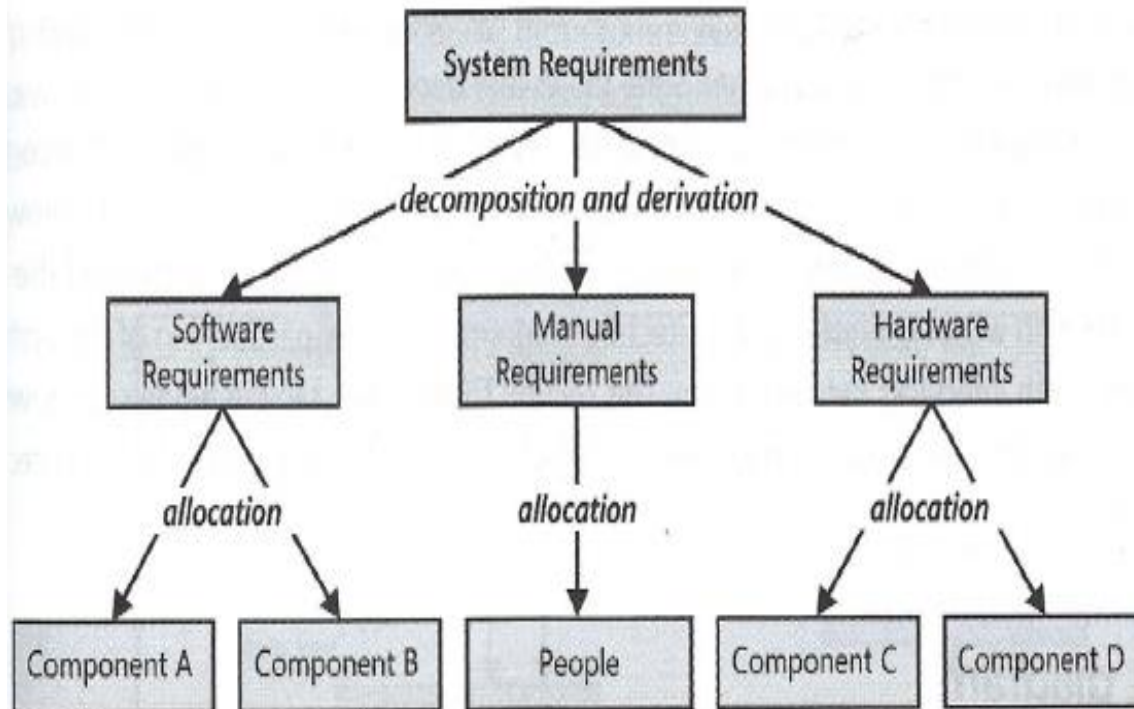


# Embedded and other real-time projects

Chapter 26

# Possible Decomposition of System Requirements



**FIGURE 26-1** System requirements are decomposed into software, hardware, and manual requirements, then allocated to appropriate components.

