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Design of a self-balancing rotatable mobile hoist for small workshop

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A hoist is a sort of machine, for the most part furnished with a crane rope, wire ropes, or chains, and piles, that can be utilized both to lift and lower materials and to move them on a level plane. It is chiefly utilized for lifting substantial things and transporting them to different places. It utilizes at least one straightforward machine to make mechanical advantage and hence move loads beyond the ordinary capability of a human. Hoists are usually utilized in the transport and construction industries. A mobile hoist, which is used for lifting heavy materials or products, such as machined metal blocks and engines, plays a major role in mechanical workshops. Once the object is lifted, the mobile hoist has rollers, which is useful for the operator to carry the lifted weight from one location to another location without any excessive strain to the human body.

Even though the mobile hoist plays a major role in the industry, it is unable to rotate the desired angle without moving the wheels. If the product is to be rotated, the hoist itself has had to be rotated. And after lifting a heavy object the hoist has to be rotated very easily. Especially in small workshops, this issue is a major problem because of the limited space. The jib crane and overhead crane give the convenience of lifting objects in narrow spaces, but they are more expensive and have to be built on heavy structural bases for support.

This paper discusses the design of a low cost self-balancing mobile hoist with rotation facility to overcome the above issues in small mechanical workshops. The design was done according to the specific requirement in small workshops and the maximum weight and height of lifting were limited to 1000kg and 1.7m, respectively. Dynamic analysis of the system was performed by using MATLAB software and the results were validated by experimental results.

Key words: Mobile hoist, MATLAB, Dynamic analysis

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