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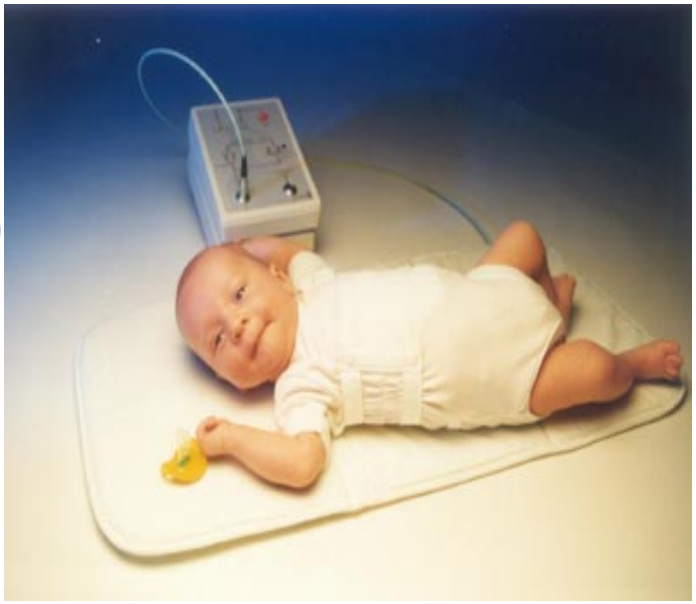
MULTI-SENSOR INFANT MONITORING SYSTEM



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BACKGROUND:

- Sudden Infant Death Syndrome (SIDS):
  - Sudden unexplained death of an infant
- Industry affected: Biomedical
- Technology: Infant Monitoring System
  - Detect multiple vital signs
  - Alerts caregiver to reduce the onset of SIDS
- Customer: Caregivers of infants

PROBLEM FORMULATION

- NIH/NICHD reports that "Back-to-bed" program significantly reduces SIDS occurrence by 50% since 1990
  - "Back-to-bed" program - designed primarily to stress that babies should be put to sleep on their back

- Existing monitoring technologies:
  - Detect singular vital signs
  - Limited in scope

- Multi-sensing monitor system required

- A working knowledge of various subjects

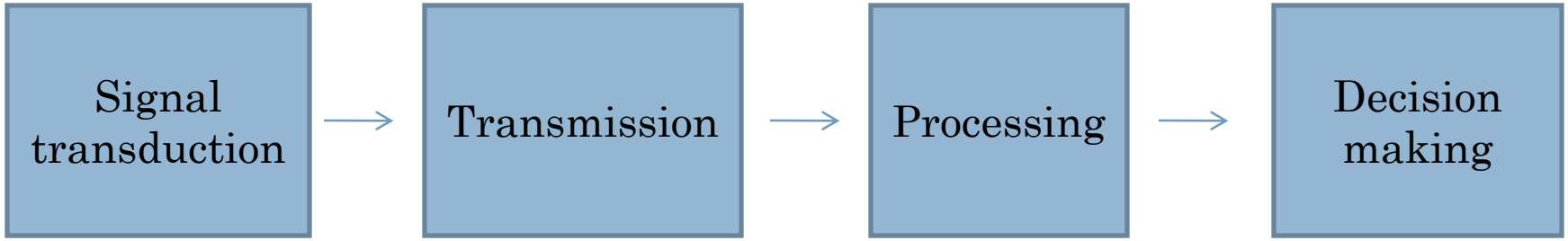
PROBLEM FORMULATION (CONT'D)

- Specifications
  - Mountable in typical bedroom
  - Work in light or dark room
  - Not excessively heavy, providing ease of travel

