Radiation Safety Interlock System for SACLA (XFEL/SPring-8)

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Poster Reference WEMMU011
Overview of SACLA

GUN, Beam chopper, 73 RFs

Accelerator systems (~ about 400 m long)

GUN, 8 GeV Accelerator

Beam repetition rate: 60 Hz

~ 400 m long

~ 240 m long

~ 60 m long

Klystron gallery

Bending Magnet

Undulator

Door

Access control

Monitoring

Permission control

Radiation Safety Interlock System

Experimental hall

BL1

X-ray laser

BL3

GUN

~ 240 m long

~ 60 m long
Radiation Safety Interlock System

Requirements

- **Response time within 16.6 ms**, because beam repetition rate is 60 Hz.
- Permission transmission:
  - Long distance transmission,
  - Many accelerator systems

However,

- PLC-based system
  - Reliability, Stability

However,

- PLC network is slow.

<table>
<thead>
<tr>
<th>Interlock</th>
<th>Permission transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi PLCs with tiny program.</td>
<td>Development of New module.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signal</th>
<th>Optical fiber</th>
<th>PLC</th>
<th>Permission</th>
<th>Optical fiber</th>
<th>Permission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct I/O connection</td>
<td>Metal wire</td>
<td>PLC</td>
<td>Daisy-chain connection</td>
<td>Next module</td>
<td></td>
</tr>
</tbody>
</table>

< 3.0 ms  < 3.0 ms

microsecond order time
Total Response Time

Signal of safety device → PLC → PLC → (Permission signal)

- 5.2 ms for 10,000 events
- 6.7 ms (Upper limit)
- < 16.6 ms

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