# Context Diagram for Author's Treadmill

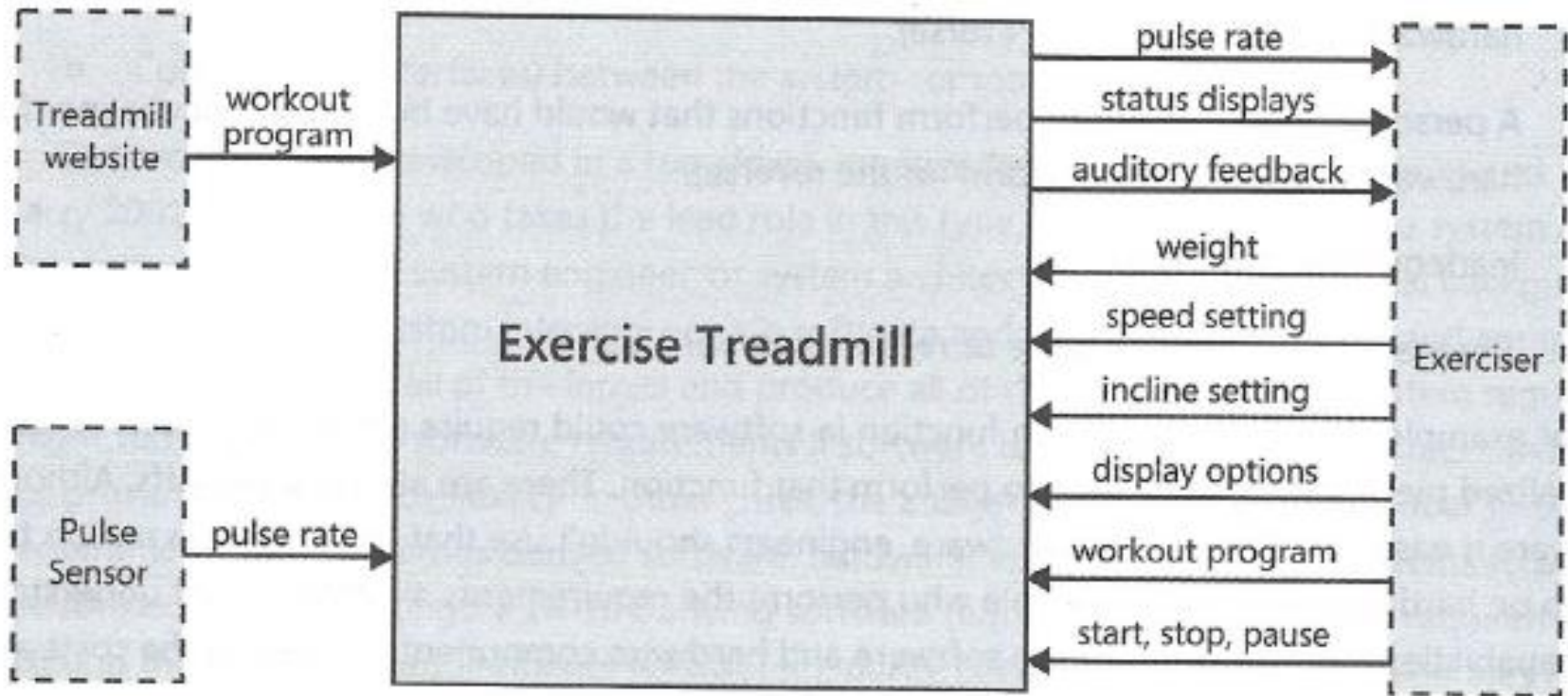


FIGURE 26-2 Context diagram for an exercise treadmill.

