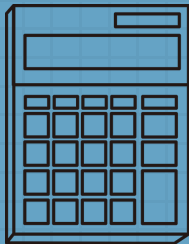


# MATHEMATICAL MODEL

BY: ENG. AMAL ALGETHAMI



## PROBLEM DEFINITION:

This document presents a mathematical model of the evaluation robot arm to locate sensors to ensure the highest possible level of safety.

## VARIABLES:

If the arm movement is in 3D it will be  $x$ ,  $y$  and  $z$ .  
If it is 2D then it will be  $x$  and  $y$ .

## OPERATIONS:

We use: 1/8 ball volume law  
( $V = (3/4) \pi r^3$ ), where  $r$  is the radius) for 3D. And the 1/4 circle area law ( $A = \pi r^2$ ), where  $r$  is the radius) for 2D.  
To make sure arm is moving from the allowed area.

# IMPLEMENTATION:

In 3D the allowed area is  $(1/4 * (3/4) \pi * 42.5^3) = 45218.68 \text{ cm}$

In 2D the allowed area is  $(1/4 * \pi * 85^2)$

$= 5674.50 \text{ cm}$

