Tree Locomotion Robot

Richard Parker, Peter Clinton, Karen Bayne & Brionny Hooper

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CAT

Is there another way to do forestry?

- Keep people safe
- Protect the soil

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Tree felling ergonomics analysis

Data collection ensemble for tree fallers

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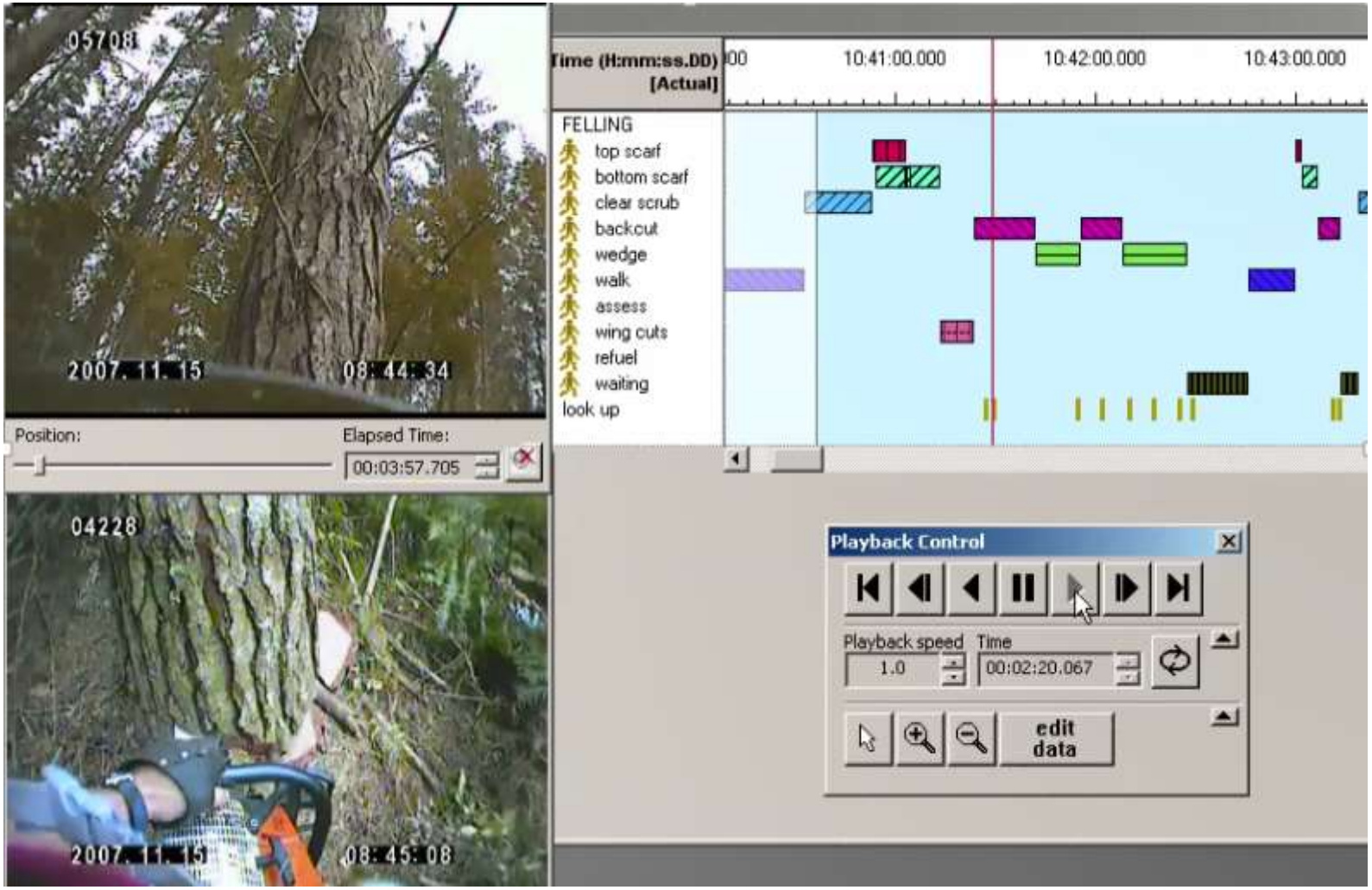
Felling and using a wedge



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What can we learn from the mining industry?

