



Future mushroom farm

- Layout of future mushroom farm
- Picking system
- Robot packing & picking



Layout of future mushroom farm



- Separate the different stages of growing
- Building sections designed to meet specific needs
 - Filling / emptying area
 - Walls
 - Corridors
 - Climate units
 - Overpressure
 - Energy recovery
 - Coils / fans
 - Walls
 - Shelves
 - Doors
 - Daylight in corridors
 - Picking equipment

Picking system



The story behind optimization



Harvest rooms

Transfer corridor

Phase 4

At the shelf

2 harvesters

Hand-picking mushrooms

26%
more efficient

In front of shelf

2 packers

Collecting

Sorting

Packing

Challenge



Robotization

Collecting

Sorting

Packing

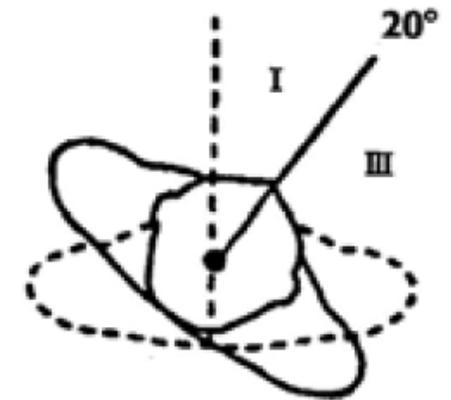
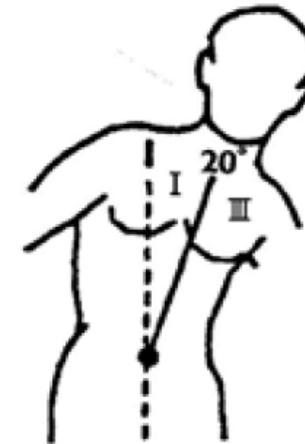
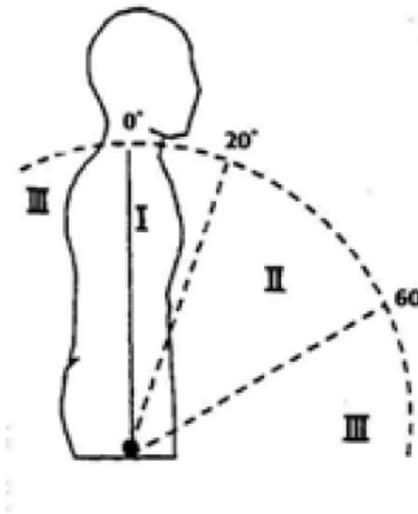
63%
more efficient

How to assess the physical impact to the body?

Research Wageningen University 2005

Torso

- I. Neutral zone
- II. Light physical strain
- III. High physical strain

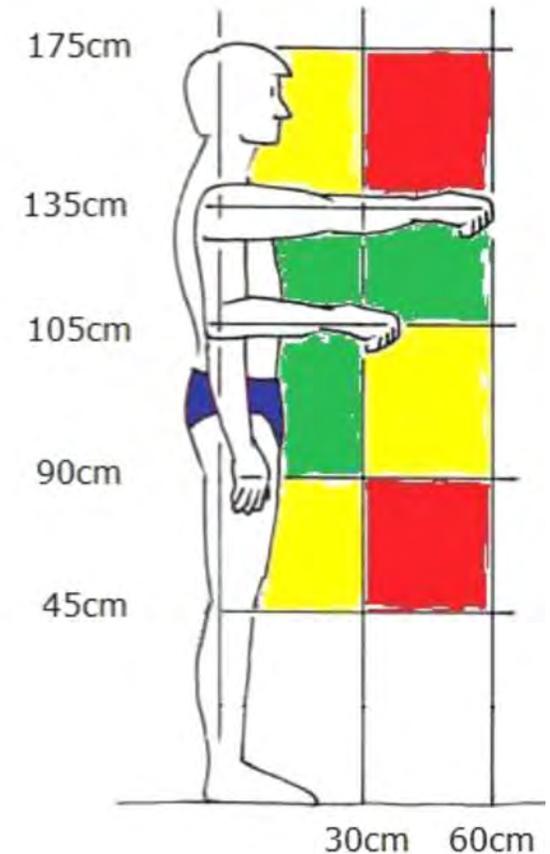
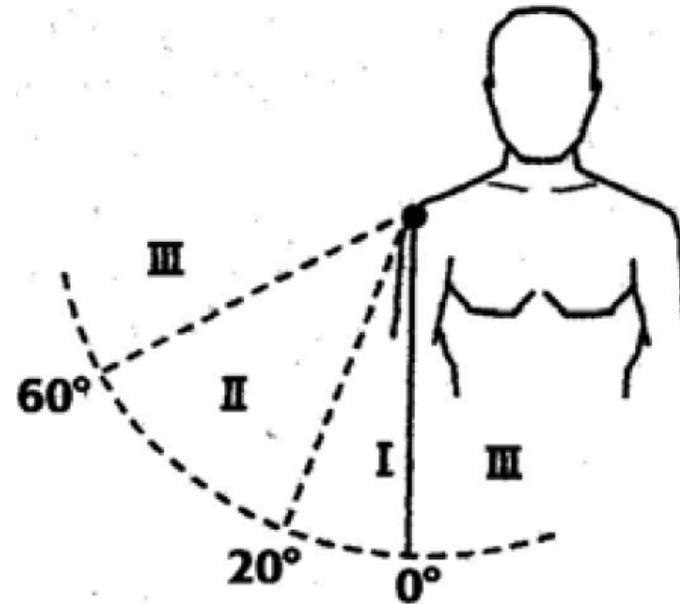


