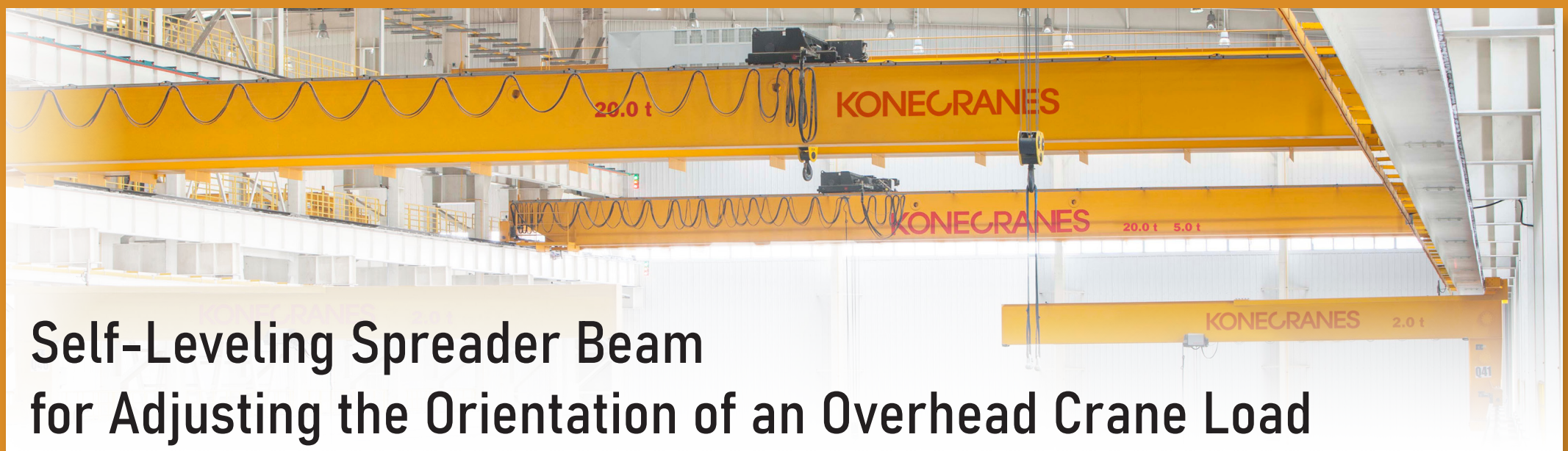

Self-Leveling Spreader Beam for Adjusting the Orientation of an Overhead Crane Load

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Challenge

Payload lifted with an overhead crane traditionally with slings can be rotated only along the hook's vertical axis during the lift. Nowadays, to ensure the right orientation of the load to be lifted, time-consuming rigging has to be planned carefully before the lift.

An under-the-hook device, that can re-orientate the workpiece mid-lift saves time and enables more diverse tasks to be carried out by an overhead crane.