- Develop radical new machines!

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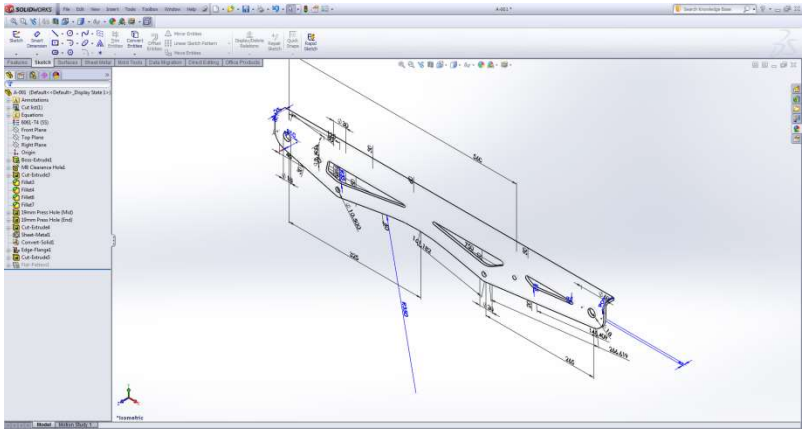
Mining machine with no cab

scion

Much thinking …



Brachiation

- Develop radical new machines!

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Forestry machine with no cab

Radical machine

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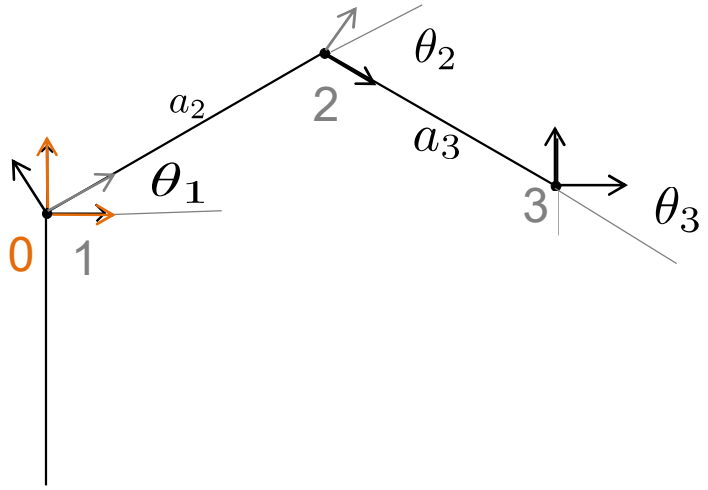
University of Canterbury – talented students



Axes rotation XYZ position

$$ {}^{n-1}T_n = \left[\begin{array}{cccc} \cos\theta_n & -\sin\theta_n\cos\alpha_n & \sin\theta_n\sin\alpha_n & a_n\cos\theta_n \\ \sin\theta_n & \cos\theta_n\cos\alpha_n & -\cos\theta_n\sin\alpha_n & a_n\sin\theta_n \\ 0 & \sin\alpha_n & \cos\alpha_n & d_n \\ \hline 0 & 0 & 0 & 1 \end{array}\right] = \left[\begin{array}{ccc|c} & R & & T \\ \hline 0 & 0 & 0 & 1 \end{array}\right] $$

