ToyADMOS dataset

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ToyADMOS dataset

ToyADMOS dataset is a machine operating sounds dataset of approximately 540 hours of normal machine operating sounds and over 12,000 samples of anomalous sounds collected with four microphones at a 48kHz sampling rate, prepared by Yuma Koizumi and members in NTT Media Intelligence Laboratories. The ToyADMOS dataset is designed for anomaly detection in machine operating sounds (ADMOS) research. We have collected normal and anomalous operating sounds of miniature machines by deliberately damaging their components. It is designed for three tasks of ADMOS: product inspection (toy car), fault diagnosis for fixed machine (toy conveyor), and fault diagnosis for moving machine (toy train). The dataset is freely available for download at

Dataset : https://zenodo.org/record/3351307#.XUzzaOj7SUm
Python code : https://github.com/YumaKoizumi/ToyADMOS-dataset/

This document includes images and some descriptions of toys used for collecting the ToyADMOS dataset. For more information, refer to the paper [1]. If you use the ToyADMOS dataset in your work, please cite this paper where it was introduced.

[1] Yuma Koizumi, Shoichiro Saito, Noboru Harada, Hisashi Uematsu, and Keisuke Imoto, "ToyADMOS: A Dataset of Miniature-Machine Operating Sounds for Anomalous Sound Detection," in Proc of Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA), 2019.

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Toy car sub-dataset

Detail of toy car (mini-4WD)

A toy car called “mini 4WD”, the four tires of which are driven by a small motor through gears and a shaft, was used as a miniature car machine. Each “case” of the toy car was designed as the combination of two types of motors and bearings.

