AI and Safety – Safe Robot-Human Interaction Stats and Facts

FACTS

1. Robots operating at high speed or with high force can cause serious injury when unexpected contact occurs, due to insufficient modelling of human-body dynamics in collisions.
2. Lack of comprehensive sensors and validation for transient contact (i.e., brief collisions or sand-wiched contact) remains a major hazard in human-robot collaborative environments.
3. Many HRI systems still rely on standard risk assessment methods that do not fully capture dynamic human motion or unpredictable human behaviour, creating safety blind spots.
4. Poorly defined workspace boundaries or overlap zones where humans and robots share space increase risk of pinching, trapping or collisions such as when humans enter a robot's cell unexpectedly.
5. Maintenance and setup phases of robot systems present heightened hazard: workers often enter robot envelopes, disable guards, or face unexpected robot activation.
6. Psychosocial and organisational hazards are emerging in HRI: e.g., increased stress when humans work alongside robots that behave unpredictably or when trust is low, which can lead to distraction or errors and thereby physical hazard.

STATS

- AI-enabled robots have reduced factory accidents by up to 25% in US manufacturing facilities through enhanced collision avoidance and predictive monitoring.
- By 2025, over 16 million service robots are deployed worldwide, with 57% AI-enabled for safer human interactions;

in the US and Canada, this includes 620,000 units in elderly care and healthcare settings to minimize worker exposure to hazards.

- In the US, 52% of large hospitals use autonomous AI logistics robots for internal deliveries, reducing patient handling injuries by 18.4% via safe human-robot coordination.
- From 2020-2025, collaborative robots (cobots) in Canadian manufacturing increased by 60%, with safety features like power and force limiting preventing an estimated 20% of potential interaction-related incidents.
- US workplaces adopting AI-driven human-robot interaction (HRI) systems report 30% lower service costs and 45% annual growth in voice-controlled industrial robotics, improving safety in high-risk tasks.
- In Canada, 70% of organizations using cobots cite AI for ergonomics and safety as key, reducing ergonomic injuries by 15-20% through adaptive task allocation in shared workspaces.