Layered Architecture

Bioprinting System

Bioink Dispensing Control
- Motor control

Bioink Management
- Volume sensing

(9)
(7)
(8)

Robotic System

Visual Servoing & Control
- Controllers

(6)

Trajectory Definition
- Time
- Speed
- Acceleration
- Path

(5)

Path Planning
- ZigZag
- Parallel Lines
- Grid

(4)

Spatial Data Processing
- Position
- Area
- Perimeter
- Mesh

(3)

Vision System

Spatial Data Processing
- Position
- Area
- Perimeter
- Mesh

(2)

Wound Detection & Segmentation
- Filters
- Segmentation

(1)

Image Capture
- RGB
- IR
- Depth
- Point Cloud
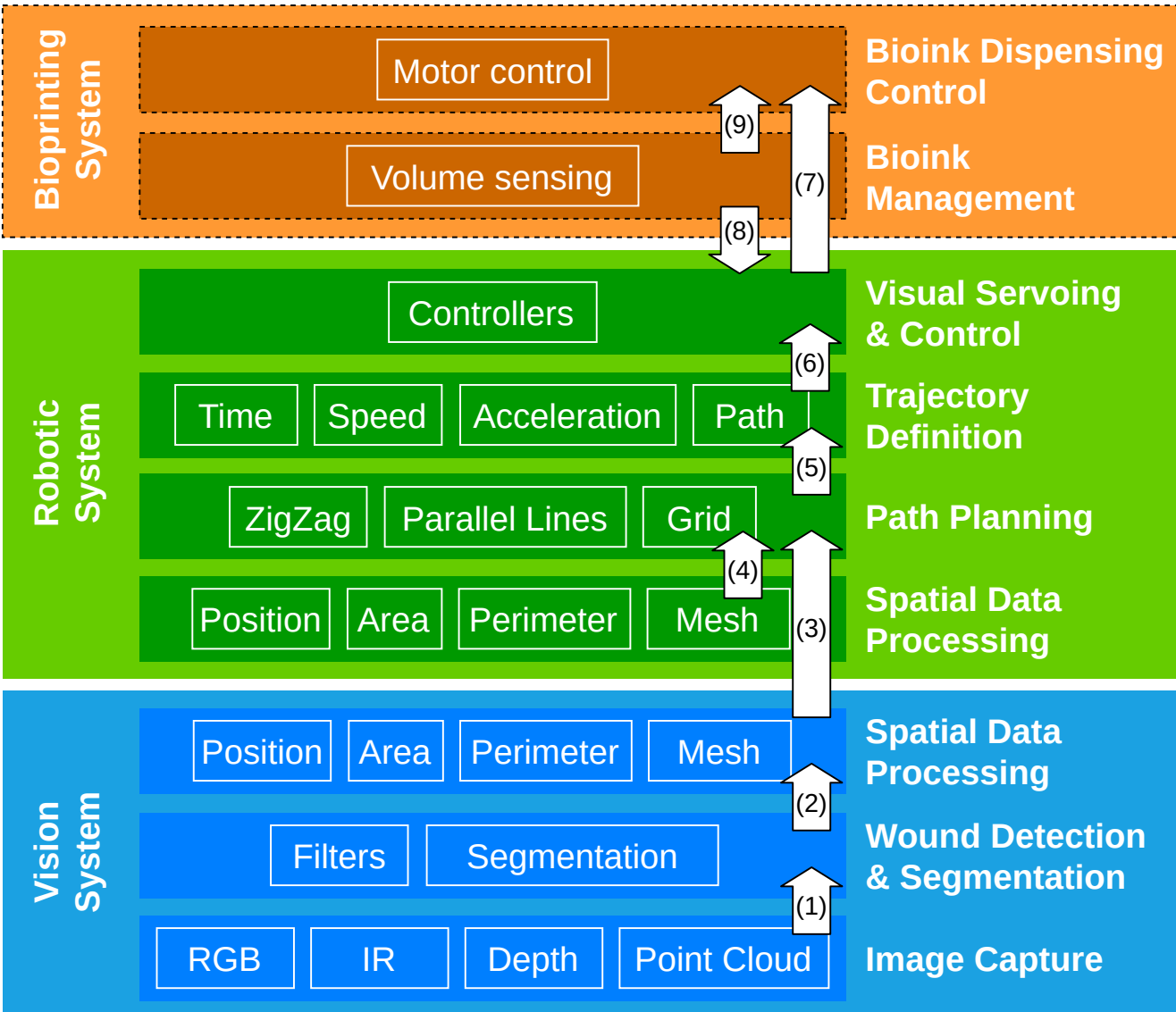
Data Exchanged

(1) RGB image (3 channels)
   IR image (1 channel)
   Depth image (1 channel)
   Point cloud (3D points)

(2) Wound contours (2D points)
   Point cloud (3D points)

(3) Wound contours (2D points)
   Wound contours region (3D poses)
   Camera to Robot transform (4x4 matrix)

(4) Wound contours (2D points)
   Wound contours region (3D poses)

(5) Wound filling path (3D poses)
   Bioprinting actions (commands)

(6) Wound filling trajectory (3D poses, bioprinting actions)

(7) Bioprinting actions (commands)

(8) Bioink volume state

(9) Bioprinting STOP command