SNAPSHOT

3D DYNAMIC SKELETAL MODELLING

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Project Description
This R&D Project is to explore the feasibility to extend the usefulness of the X-ray scanning of a carcass to further downstream carcass break-up operations by the use of the carcass's geometric predictability in its bone structure.

Project Content
In other words, it is believed that an expensive X-ray Scanner System installed at the start of the Boning Line to measure the bone structure of each incoming carcass, can share this scanned data with downstream automation stations through the use of a 3D Dynamic Re-Poseable Skeletal Model .
This is done by populating the general Skeletal Model with the specific X-ray data for each carcass to make that general 3D Skeletal Model specific to a particular carcass which is then associated with that carcass as it moves down the Boning Line, and futhermore, the 3D Skeletal Model is dynamically re-posed as required to mimick the actual disposition of the carcass at each downstream station.

This re-posed 3D Skeletal Model can then be used to predict the actual disposition of the skeleton within the scanned shape at that workstation. As such, this specific 3D Skeletal Model can then be used to support any automation operation that requires the knowledge of the position of the carcass bones, at that workstation.

Such an ability to "piggy-back" a machine concept onto an expensively and cumbersomely obtained X-ray data set from an upstream scanning module will make it possible to accurately locate the bone structure at a downstream workstation without the repeated use of specific dedicated expensive X-ray scanning there.

Project Outcome
This Project examined and established the in-principle feasibility in three areas of technology that are needed to underpin this concept:

1. that a Dynamic 3D Skeletal Model can be created, that it can be readily made specific to each carcass, and that it can be dynamically re-posed in real time, and

2. that X-ray bone measurement data can be obtained and used to adapt the general 3D Skeletal Model to that of each specific carcass.
3. that it is feasible to re-pose this 3D Model at each downstream station by using simpler sensors to ascertain the positions of salient features of the carcass.

Thus this scoping research project has indicated that it is indeed conceptually feasible to "piggy-back" and utilize the scan data from an upstream 3D X -ray scan, provided that the X-ray scan is of sufficient high-resolution and is able to yield data to extract 3D measurements. However, at this time, the first generation of X-ray scans in use in existing abattoir applications is of insufficient resolution and "3D-ness" for our application. It is foreshadowed that the second generation of X-ray scans currently envisaged for more sophisticated future boning applications will be of sufficient resolution and "3D-ness" for us the "piggy-back" onto, and use our concept to extend their usage for down-stream boning automation.
A recommendation is that our "piggy-back" concept is borne in mind when this second generation X-ray scanning is being developed so that its results can be directly suitable also for our application.

Benefit for Industry
Such an ability to "piggy-back" a machine concept on an expensively and cumbersomely obtained X-ray data set from an upstream scanning module will make it possible to accurately locate the bone structure at a downstream workstation without the repeated use of specific dedicated expensive X-ray scanning there.

This capability could be one of the missing technology elements that can be used to make feasible new or nascent downstream automation applications.