Case detail

◎Motors

Motor 1:
Torque-tuned motor 2

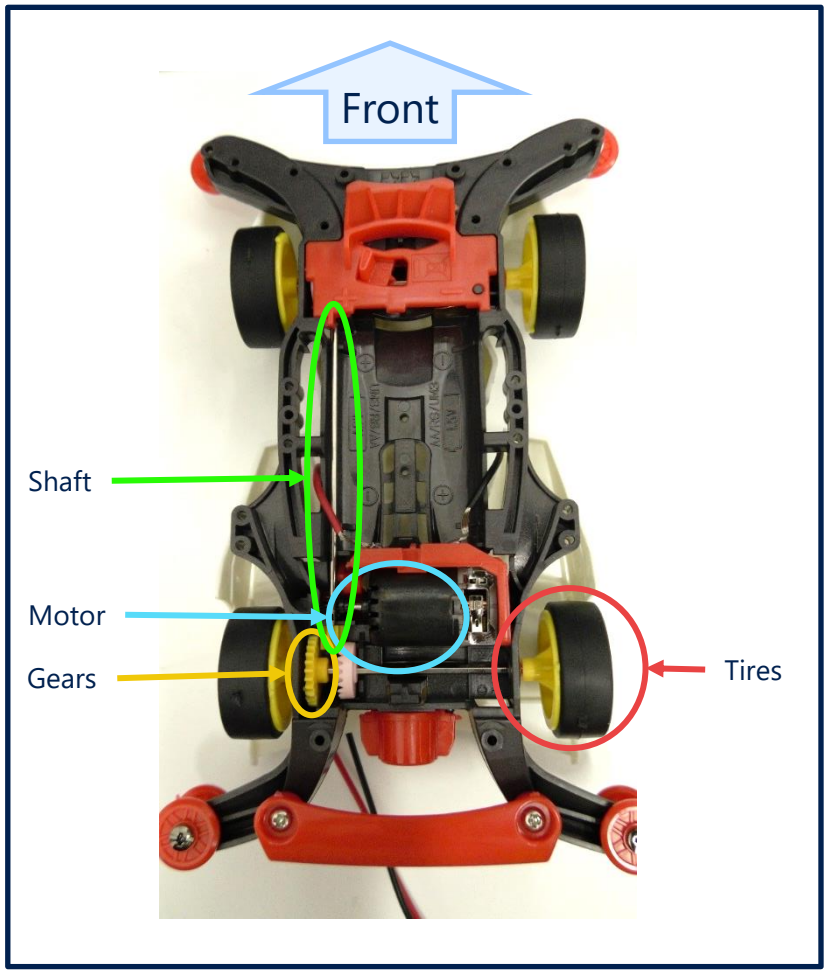
Motor 2：
Plasma dash motor

◎Bearings

Bearing 1:
Plastic bearing

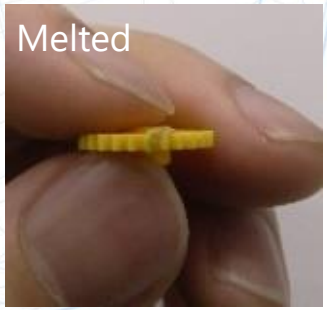
Bearing2:
Steel bearing

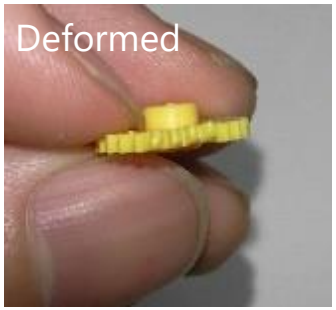
Case 1	Motor 1 & Bearing 1
Case 2	Motor 1 & Bearing 2
Case 3	Motor 2 & Bearing 1
Case 4	Motor 2 & Bearing 2



Images of anomalous conditions

1. Deformed/melted gears

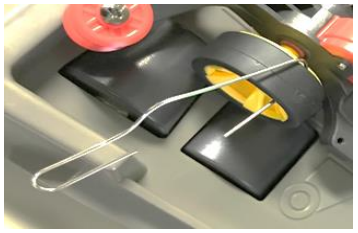




2. Coiled plastic ribbon and steel ribbon

Plastic ribbon

Steel ribbon



3. Bent shaft

4. Over/under voltage

Motor 1
- Normal: 3.0V
- Under: 2.5V
- Over: 3.5V

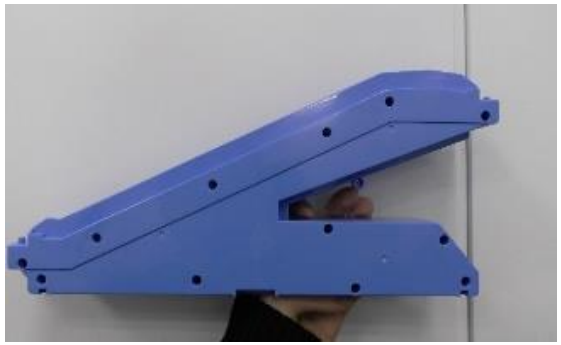
Motor 2
- Normal: 4.0V
- Under: 3.5V
- Over: 4.5V

Toy conveyor sub-dataset

Detail of toy conveyor

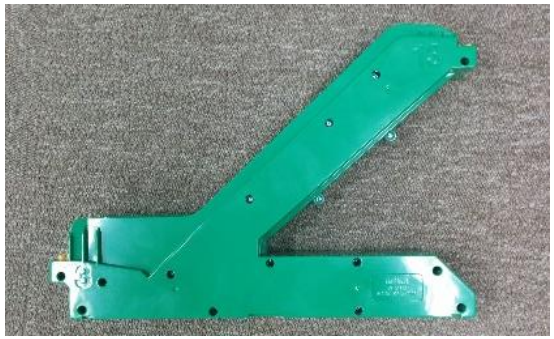
We used a conveyor that transports a small tin toy car (known as "TOMICA" https://www.takaratomy.co.jp/english/products/tomica/index.html) by driving a belt using a small built-in small. Three types of conveyors, which were produced by the same manufacturers but had different sizes, were used as “cases” of toy conveyors. YouTube videos of the conveyors are followings (in Japanese):
Case 1: https://www.youtube.com/watch?v=fxtQHqgz6nA
Case 2: https://www.youtube.com/watch?v=N2QOk-CDKBs&feature=youtu.be
Case 3: https://www.youtube.com/watch?v=Ah8j_L9d0NI&feature=youtu.be