# State Transition Diagram

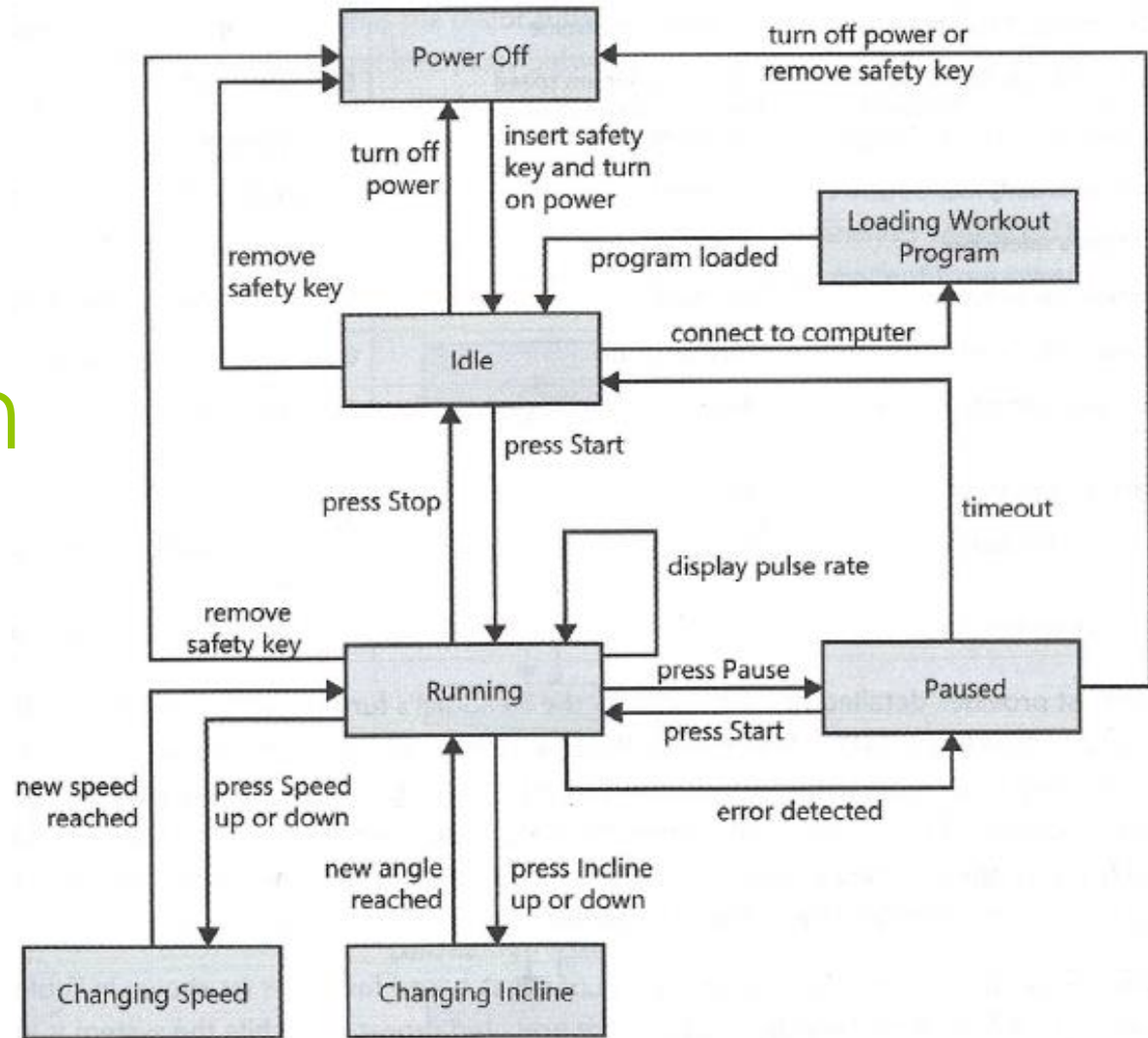


FIGURE 26-3 Partial state-transition diagram for an exercise treadmill.

# Event-Response Table

**TABLE 26-1** Partial event-response table for an exercise treadmill

Event	Treadmill state	Response
Exerciser presses Incline Up button	Below maximum incline	Increase incline by 0.5 degree
Exerciser presses Incline Up button	At maximum incline	Generate "at limit" audio signal
Exerciser presses Speed Down button	Above minimum speed	Decrease speed by 0.1 mph
Exerciser presses Speed Down button	At minimum speed	Stop treadmill belt
Exerciser removes safety key	Running	Stop treadmill belt and turn power off
Exerciser removes safety key	Idle	Turn power off
Exerciser presses Pause button	Running	Stop treadmill belt; initiate timer
Exerciser presses Pause button	Paused or idle	Generate "error" audio signal
Timer for paused condition reaches timeout limit	Paused	Go to idle state
Exerciser presses Start button	Running	Generate "error" audio signal
Exerciser presses Start button	Paused	Start treadmill belt on current speed setting
Exerciser presses Start button	Idle	Start treadmill belt at lowest speed

