New Visual Programmer Converter that allows the Hummingbird Duo to Run Untethered

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Motivation

- Allow novice students to use untethered mode by translating Visual Programmer code to Arduino code.
- Learning how to code could be a frustrating process for many novice users.
- Expose students to the code to facilitate the transition of students from novice to intermediate.
- Encourage young students to pursue fields in electronics, programming and robotics.
- Provide a more comfortable environment when using the Hummingbird Duo.
- Easier mobility.

Background

- The Hummingbird is a robotics kit designed for educational purposes.
- The user programs the Hummingbird controller to manipulate components such as LEDs, Motors and Sensors.
- The newly released Hummingbird Duo has integrated an Arduino Leonardo in addition to standard Hummingbird capabilities.
- The Hummingbird Duo can currently be programmed with Visual Programmer or with Arduino code.

Visual Programmer components and their conversion

Visual Programmer

- Novice Users
- Easy to learn
- Limited programming complexity
- Tethered operation

Arduino Code

- Advance Users
- Text language requires user to learn syntax
- Can create complex and elaborated programs
- Untethered operation

Easier mobility when using the Hummingbird Duo.

Counter

Sequences

Conditional Loops

Expressions

Counter:

```java
for(int counter = 0; counter <5; counter++){
    LED1();
    delay(500);
    Servo27();
    delay(1000);
}
```

Sequences:

```java
StartMotor();
delay(1000);
blue();
//Start Seq: Sequence.xml
Ltd1();
delay(1000);
Servo27();
delay(1500);
blue();
//End Seq: Sequence.xml
```

Conditional Loops:

```java
if(hummingbird.readSensorValue(3)<511) {
    blue();
    delay(1000);
} else {
    red();
    delay(1000);
}
```

```java
while(true){
    if(hummingbird.readSensorValue(3)<511) {
        blue();
        delay(1000);
    } else {
        red();
        delay(1000);
    }
}
```

Discussion

Sensor conversion

The values from the Visual Programmer are given in percent format, and a conversion was needed. For potentiometer and distance sensor, a conversion to the opposite equivalent value within a range was applied, and the range values for distance and temperature were modified.

Limitations

To change the Hummingbird Duo from Arduino Mode back to Hummingbird Mode a firmware burner is needed.

Availability

The converter is available as a standalone application and integrated in the Visual Programmer.

Conclusion

This is a tool for any user that wishes to use the Hummingbird Duo controller in Arduino Mode and does not have the knowledge and/or the time for developing the code.

References

- http://www.hummingbirdkit.com/learning/software/visual-programmer
- http://www.cmureatelab.org/projects/Arts_Bots
- http://artsandbots.posthaven.com/pages/research