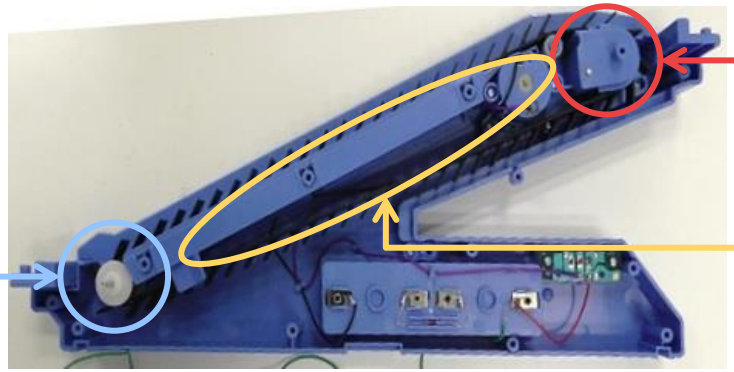
Case 1



Case 2

Case 3

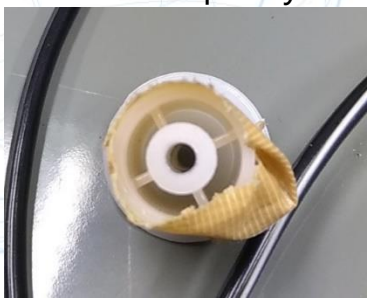




Images of anomalous conditions

1. Excessive tension

Tension pulley

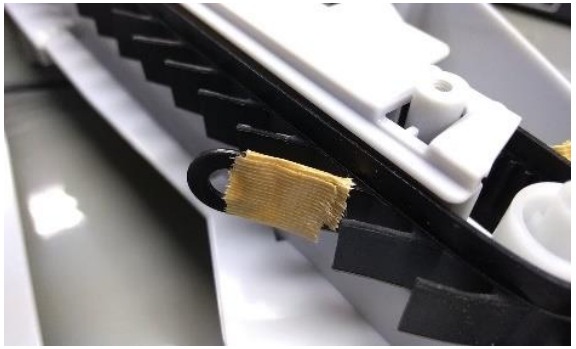


Tail pulley

2. Attached metric objects

Steel nut

Steel washer



Screwdriver

3. Over/under voltages

Normal: 3.0V
Under: 2.5V
Over: 3.5V

Toy train sub-dataset

Detail of toy train

We used HO-scale (large) and N-scale (small) model railways, which are precisely detailed miniature models of railways. Each “case” of a toy train is designed as a combination of two types of trains (commuter and a bullet) and scales (HO-scale and N-scale). Oval railway tracks were used.

Bullet train (“Hayabusa”)

Commuter train (Yamanote-line)

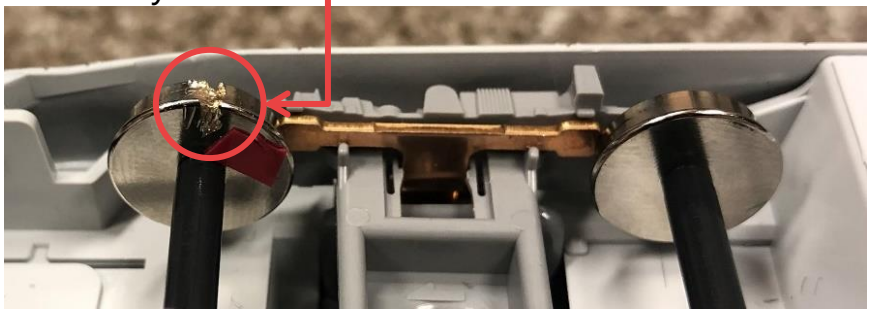
Case 1	Bullet & HO-scale
Case 2	Commuter 1 & HO-scale
Case 3	Bullet & N-scale
Case 4	Commuter 2 & N-scale

Images of anomalous conditions

1. Chipped wheel axes

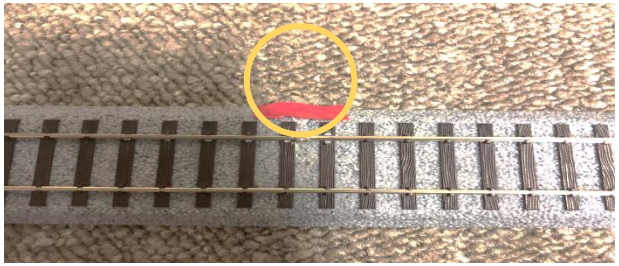
Normal

Anomaly

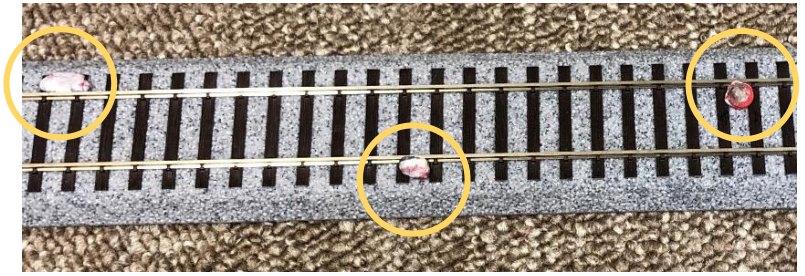


2. Straight/curved railway track

2.1 Broken (chipped using radio pliers)



2.2 Obstructing stone



2.3 Disjointed