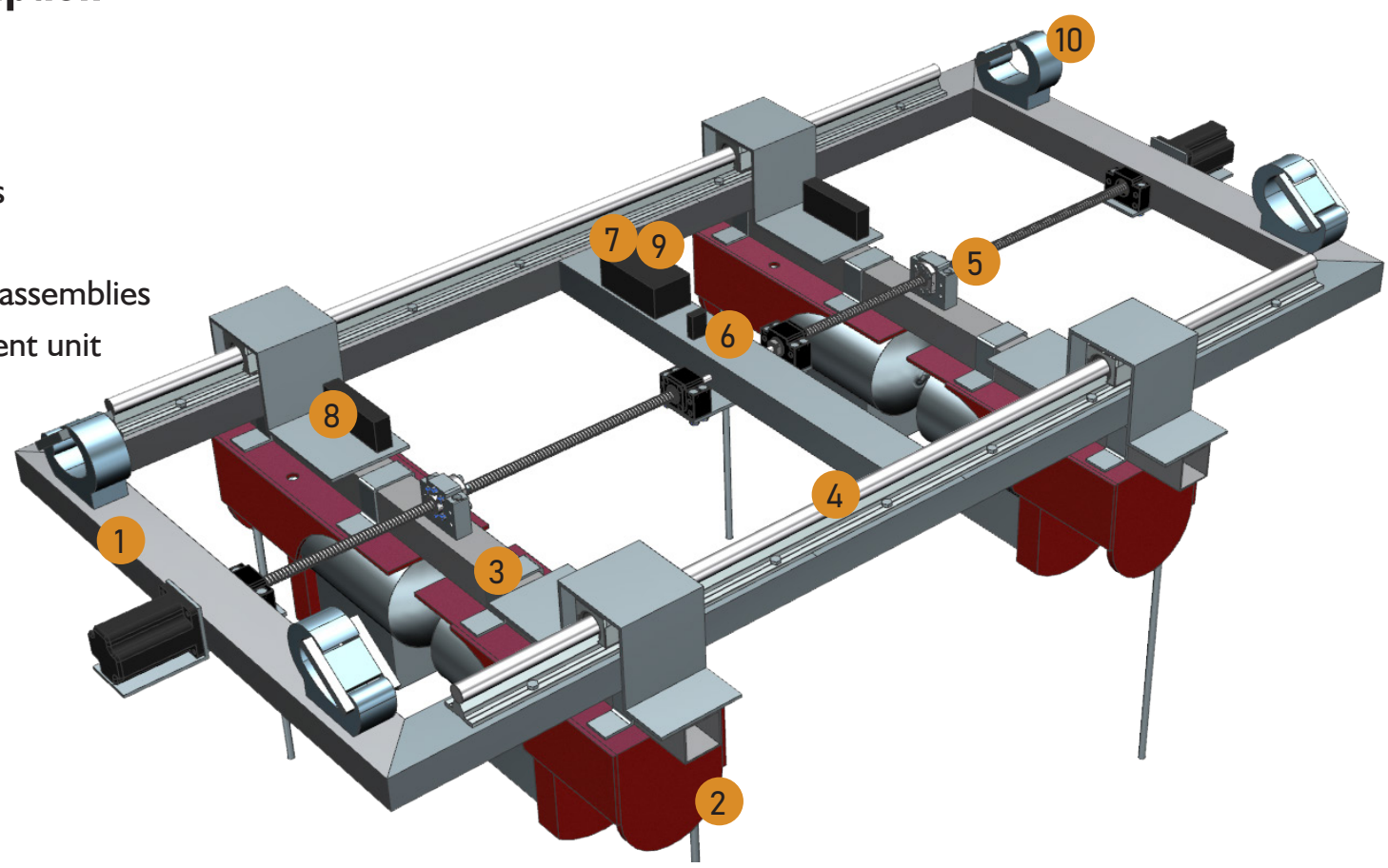
Solution

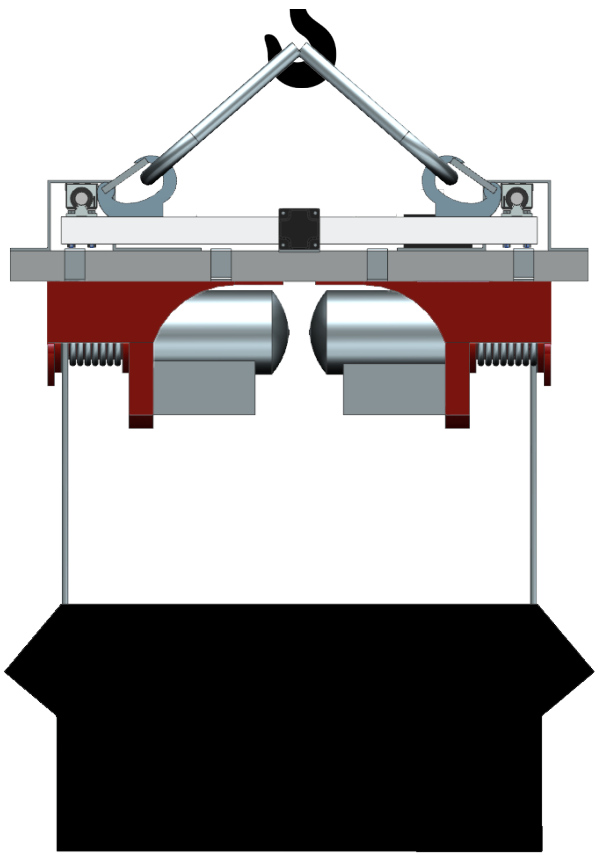
Winches are used to shorten and lenghten the cables individually to rotate the payload along the two horizontal axes. When the payload is reoriented the frame experiences some tilting as well, because the payload's center of gravity is moving from the center.