Transformation matrix from
Joint n-1 to joint n

$$ {}^0T_3 = {}^0\,T_1^1 T_2^2 T_3 $$

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SAFETY NOTICE

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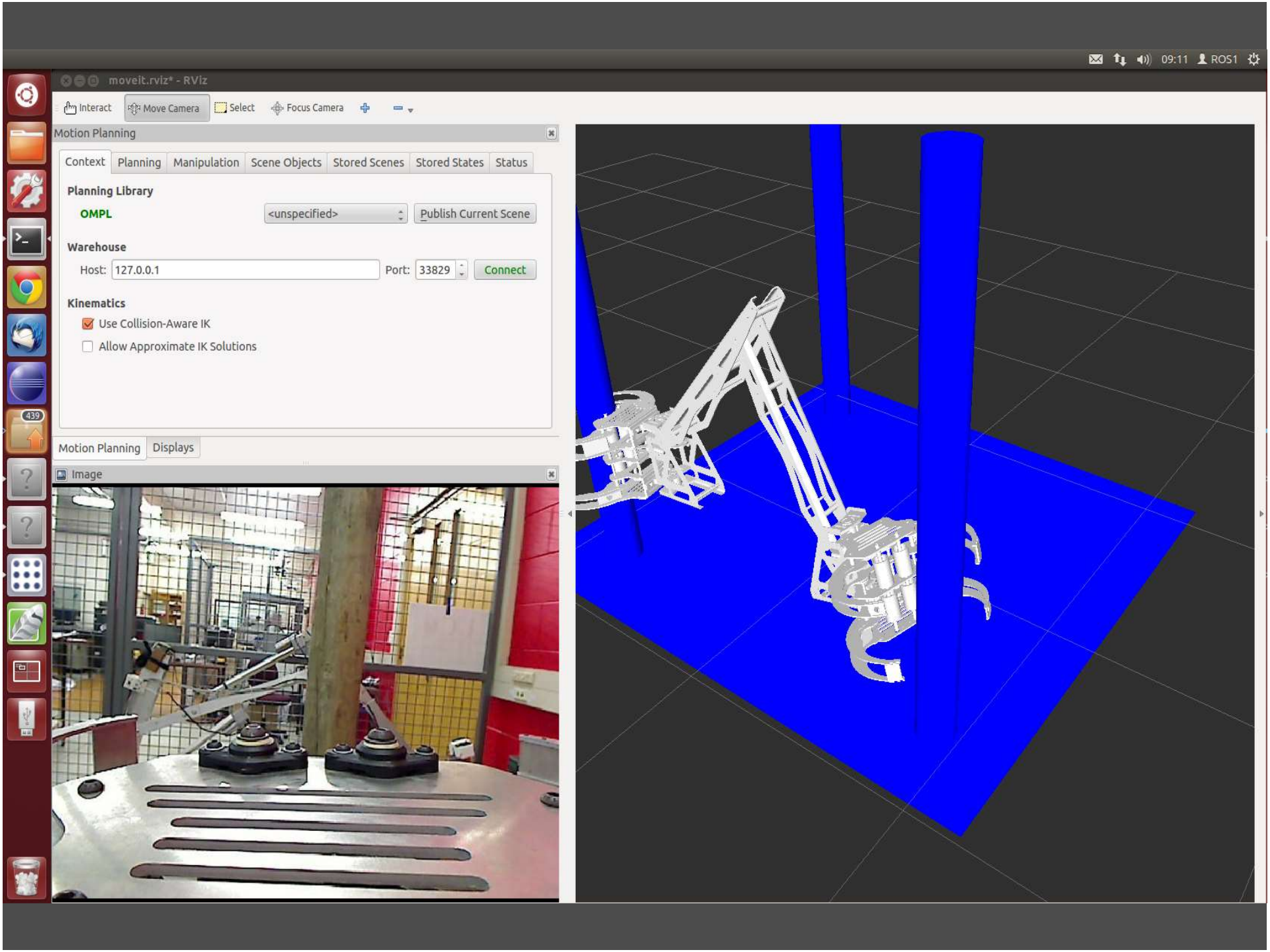
09:11
ROS1
moveit.rviz* - RViz
Interact
Move Camera
Select
Focus Camera
Motion Planning
Context
Planning
Manipulation
Scene Objects
Stored Scenes
Stored States
Status
Planning Library
OMPL
<unspecified>
Publish Current Scene
Warehouse
Host:
127.0.0.1
Port:
33829
Connect
Kinematics
Use Collision-Aware IK
Allow Approximate IK Solutions
Motion Planning
Displays
Image

