

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About JAVA and LEGO Robotics…

Java is a high-level, object-oriented programming language that is designed to run on a variety of platforms, including desktop computers, servers, mobile devices, and embedded systems. It was first released in 1995 by Sun Microsystems (Oracle Corporation) and has since become one of the most popular programming languages in the world.

Java is used to develop a wide range of applications, including web applications, mobile apps, enterprise software, and games.

As for LEGO Robotics, it refers to the use of LEGO building blocks, combined with programmable motors, sensors, and control units, to create robots and other interactive devices. Along with specialized components such as motors, sensors, and a programmable "brain" or control unit. These components can be assembled into robots and other devices, which can then be programmed to perform a wide range of tasks.

LEGO Robotics EV3 is the third generation of LEGO Robotics, following the NXT and RCX systems. The EV3 brick is the central component of the LEGO Robotics EV3 platform. It is a small computer that serves as the brain of the robot, allowing it to receive input from sensors and control the movement of motors. The EV3 brick features a color screen, buttons for user input, and ports for connecting sensors and motors.

What programs was used…

The programs were used for this project, which are LeJOS, Eclipse and JAVA. LeJOS is a free, open-source firmware for LEGO Robotics EV3 that allows users to program their robots using the Java programming language. It stands for "Java for LEGO Mindstorms," and is designed to be a more powerful and flexible alternative to the standard LEGO Robotics EV3 programming environment.

Eclipse is a popular integrated development environment (IDE) that is commonly used for developing Java programs. It can also be used for programming robots with leJOS and LEGO Robotics EV3. To use Eclipse with leJOS and LEGO Robotics EV3, you will need to first install the leJOS firmware on your EV3 brick. Once you have done this, you can then set up Eclipse to work with the leJOS libraries and tools.


Putting it together…

It is also possible to install leJOS on a LEGO EV3 brick using an SD card. Here are the basic steps to install leJOS on the EV3 brick with an SD card: **1)** Download the leJOS firmware: By downloading the latest version of the leJOS firmware from the leJOS website. **2)** Format the SD card: Insert an SD card into the computer and format it. **3)** Copy the leJOS firmware to the SD card: Copy the leJOS firmware file to the root directory of the SD card. **4)** Insert the SD card into the EV3 brick: Turn off the EV3 brick and insert the SD card into the slot on the side of the brick. **5)** Boot the EV3 brick: Turn on the EV3 brick and wait for the leJOS firmware to boot up. Which it took a total wait time of 10 minutes. **6)** Test the installation: Once leJOS is installed on the EV3 brick, you can test it by running a simple Java program.

To use Eclipse with leJOS, it need to install the leJOS plugin for Eclipse. Here are the steps to install the leJOS plugin: **1)** Download and install Eclipse from its website. **2)** Install the leJOS plugin: Open Eclipse and go to the Help menu. Choose "Eclipse Marketplace" and search for "leJOS." Install the leJOS plugin for Eclipse. **3)** Create a new leJOS project: After installing the leJOS plugin, I have to create a new leJOS project in Eclipse. By going the File menu and choose "New" and then "Project." Select "leJOS EV3 Project" from the list of project types. **4)** Configure the leJOS settings: Once I created a new leJOS project, it need to configure the leJOS settings. Right-click on the project and choose "Properties" from the menu. Click on "leJOS EV3" in the left-hand pane and select the appropriate options for the project. **5)** Write and run your leJOS program: With the leJOS plugin installed and the project configured, I can now write and run leJOS programs in Eclipse.

