Nala: Smart Companion for Seniors



TEAM: Randy Garcia (Project Manager), Thomas Wilk, Hongyu Shi, Mohammad Zilon, Parmanand Shiwmangal
MENTOR: Professor Xiao

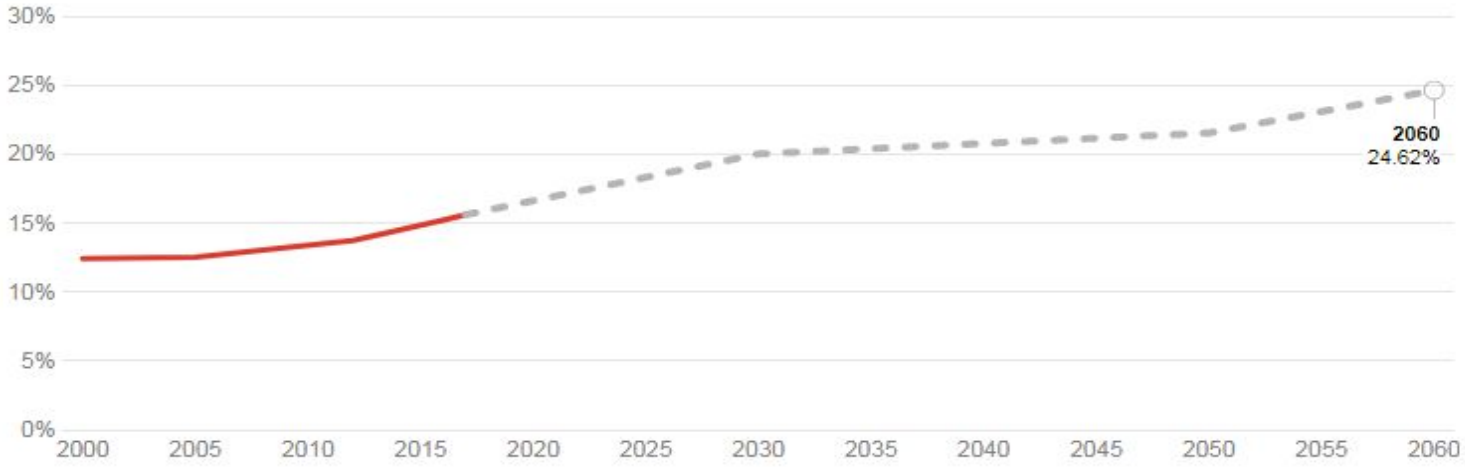
Chapter 1: Introduction

- The idea of smart companion for seniors resonated with us
- Nala is a smart companion for seniors which helps improve the lives of its users
- The device will be small so that it can fit comfortably in a home and also be pleasant or cute in appearance

Image I: Randy wants his grandmother to have all the support she can get

Need

- Seniors have become a fast-growing share of the U.S. population. According to projections from the Population Reference Bureau, nearly one in four Americans will be over 65 by 2060. (Source: U.S. Census Bureau)
- Most adults are out working, while their elderly parents are often left alone, or are at a senior care center where they might not be given adequate attention.



Need cont.

- Study conducted Selwyn Height retirement home in New Zealand.
- 40 seniors participated in the from ages ranging from 55-100 years.

- Where a group of 20 interacted Paro for 12 weeks
- Compared to the control group the group with Paro were noted to feel less lonely

Problem

- The main problem addressed we will be companionship for the elderly.
- So a pleasant appearance, a comfortable size along with a natural way of interacting with our companion are all necessary help to alleviate those feelings of the user being lonely or perhaps forgotten
- The device will support its user by providing reminders, life alert, and functions for fun. The machine-learning nature of the robot would allow it to create more useful alerts, reminders, and games.