Wireless control

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Battery powered & wireless control

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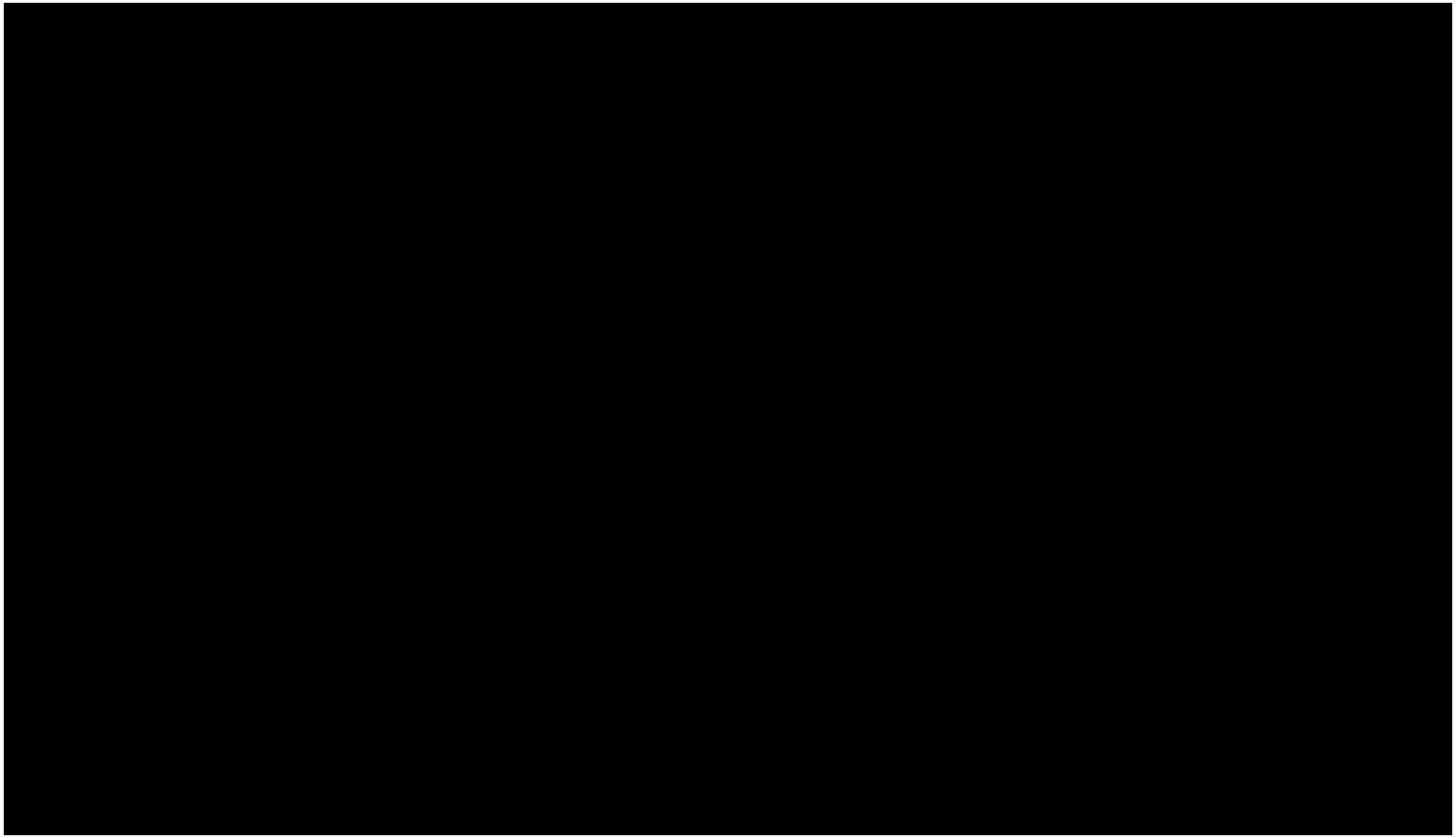
Tree-to-tree robot



