The Drawstuff Library

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Marc Schraffenberger
Introduction

The Drawstuff library comes with the Open Dynamics Engine. It allows someone who has little or no background in 3D graphics to create simple environments for testing out the ODE functions.

The Drawstuff library gives functions for drawing simple shapes, such as spheres, boxes, triangles, cylinders, and lines. Each shape can be translated, rotated, and scaled. There are also some functions to allow for moving the camera.
Simulation Functions

• Each program needs to define a number of functions in-order for the Drawstuff library to work properly.

• When the simulation is turned over the Drawstuff library, it will call these functions at various times during the simulation.

• Functions:
  - `void start()` – called before simulation starts. Typically used to initialize the camera and other objects.
  - `void step(int pause)` – called before every frame is displayed on the screen.
  - `void command(int cmd)` – called is a key is pressed.
  - `void stop()` - called after the simulation is finished.
Starting the Simulation

- After defining the your functions, you must tell the Drawstuff library about them.
- This is done by giving function pointers to the library. Once the library has the pointers to your functions it can call them during the simulation.
- After you give the function pointers to the library, you can start the simulation.
- The following slide shows a generic `main` function for setting up and using the Drawstuff library.
int main(int argc, char** argv)
{
    // set function pointers
    dsFunctions fn;
    fn.version = DS_VERSION;
    fn.start = start;
    fn.step = step;
    fn.command = command;
    fn.stop = 0;
    fn.path_toTextures = "textures/";

    // run simulation
    dsSimulationLoop (argc, argv, 640, 480, &fn);

    return 0;
}
Draw a Sphere

- To draw a sphere you call the following function:

```c
void dsDrawSphere(float pos[3], float R[12], float radius);
```

- **pos** – is x,y,z of center of object
- **R** – is the rotation matrix
- **radius** – is the radius of the sphere
Draw a Box

• To draw a box you call the following function:

```c
void dsDrawBox(float pos[3], float R[12], float sides[3]);
```

- `pos` – is x,y,z of center of object
- `R` – is the rotation matrix
- `sides` – length of the x,y,z sides of the box
Change Texture or Color

• Before telling the Drawstuff library to draw an object you can specify what texture or color to draw it as.

• `void dsSetColor (float red, float green, float blue);`
  - where the red, green, and blue values are between 0.0 – 1.0
  - By combining the values you can generate all colors
  - For example (1.0, 1.0, 0.0) is yellow

• `void dsSetText (int texture_number);`
  - where the `texture_number` should be `DS_WOOD` to make the object look like wood.
Camera Functions

- There are a couple functions available to change what the camera is look at:
  - `void dsSetViewpoint (float xyz[3], float hpr[3]);`
    - `xyz` – sets the position of the camera
    - `hpr` – sets the heading, pitch, and roll of the camera
  - `void dsGetViewpoint (float xyz[3], float hpr[3]);`
    - giving the `xyz` and `hpr` as float pointers of size 3
    - the values of the camera will be stored in the given arrays