Landfill Model User Guide

Description

There are 7 buttons paired with 7 audio tracks. When a user presses a button, a section of lights will show on the display accompanied by an audio file. Once the audio track ends, the lights will also turn off. One light, representing the methane gas flame, will always be lit when the model is powered.

The landfill model is run by two Arduino Nano with one controlling lights and one controlling audio. A speaker amplifier is provided for audio output. The audio track files live on the microSD card in the breakout board with the second Arduino Nano. The audio files on the SD card can be replaced. See sections below for more information on track naming and formatting.

Volume adjustment is done via the speaker amplifier.

Audio Track Information

The audio tracks are labeled using the scheme “TRACK000.wav” where “000” is the track identifier. These track numbers correspond to the buttons which light up specific sections. If new audio tracks are loaded onto the SD card, Arduino Board 1 will need to be reprogrammed to include the audio file lengths. See “Programming” for more information. The default track lengths are listed below.

Track Number	Description	Default Time (sec)
“000”	Electric Power Plant	22
~~“001”~~	~~Empty - Not Used~~	
“002”	Ground Water	20
“003”	Ground Liner	22
“004”	Leachate Runoff	26
“005”	Gas Collection	22
“006”	Garbage Layer	14
“007”	Ground (Surface Layer)	26

Track Formatting

The Arduino uses the TMRpcm library to play audio track from a microSD card. The full documentation for this library can be found at https:/github.com/TMRh20/TMRpcm/wiki.
In summary, the tracks should be formatted as follows:
Mono track
32000Hz (22050, 1600, 11025 also work)
WAV, Unsigned 8 bit PCM

Troubleshooting

Model won’t turn on
There are two power cords needed to power the model. Ensure both are plugged in. Additionally, there is a power switch for the electronics boards located near Arduino Board 1. Ensure this switch is on.

No Audio When Pressing Buttons
Check the volume control. There is a volume knob on the speaker amplifier near Arduino Board 1. Additionally, there is a small switch on the Arduino Board 2 that controls power to the SD card. Ensure the switch is enabled.

No Lights When Pressing Buttons
Ensure the LED Lights are connected to power. There are multiple wires that flow through the model to provide power and data. Ensure these wires are in working condition.

Programming

Code located at https://github.com/arcanaworkshop

There are two Arduino Nano boards. Board 1 is the master and mainly controls all the Leds and Button Input. Board 1 is the master to control the slave Arduino (Board 2) which controls audio playback. Board 2 uses the micro SD card breakout board. To program Board 2, the SD car must NOT be connected to the board. The MISO/MISI connections with the usbtiny during programming will cause the program upload to fail. There is a switch on the circuit board that disables the SD card interface. Turn this off when programming. Once programming is done, turn the switch back on. Otherwise, no audio files will play during operation.