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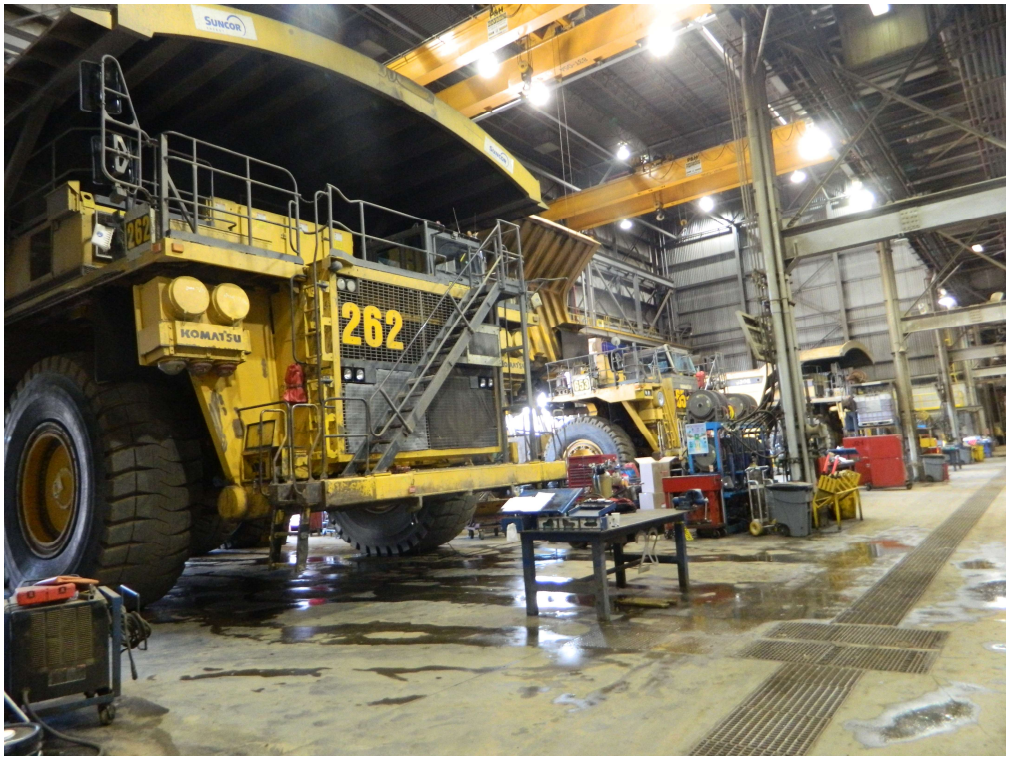
Mining experience - Robot effect on jobs

- Less operators
- More maintenance staff
  - Highly complex systems requiring upkeep
- More data staff



Potential problems and Human Factors

- Forestry is an outdoor occupation
- Sedentary office task
- Disconnect from reality
- Loss of situational awareness
- No travel
- Interaction with work mates

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Where to now?

Locate funding to build a prototype thinning machine to demonstrate to machine manufacturers

Philosophy

- small, light robots – easily transportable
- less financial cost per unit
- less risk for contractors
- collaborative robots – one cuts tree , one pushes tree

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Thank you to:

- Forestry contractors and companies
- Ministry for Primary Industries
- Forest Growers Levy Trust
- Forest Growers Research
- Scion
- University of Canterbury