By using Eclipse with the leJOS plugin, I can take advantage of the powerful features of Eclipse, such as code completion, debugging, and version control, while also leveraging the advanced capabilities of leJOS and LEGO Robotics EV3 for programming robots.
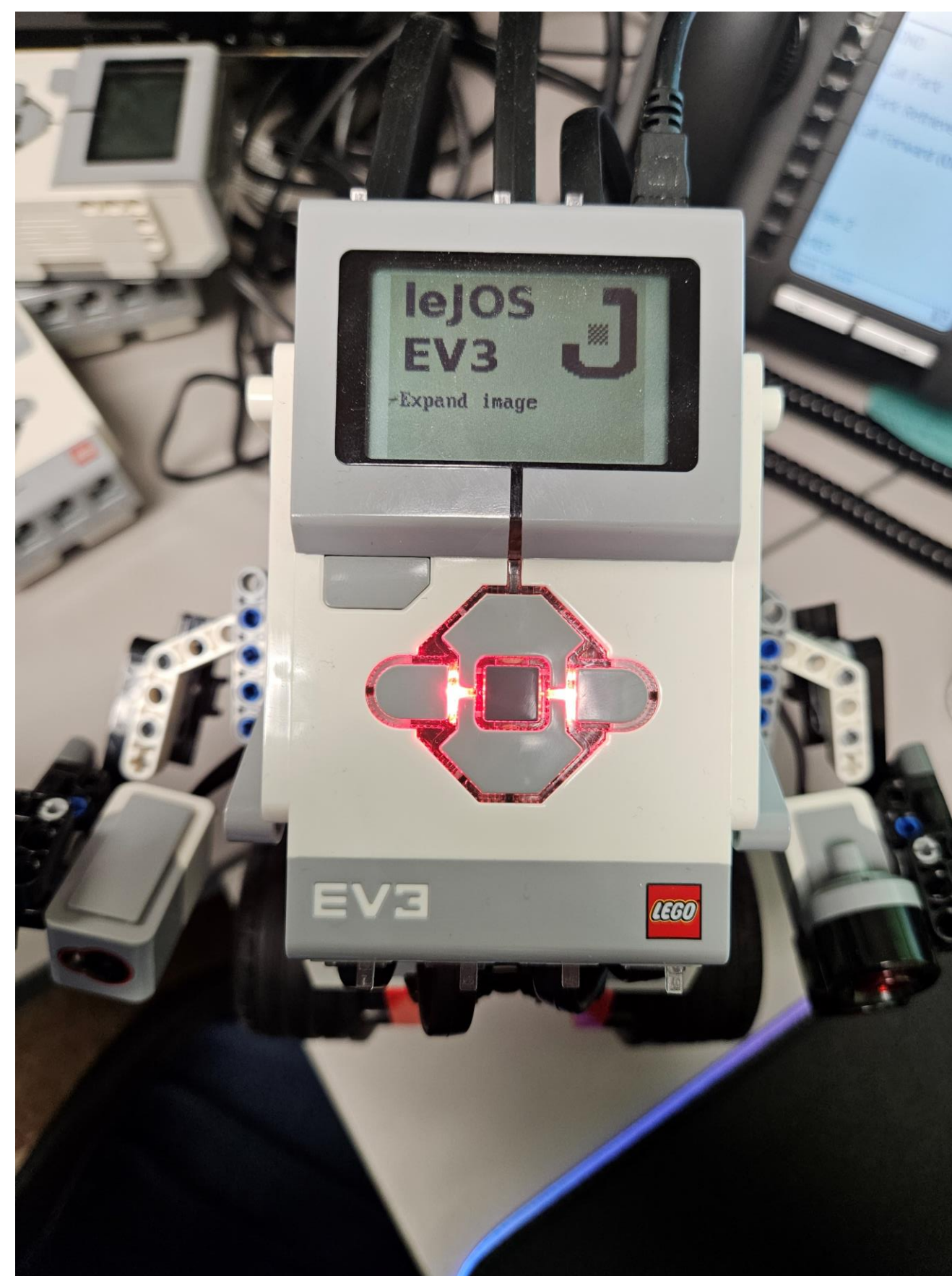
What parts of the Robot are used?

The LEGO EV3 Gyro Boy model uses the gyroscopic sensor as its primary sensor for balancing on two wheels. The gyroscopic sensor is a high-precision sensor that measures rotational motion and provides accurate angle and rate data.

In addition to the gyroscopic sensor, the Gyro Boy model also includes two touch sensors and two-color sensors. The touch sensors are used to detect physical contact with objects and can be used to implement collision detection or touch-based user interfaces. The color sensors are used to detect the color of objects and can be used for line following or color-based object recognition.

The EV3 gyro sensor has a range of ±3,200 degrees per second and can detect changes in orientation as small as 0.01 degree. It uses a MEMS (micro-electro-mechanical systems) technology to sense the angular motion and has a built-in 3-axis accelerometer that provides additional data on the robot's acceleration and tilt.

In programming, the gyro sensor is typically used to control the robot's movements and maintain balance by providing feedback on its orientation. For example, the gyro sensor can be used to detect when the robot is leaning forward or backward and adjust the motor speeds accordingly to keep it upright. It can also be used to detect turns and changes in direction and perform precise movements.