

# Student Handout: Lesson 4 - Programming a Shakermeter

## Welcome to the World of Shakermeter!

Get ready to program a **Shakermeter**—a cool tool that shows how much the ground shakes under your feet in real time! Using your Raspberry Shake and Node-Red, you'll turn seismic data into a live gauge you can watch jump when you bang the table or stomp around. Let's dive in!

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## What You'll Need

- Raspberry Shake (set up and powered on)
  - A computer or Raspberry Pi running Node-Red
  - Both devices on the same network (e.g., school Wi-Fi)
  - A web browser (like Chrome or Firefox)
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## Step 1: Connect Your Raspberry Shake to Node-Red

**Goal:** Get your Shake sending live data to Node-Red.

1. **Check Your Network:** Make sure your Raspberry Shake and the device running Node-Red (your computer or Pi) are on the same Wi-Fi or wired network.
2. **Find Your IP:** On the Node-Red device, open the terminal (a command-line tool) and type `ifconfig` (Linux) or `ipconfig` (Windows) to find its IP address (e.g., `192.168.1.100`).
3. **Set Up the Shake:**
  - Open a browser and go to `rs.local`.
  - Click **Settings > UDP STREAMS**.
  - Enter your Node-Red device's IP and port `8888`. Hit the "plus" icon, then "Save."
4. **Receive the Data in Node-Red:**
  - Open Node-Red in a browser at `localhost:1880` on the Node-Red device.
  - Drag a **UDP IN** node from the left palette (under "input").
  - Double-click it, set Port to `8888`, Output to "a String," and Name it "UDP RECEIVER." Click Done.

- Drag a **Debug** node (under “output”), connect it to UDP RECEIVER, and click “Deploy” (top-right red button).
- Check the debug tab (right side)—do you see data streaming? If not, ask your teacher to check the network!

#### 5. Parse the Data:

- Go to **Manage Palette** (top-right menu), search “shake,” and install the “Raspberry Shake Parser” node.
- Add it after the UDP RECEIVER and connect them. Add another Debug node after it. Deploy again—see the data split into parts like “EHZ” (your Shake’s sensor)!

## Step 2: Build Your Shakemeter

**Goal:** Make a gauge that shows ground shaking live!

### 1. Process the Shaking:

- Copy this code:

```
[
{
  "id": "d5d2efbb.2600e",
  "type": "function",
  "z": "b308f371.c9fa",
  "name": "Absolute Amplitude",
  "func": "acc = 0; \nnum = 0; \nfor(const p of msg.payload.packets)
\n{\n acc += Math.abs(p); \n num++; \n}\nacc /= num; \n\nmsg.payload = acc;
\nreturn msg;",
  "outputs": 1,
  "noerr": 0,
  "x": 570, "y": 360,
  "wires": [ ["c8911fad.47f72"] ]
},
{
  "id": "c8911fad.47f72",
  "type": "smooth",
  "z": "b308f371.c9fa",
```

```

    "name": "",
    "property": "payload",
    "action": "mean",
    "count": "25",
    "round": "0",
    "mult": "single",
    "x": 780, "y": 360,
    "wires": [ ["6270e4ac.2138fc", "64858a7e.ecae14"] ]
  }
]

```

- In Node-Red, go to top-right menu > **Import > Clipboard**, paste the code, and click Import.
- Connect the “Absolute Amplitude” node after the Rshake Parser. This turns raw data into a shaking strength number. The “smooth” node averages it so it’s not jumpy.

## 2. Show It Off:

- Drag a **Gauge** node (under “dashboard” in the palette) and connect it after the smooth node.
- Double-click it: Set Range to **0-50000** (no comma), Label to “ShakeMeter!”, Units to “units,” Group to “[Home] Shake it Up!” (create it if needed: edit > Tab “Home” > Width 12 > Update > Done).
- Click “Deploy.”

## 3. See It Live:

- In a browser, go to <http://yourIPaddress:1880/ui> (e.g., <http://192.168.1.100:1880/ui>).
- Bang the table or jump—watch the Shakemeter move!

## Try This!

- Stomp near the Shake—how high does the gauge go?
- What else could you measure? Footsteps at home? Vibrations at school?

## Key Ideas

- **Node-Red:** A fun way to program with blocks, not code lines!
  - **UDP:** Fast data streaming from your Shake—like shouting instead of mailing letters.
  - **Shakemeter:** Turns ground shakes into a live meter you can see!
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### Need Help?

- No data? Check your network or ask your teacher/IT.
- Stuck? Watch the videos: [Connecting](#) | [Shakemeter](#)

Keep Shaking!