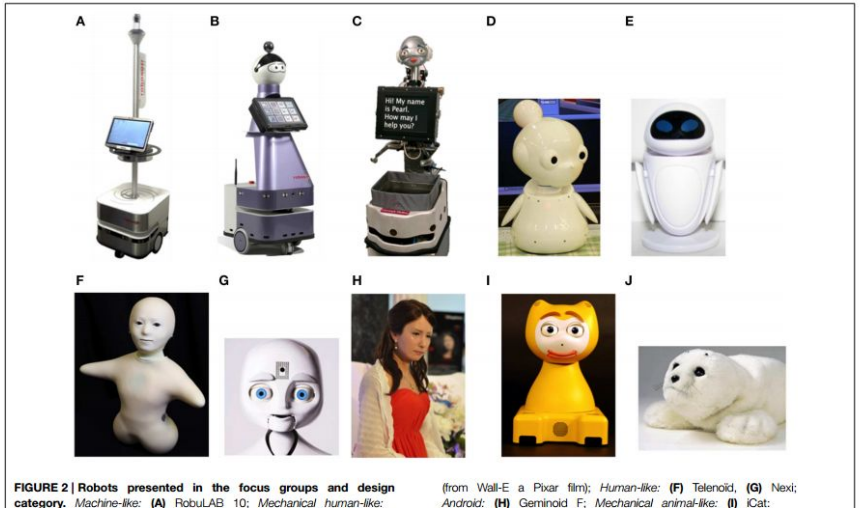
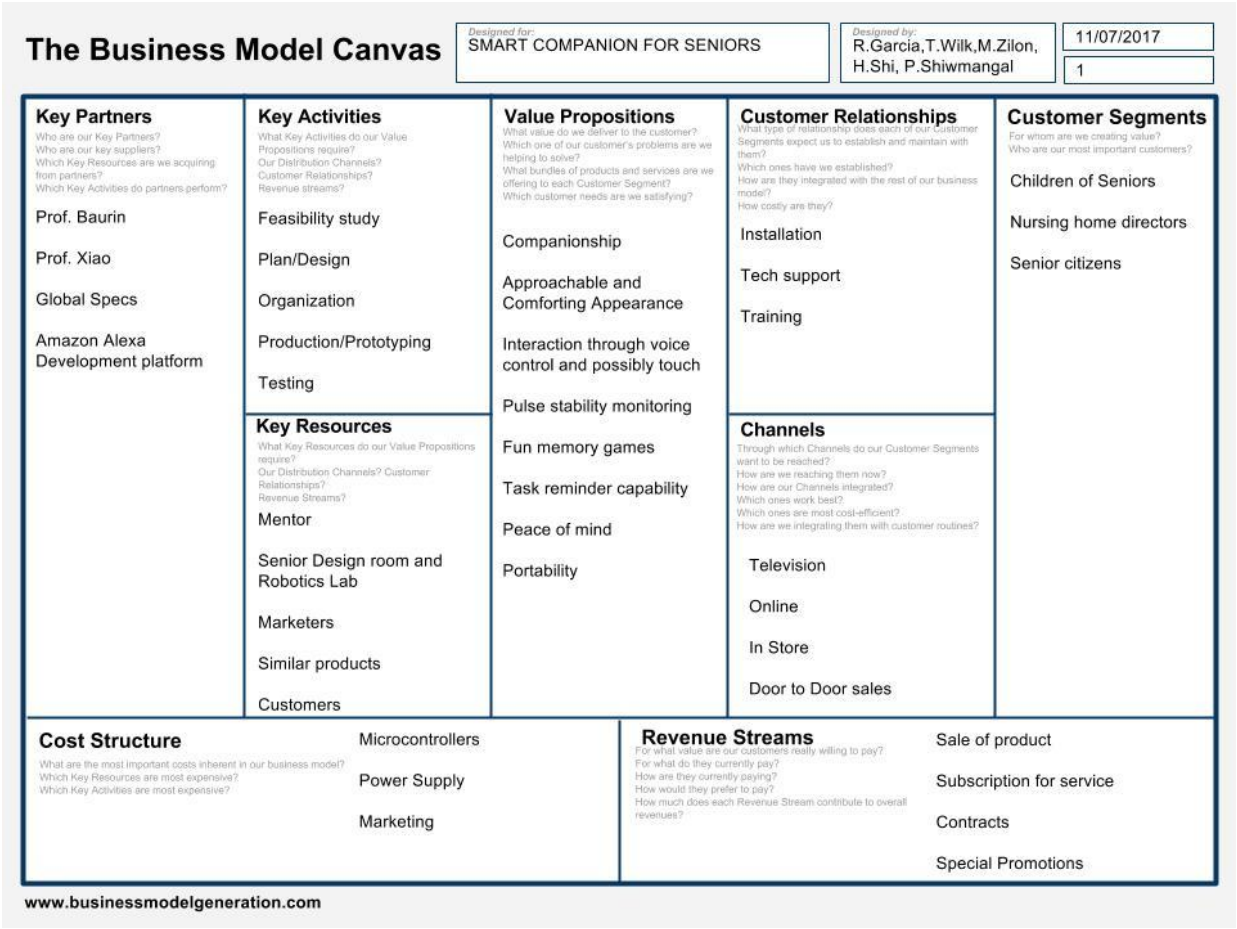


FIGURE 2 | Robots presented in the focus groups and design category. *Machine-like:* **(A)** RobuLAB 10; *Mechanical human-like:* (from Wall-E a Pixar film); *Human-like:* **(F)** Telenoid, **(G)** Nexi; *Android:* **(H)** Geminoid F; *Mechanical animal-like:* **(I)** iCat;

Business Model Canvas



The Business Model Canvas

Designed for: SMART COMPANION FOR SENIORS

Designed by: R.Garcia,T.Wilk,M.Zilon, H.Shi, P.Shiwmangal

11/07/2017

1

Key Partners

Who are our Key Partners?
Who are our key suppliers?
Which Key Resources are we acquiring from partners?
Which Key Activities do partners perform?