How to assess the physical impact to the body?

Research Wageningen University 2005

Arms

- I. Neutral zone
- II. Light physical strain
- III. High physical strain

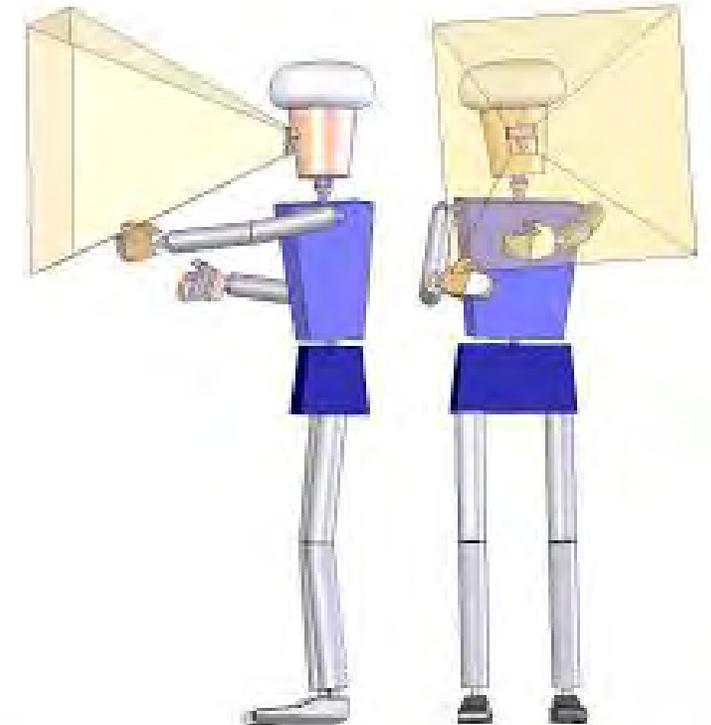
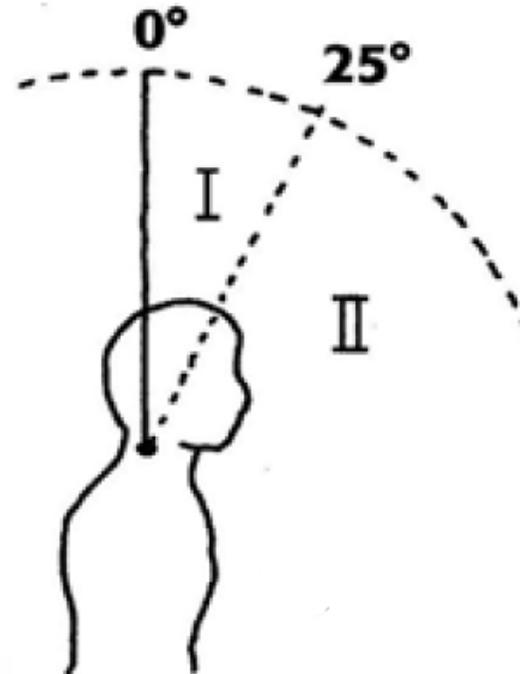


How to assess the physical impact to the body?