# Architecture Diagram

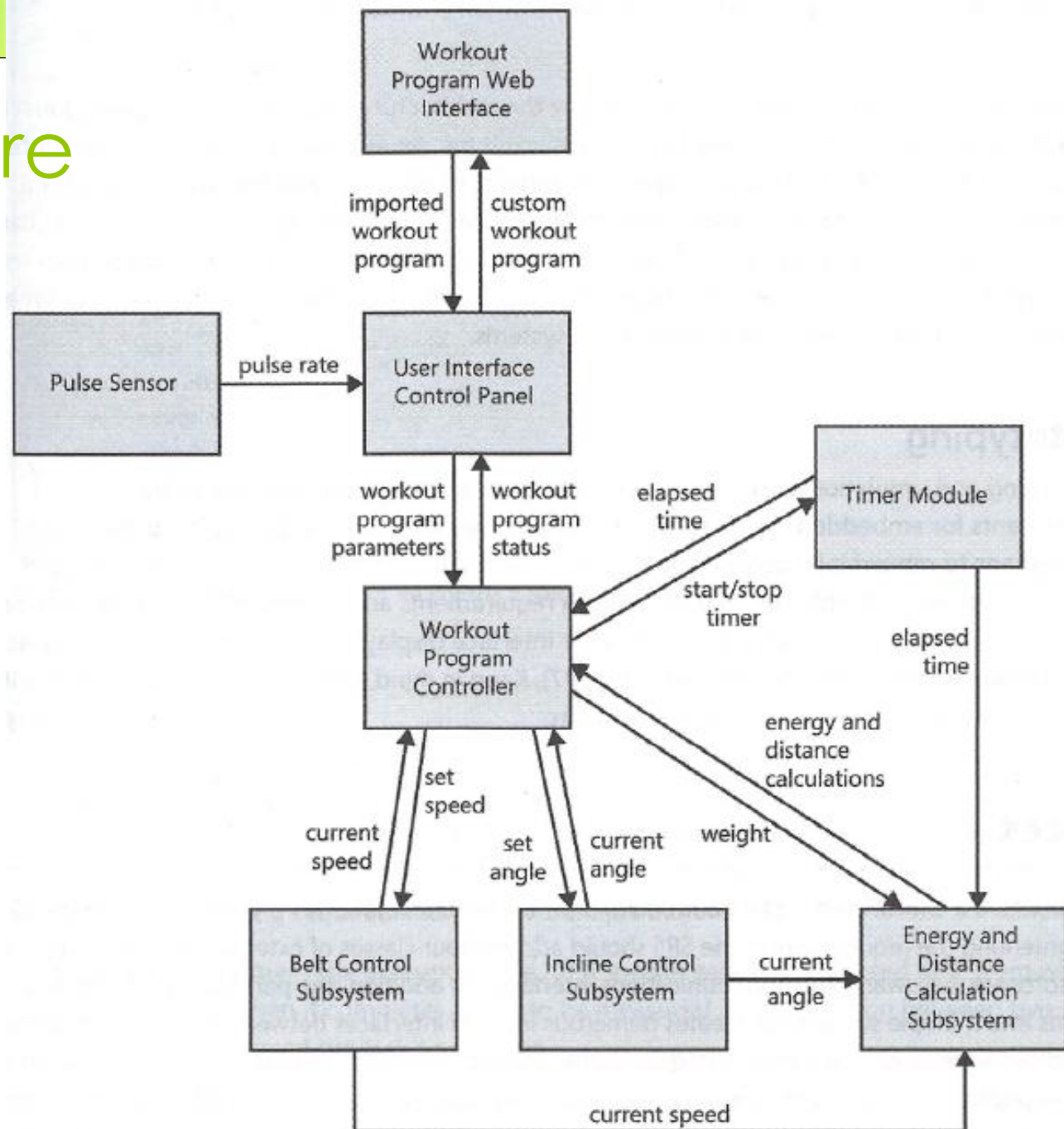


FIGURE 26-4 Partial architecture diagram for an exercise treadmill.



# Functional Requirement Examples

***Incline.Angle.Range*** *The Exerciser shall be able to increase and decrease the incline angle of the treadmill from 0 degrees through 10 degrees, inclusive, in 0.5-degree increments.*

***Incline.Angle.Limits*** *The treadmill shall stop changing its angle and provide audible feedback when it has reached the minimum or maximum limit of its incline range.*

# Example Business Rule

Calculating the number of calories the Exerciser has burned from the combination of his weight and the workout program, which is a series of segments of specified duration, incline angle ,and belt sped.



# Possible SyRS Template

1. Introduction
  - 1.1 Document purpose
  - 1.2 Product overview
  - 1.3 Operating environment
  - 1.4 References
  - 1.5 Assumptions
2. Interface diagrams
3. Data interfaces
  - 3.x <Interface ID x>
    - 3.x.1 Overview
    - 3.x.2 Data types
    - 3.x.3 Interface file formats
    - 3.x.4 Communication protocol
4. Software interfaces
  - 4.x <Interface ID x>
    - 4.x.1 Overview
    - 4.x.2 Interface specification
    - 4.x.3 Timing issues
    - 4.x.4 Communication protocol
5. Hardware interfaces
  - 5.x <Interface ID x>
    - 5.x.1 Overview
    - 5.x.2 Connection
    - 5.x.3 Data and control flow
6. User interfaces

**FIGURE 26-5** Proposed template for an interface specification.