Prof. Baurin

Prof. Xiao

Global Specs

Amazon Alexa Development platform

Key Activities

What Key Activities do our Value Propositions require?
Our Distribution Channels?
Customer Relationships?
Revenue streams?

Feasibility study

Plan/Design

Organization

Production/Prototyping

Testing

Key Resources

What Key Resources do our Value Propositions require?
Our Distribution Channels? Customer Relationships?
Revenue Streams?

Mentor

Senior Design room and Robotics Lab

Marketers

Similar products

Customers

Value Propositions

What value do we deliver to the customer?
Which one of our customer's problems are we helping to solve?
What bundles of products and services are we offering to each Customer Segment?
Which customer needs are we satisfying?

Companionship

Approachable and Comforting Appearance

Interaction through voice control and possibly touch

Pulse stability monitoring

Fun memory games

Task reminder capability

Peace of mind

Portability

Customer Relationships

What type of relationship does each of our Customer Segments expect us to establish and maintain with them?
Which ones have we established?
How are they integrated with the rest of our business model?
How costly are they?

Installation

Tech support

Training

Channels

Through which Channels do our Customer Segments want to be reached?
How are we reaching them now?
How are our Channels integrated?
Which ones work best?
Which ones are most cost-efficient?
How are we integrating them with customer routines?

Television

Online

In Store

Door to Door sales

Customer Segments

For whom are we creating value?
Who are our most important customers?

Children of Seniors

Nursing home directors

Senior citizens

Cost Structure

What are the most important costs inherent in our business model?
Which Key Resources are most expensive?
Which Key Activities are most expensive?

Microcontrollers

Power Supply

Marketing

Revenue Streams

For what value are our customers really willing to pay?
For what do they currently pay?
How are they currently paying?
How would they prefer to pay?
How much does each Revenue Stream contribute to overall revenues?

Sale of product

Subscription for service

Contracts

Special Promotions

www.businessmodelgeneration.com

External Requirements

Nala’s key external requirements are its functions, safety, operating environment, appearance, robustness and reliability.

Key Functions:

- Companionship (Note it does not replace human companionship),
- Life stability monitoring,
- Task reminding,
- Memory games,
- Motion to aid in appearance and interaction.

The Operating Environment:

- At room temperature of about 20℃ or 68℉ or 293°K.
- To be used indoors such as private homes and nursing homes, though it can be utilized outdoors.
- To be used in stationary condition, such as on top of desks or tables.

External Requirements cont.

Appearance:

- Friendly, approachable, comforting and soothing.

Robustness:

- Internal circuitry protected by metal framework.
- External body encased in polymer.

Reliability:

- Supported by emergency batteries in case there is loss of AC power.
- Nala's functionality is not dependent on its physical condition. Therefore, its functionality will not degrade even if it is physically damaged.

Internal Requirements

Marketing

- Phone interviews and face-to-face interviews have been conducted with potential customers to gain insight of their experiences with senior care products, such as devices to keep patients occupied and other unmet needs that can be offered by a companion bot.

- Adults ages 50 to 65 who are providing active care to their elderly parents ages 70 and beyond.

- Ideally receive a government contract requiring our device be installed in all federal and state veteran's hospitals.

Internal Requirements cont.

Manufacturing

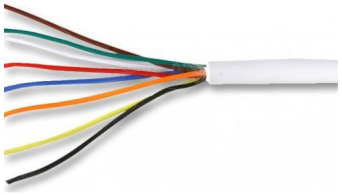
- Essential Parts to be Ordered:
    1. 3D printing Filaments,
    2. Raspberry Pi 3,
    3. Arduino Uno,
    4. Bluetooth Pulse Sensor,
    5. Stereo Camera,
    6. A microphone,
    7. 5V Voltage Regulator
    8. Continuous Rotation Servos.
- We have options to assemble and test the companion bot in in a studio space in NYC or in Professor Xiao's Lab Room.