Research Wageningen University 2005

Head

- I. Neutral zone
- II. Light physical strain
- III. High physical strain



Research physical strain during mushroom harvesting

Relative proportion (%) of the physical impact to the body

	Torso			Arms			Head	
	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2	Zone 3	Zone 1	Zone 2
Traditional shelve 5 high Hydraulick picking lorrie	84	9	7	49	17	34	33	67
One layer (chest) Punnets above the bed	89	10	1	62	34	4	28	72

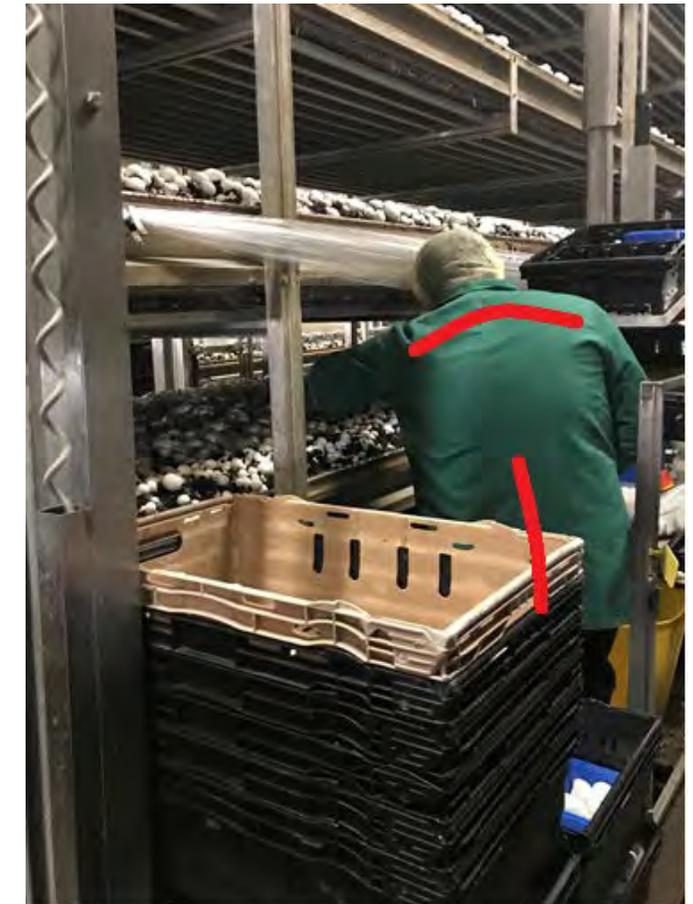
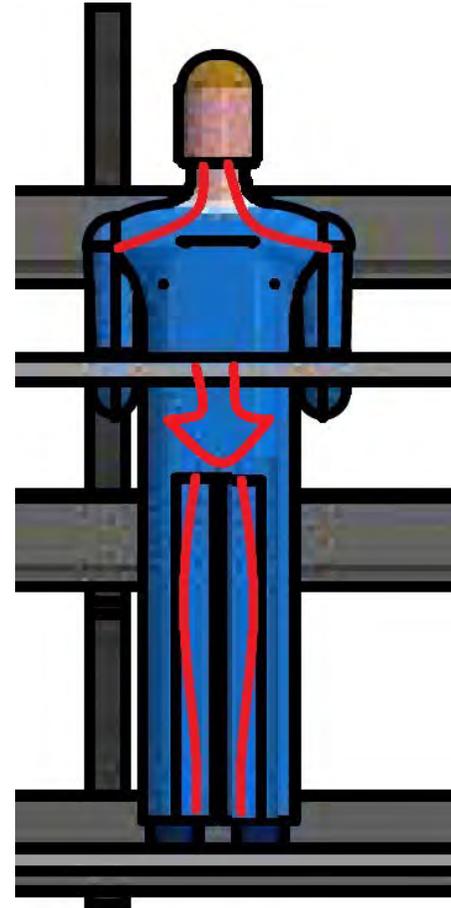
Traditional picking

A lot of tasks & movements

- Select the right mushrooms
- Pick the mushrooms
- Cut the stems
- Place in correct box & weighing
- Move along the shelf
- Move full & empty packing material

The traditional complaints

- Stiff neck
- Shoulders or arms
- Stiff legs
- Lower back



Mushroom Packing Unit

- Robot developments in the past
- Mushroom Packing Unit
- Working principle
- Possible setups
- Future developments

■ Two main MPU setups

- Punnets

- Punnets / boxes / crates

Future upgrades

- Stem cutting
 - Weighing / filling
 - Third quality
 - Software possibilities
- 
- A decorative background image at the bottom of the slide showing a close-up of several smooth, light-colored stones or pebbles.

▣ Process robot picking

- ▣ Scanning

- ▣ Scan information

- ▣ packing and placing

Thank you !