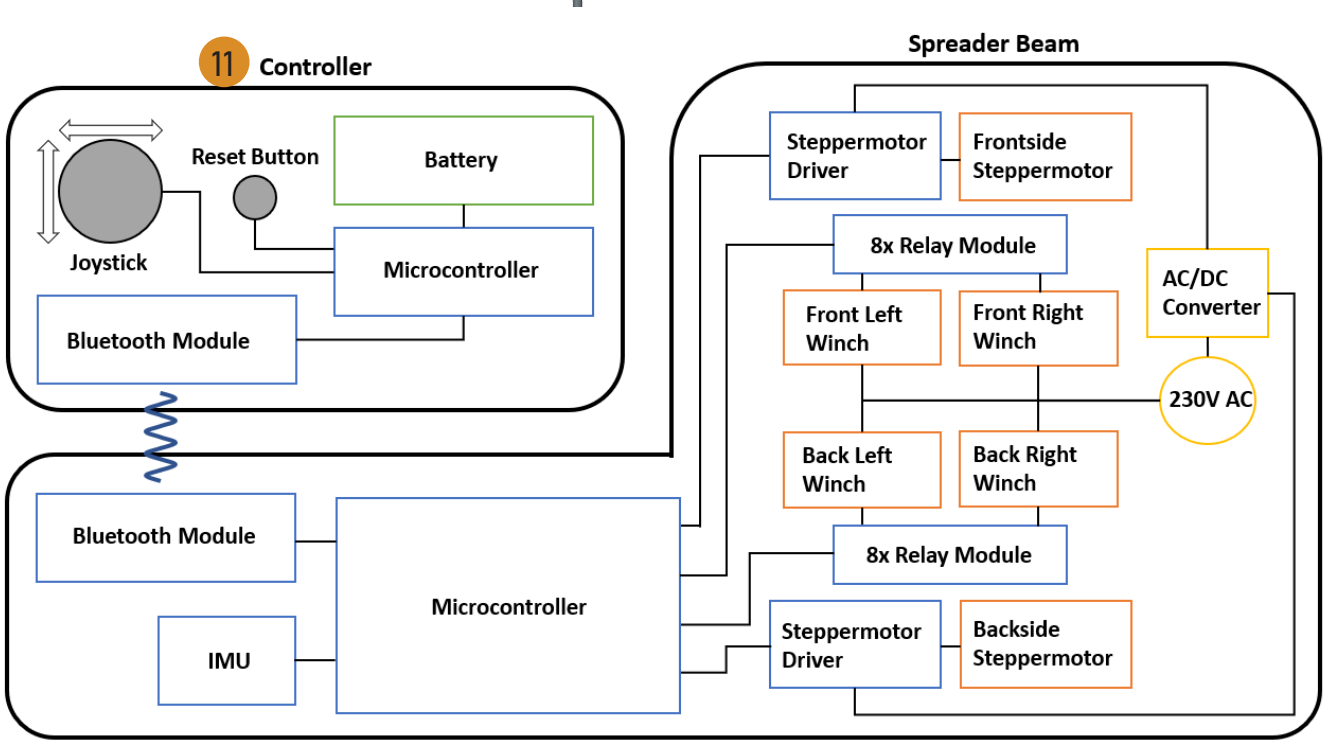
Horizontal frame balance position along one axis is obtained by two stepper motor actuated ball screw mechanisms moving winch carrying trolleys individually. Frame orientation is sensed with an IMU and control input is obtained from controller module through Bluetooth.

System Description

1. frame
2. 4 winches
3. 2 linearly moving trolley assemblies
4. 2 linear rails
5. 2 stepper motor driven ball screw assemblies
6. frame mounted inertial measurement unit
7. microcontroller
8. 2 relay modules
9. Bluetooth module
10. 4 hook rigging points
11. controller







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