Restrictions

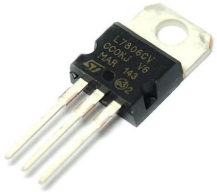
- **Patent:** exists for robotic system to “assist immobile persons”
- **Institutions:** respect for others
- **Insurance:** UL certification would be need for final product

Limitations: Environmental limitations affecting the product

Conductive surfaces insulated



Voltage regulator to isolate internal parts from wall voltage



Air circulates through device body for natural cooling

Limitations: product affecting the environment

Creates no solid waste

Creates no air pollution

Noise pollution: headphones can be used

Project Charter

The Project Charter

Project Name: Smart Companion for Seniors **Date:** October 30th, 2017
Project Manager: Randy Garcia
Project Members: Thomas Wilk, Randy Garcia, Hongyu Shi, Mohammad Zilon, Parmanand Shiwmangal

Project Justification (problem or opportunity addressed):

There are cases where older adults cannot have the care they require, be it that their families cannot provide full-time care because of their work schedule or that adult care facilities do not have the funding to hire enough nurses to take care of their residents which are always increasing. Which leaves them with unmet needs of social interaction, medical supervision, and healthful structured schedules. Our senior companion device will not replace nurses or families taking care of their elders, but would support those who are taking care of older adults. Our device would serve as a support companion to the user, which could provide life-saving and therapeutic value.

Overview of Deliverables

We will deliver an analysis of the senior care products market. This analysis will contain information about the total market size of the senior care products market, as well the size of the smaller segment that we wish to address.

A feasibility study will also be delivered which will outline how our group will be able to design, manufacture, and distribute our product.

Specific Project Objectives & Success Criteria (schedule, cost, quality):

During the month of November 2017, we will do market research by calling and meeting face-to-face with potential customers and influencers of our product. For instance, as we are considering creating a senior care companion device, we are studying how an "end user" or senior citizen may have unmet needs that our product can fulfill. We will also study who affects senior citizens' access to our product. For instance, a buyer at a senior care facility may have the power to buy our devices for use at their care facility. During November 2017, we would like to do market research to discover what these customer segments need from a product such as ours.

During December 2017, we will finalize our technological design and create a bill of materials (BOM) to purchase which will be used to build our product.

In this phase of our project, we will consider success if we have conducted the customer interviews by the end of December 2017 and have submitted our project charter to our Senior Design mentor.

Primary Stakeholders & Roles (including broad statement of roles and responsibilities of all customers, sponsors, contributors, reviewers, managers, sign-off authorities, project manager, etc.):

The following are the primary stakeholders:

- Professor Xiao – He is our mentor and will help us in properly designing other project, and also providing us with a work space and may also provide extra funding if needed.
- Professor Baurin – He will teach us project management skills, and guide us on how to properly create the Senior Design project binder. He also supply with the $250 to purchase the material need for our project.
- Children of Seniors – They are our customers, that want our device to be companion to their parents.
- Senior citizens – They are the end user and who we designing our companion for, so for this reason they are the most important stakeholder because it is them who really decide if our product is good or not.

Key Assumptions (including broad statement of sponsor/stakeholder inputs and resources to be provided, as well as a delineation of "what's outside" project scope):

In this project, we assume that we will address two market segments: users using our device at home, and secondly, users using our device in an institution, such as a nursing home. We also assume that we will have adequate funds to build a minimum viable prototype as an implementation of our design study.

Signatures:

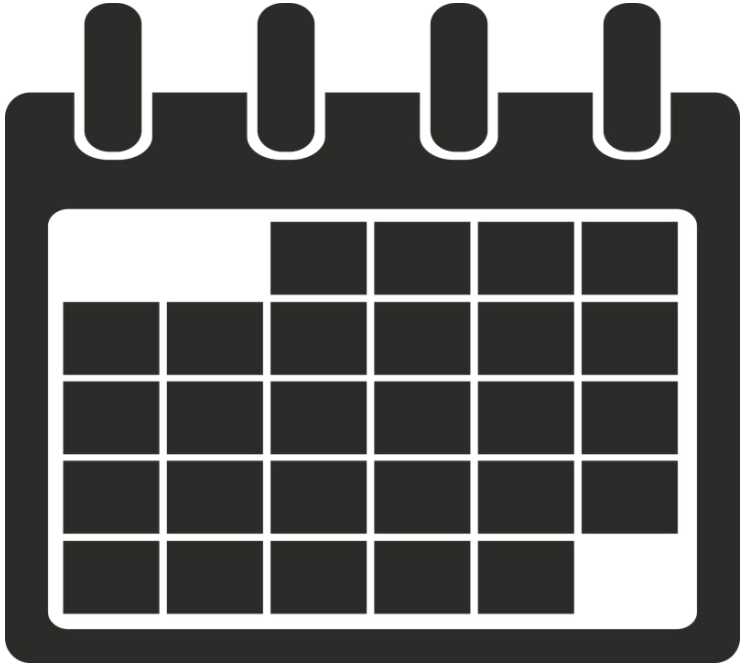
The following people agree that the above information is accurate:

