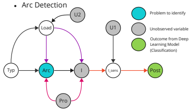
- Arc Detection



Variable	Meaning	Observed (Run-Time)	Annotated (Training)
Arc	Arc Occurance	no	yes
I_sens	Sensed current	yes	yes
Load	Load Profile (incl. fixed or flexible connect. loads)	(yes)	yes
Post	Classification (Arc occured / not occured)	no	yes
Pro	Property of fault (Serial or Parallel arc)	no	yes
Typ	Type of installation (material, classifaction fix or flexible)	yes (constant)	yes
U1	Sensor Noise (statistical)	no	no
U2	Unmodelled aspect of load	no	no

Testable independence criteria
1. Typ ⊥ Post | I_s
2. Arc ⊥ Post | I_s
3. Post ⊥ Load | I_s

Minimal sufficient adjustment sets for estimating the total effect of Arc on Post:
1. Load, Pro

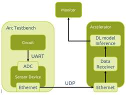
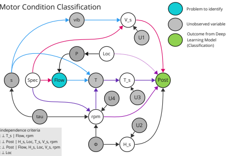


Figure 13 Demonstrator with accelerator integrated

- Motor Condition Classification



Variable	Meaning	Observed (Run-Time)	Annotated (Training)
Flow	Airflow	no	yes
H_s	Magnetic Field measured	yes	yes
Loc	Location of installation (height)	yes	yes
P	Air-Pressure outside	no	no
Post	Classification (Flow OK / NOK)	no	yes
rpm	Rotations per minute	yes	yes
s	Slip	no	no
Spec	Motor Specification	yes	yes
T	Temperature	no	no
T_s	Temperature measured	yes	yes
tau	Torque	no	no
U1, U2, U3	Sensor noises	no	no
V_s	Vibrations measured	yes	yes
vib	Vibrations	no	no
Φ	Magnetic Flux	no	no

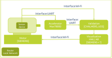
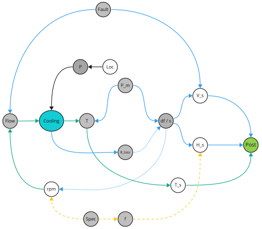


Figure 2 Evolved Architecture for Motor Condition Classification

Testable independence criteria
1. Spec ⊥ T_s | Flow, rpm
2. Spec ⊥ Post | H_s, Loc, T_s, V_s, rpm
3. Spec ⊥ Post | Flow, H_s, Loc, V_s, rpm
4. Spec ⊥ Loc
5. Flow ⊥ Post | H_s, Loc, T_s, V_s, rpm
6. Flow ⊥ Post | Loc, Spec, T_s, rpm
7. Flow ⊥ V_s | Spec
8. Flow ⊥ rpm | Spec
9. Flow ⊥ H_s
10. T_s ⊥ Loc | Flow, Spec
11. T_s ⊥ Loc | Flow, rpm
12. T_s ⊥ V_s | Spec, rpm
13. T_s ⊥ V_s | Flow, rpm
14. T_s ⊥ H_s | Spec, rpm
15. T_s ⊥ H_s | Flow, rpm
16. Loc ⊥ V_s
17. Loc ⊥ rpm
18. Loc ⊥ H_s
19. V_s ⊥ H_s

Minimal sufficient adjustment sets for estimating the total effect of Flow on Post:
1. H_s, V_s, rpm
2. H_s, V_s, rpm
3. Spec
4. P, Spec



df = Differenz zw. magnetischer und elektrischer Frequenz
r_loss = inner losses (temperatuer depended)
fault = Fehlerfall am Schaufelrad