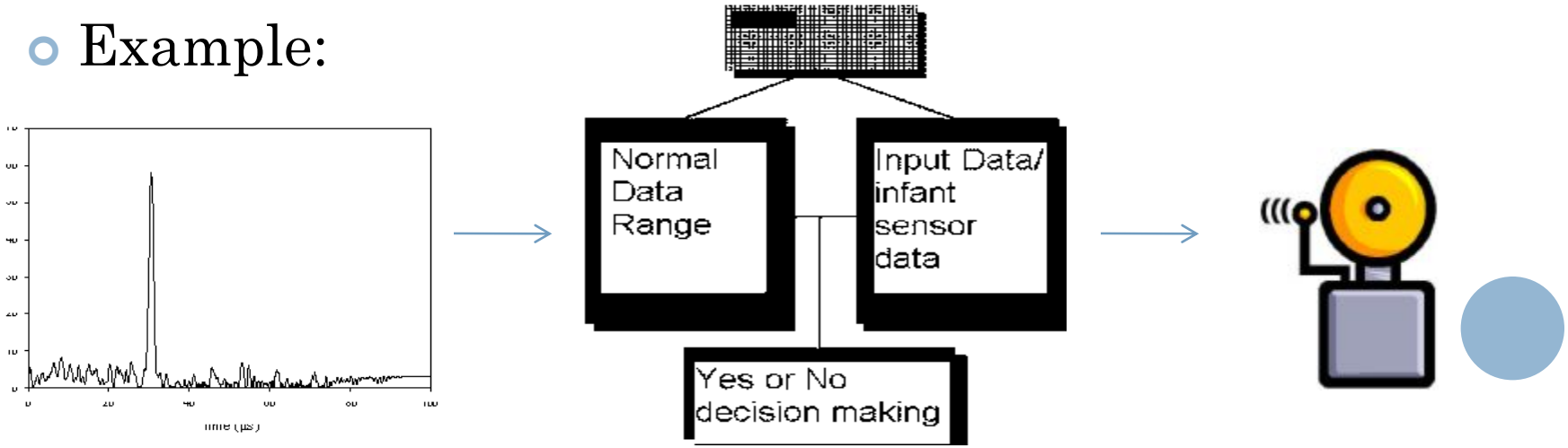
- Regulations
  - Must meet the definition of a medical device in section 201(h) of the Federal Food Drug & Cosmetic (FD&C) Act
  - Must adhere to the Food and Drug Administration (FDA) regulation of a maximum level of 0.5 µg/mL for lead content products intended for use by infants and children

SOLUTION APPROACHES

- System level schematics

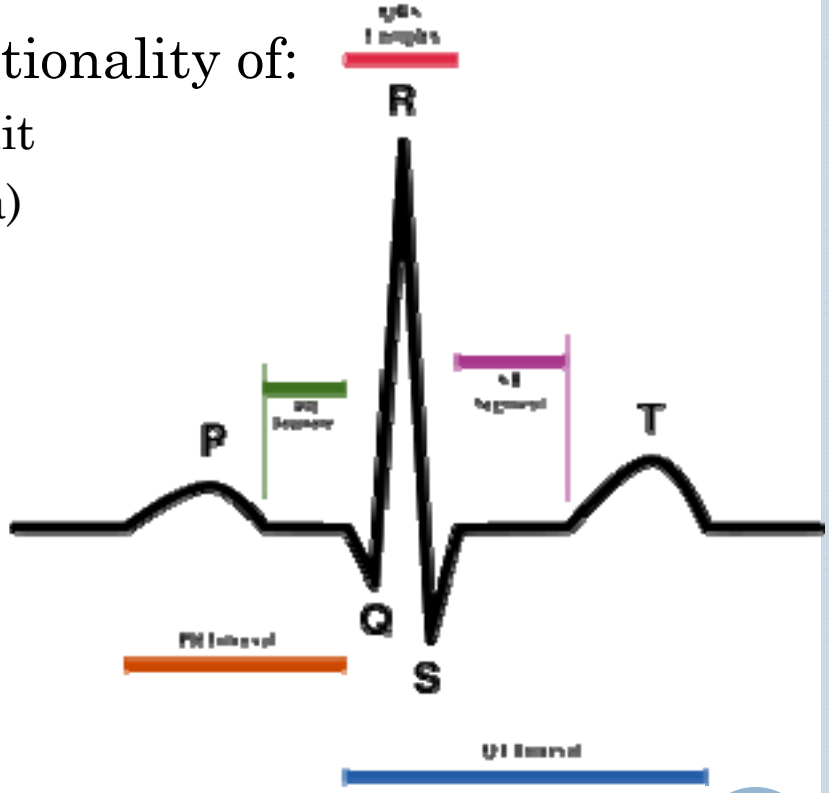


- Example:



MAJOR SOLUTION

- PAT Baby Suit (Hybrid)
  - Merges the concepts and functionality of:
    - Integrated Multi-senor Baby Suit
    - PAA(Position, Alternans, Apnea) Infant Monitoring System



- Monitors:
  - Position – Pressure sensors
  - Temperature
  - Heart Alternans
    - Electrodes →Input unit → Processor → Comparator

