

COLLABORATIVE ROBOTICS:

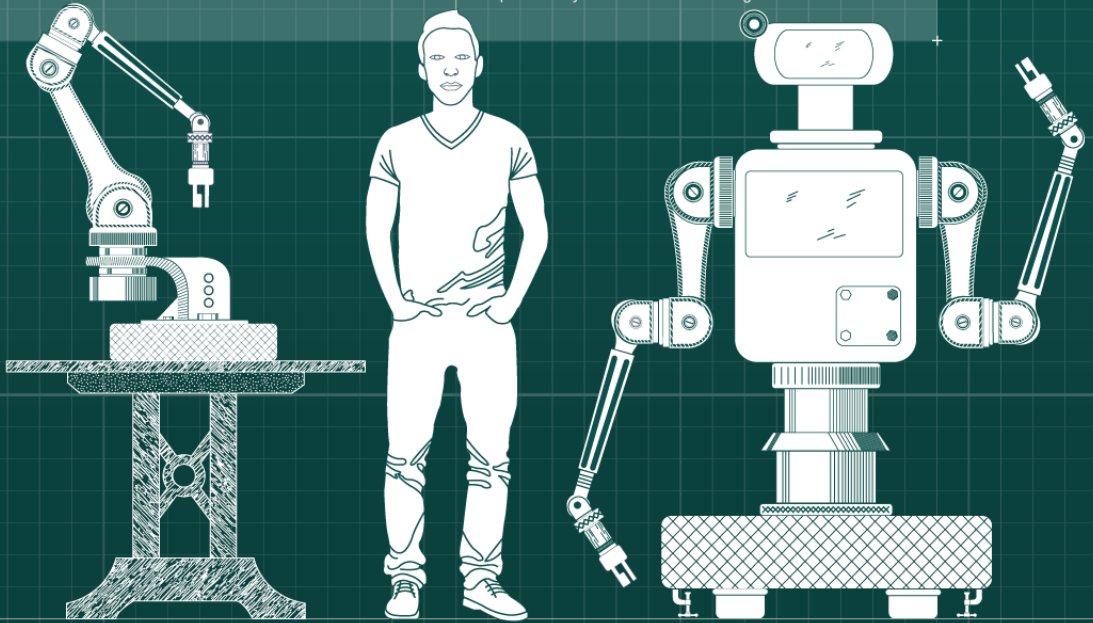
Market Opportunities

REPRESENTATIVE TECHNOLOGIES

- 6 or 7 DoF articulated arms
- Force sensing / force control
- No pinch points / sharp edges
- Programming by demonstration
- Lightweight construction / new materials
- Integrated sensors (torque, vision, sonar etc.)
- Software centricity / intelligence / "perception"
- Compliant / gravity compensated / backdrivable arms

OPERATIONAL CAPABILITIES

- Relatively low cost / rapid ROI
- Programmed easily and quickly
- Rapid deployment and integration
- Lightweight systems / small footprint
- Human scale size and operating range
- Work safely and effectively with humans
- Lower power / maintenance requirements
- Versatile, supports multiple automation tasks
- Operated by a workforce with range of education levels



BUSINESS DRIVERS

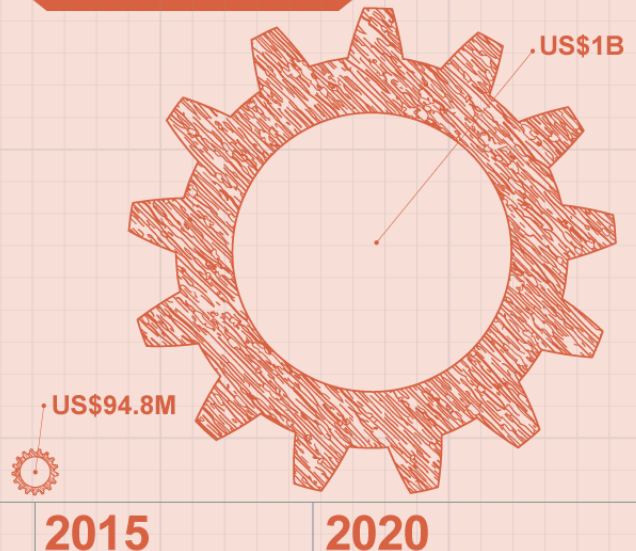
- Offset increase labor costs
- Increase automation levels
- Reduce automation costs / risks
- Overcome labor pool variability
- Increase manufacturing agility / flexibility
- Introduce new products/applications / markets
- Support variable production / mass customization
- Address increased consumer expectations / demands



POLITICAL / SOCIAL IMPERATIVES

- Back reshoring initiatives
- Maintain / increase high wage jobs
- Increase exports of manufactured products
- Address international competition / globalization
- Increase levels of high value manufacturing overall
- Support small-to-medium businesses manufacturing
- Develop solutions for shrinking / variable / unsuitable labor pools

COLLABORATIVE ROBOTICS PLATFORM REVENUE



FURTHER ROBOTICS COVERAGE AREAS



CONSUMER ROBOTS



MOBILE ROBOTIC TELEPRESENCE



AUTONOMOUS VEHICLES



EMERGING TECHNOLOGIES



DRONES



COLLABORATIVE ROBOTS