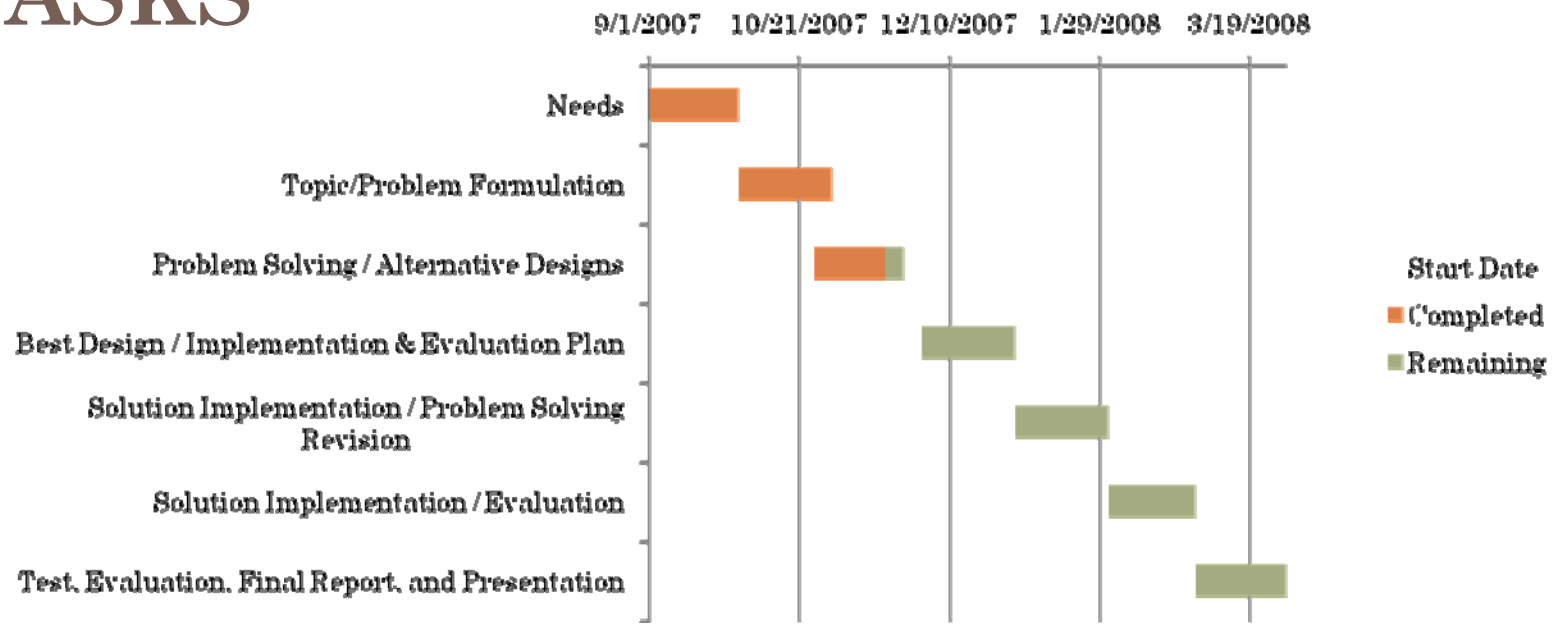
ALTERNATE SOLUTIONS

- Integrated Multi-senor Baby Suit
  - Monitors:
    - Position, Temperature, Pulse
- Position Monitoring Mattress
  - Monitors:
    - Position, Pulse, Air quality, Noise monitor, Video Surveillance
- PAA(Position, Alternans, Apnea) Infant Monitoring System
  - Monitors:
    - Position, Heart alternans, Apnea

DELIVERABLES & VERIFICATION PLAN

- Deliverables
  - Wearable prototype with detachable sensors
  - Mannequin baby
  - Crib-side mountable alerting device
  - User manual
  - Virtual instrumentation with Labview programming
- Verification plan
  - Turn the mannequin infant over to test pressure sensors
  - Heat the mannequin infant to emulate a rise in temperature to test
  - Emulate heart beat by pressing on the mannequin infant

PROJECT MANAGEMENT & TASKS



- Research
  - SIDS
  - Patents for baby monitoring
  - Ways to alert caregiver
- Development
  - Pressure switch circuit
  - Heart Alternans monitor
  - Temperature monitor
- Test and analysis
- Implementation
  - Establish a method of alerting
  - Determine optimal positions of sensors
  - Attach sensors
- Production
  - Prototype
  - Alerting device
  - manual

COSTS AND RESOURCES

- Resources:
  - Dr. Anderson
  - Internet
  - National Institute of Health (Journals, statistics, etc.)
  - United States Patents & Trademark Office
- Costs:
  - Microprocessor - $300
  - ECG Electrodes - $27.50
  - Alarm Buzzer - $74.50
  - Comparator - $20.00
  - Pressure Sensor Switches - $100
  - Miscellaneous costs - $100
  - Labview – free
  - Labview toolkits - $1250
- Total Budget - $1872.00

CONCLUSION

- Our system will effectively detect multiple signals and vital signs associated with the onset of SIDS
- We hope to thoroughly evaluate and test our solution implementation for our design according to the projected timeline
- Completion of final design and deliverables, including prototype by end of March 2008
- Upon project proposal review, we are willing to make any necessary changes to our design and/or functional requirements