Name of Project Members	Signature	Date
Randy Garcia	Randy Garcia	12/12/17
Hongyu Shi	Hongyu Shi	12/12/17
Parmanand Shiwmangal	P. Shiwmangal	12/12/17
Thomas Wilk	Thomas Wilk	12/12/17
Mohammad Zilon	Mohammad Zilon	12/12/17

Project sponsor and/or authorizing manager(s):

Xiao Jie

Chapter 2: Planning



“*If you fail to plan, plan to fail.*” -- Benjamin Franklin

Project Justifications

Justification: elderly people report feeling lonely

Nala offers:

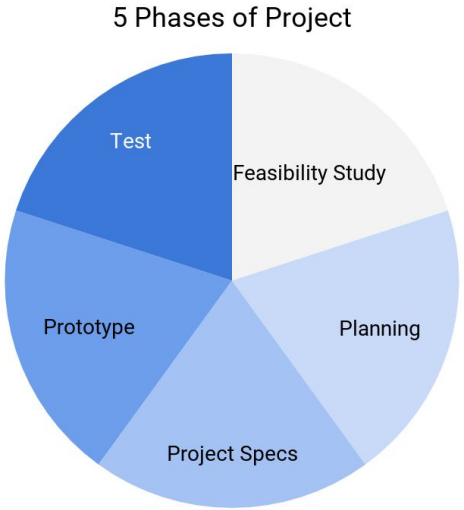
- 24 hour heart rate monitoring
- Appointment reminders
- Memory games

Project Deliverables

1. Scope
2. WBS
3. Activities
4. Network Diagram
5. GANTT Chart
6. Budget
7. BOM

Scope Management Plan

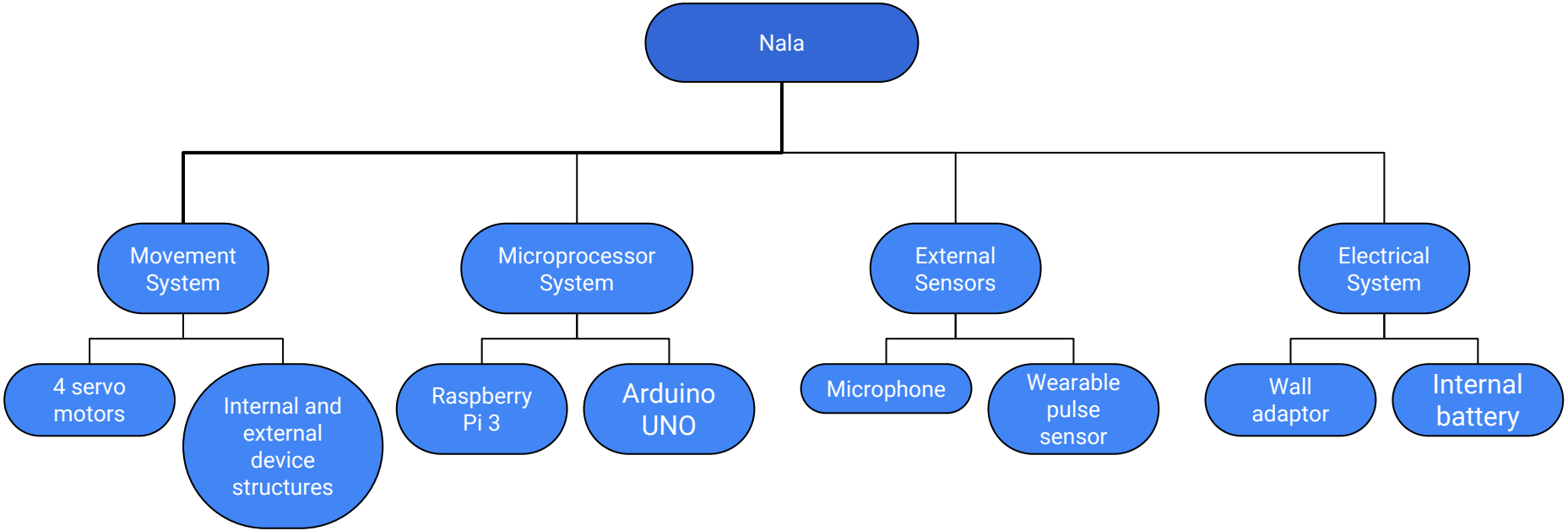
In scope: Identify unmet market needs.



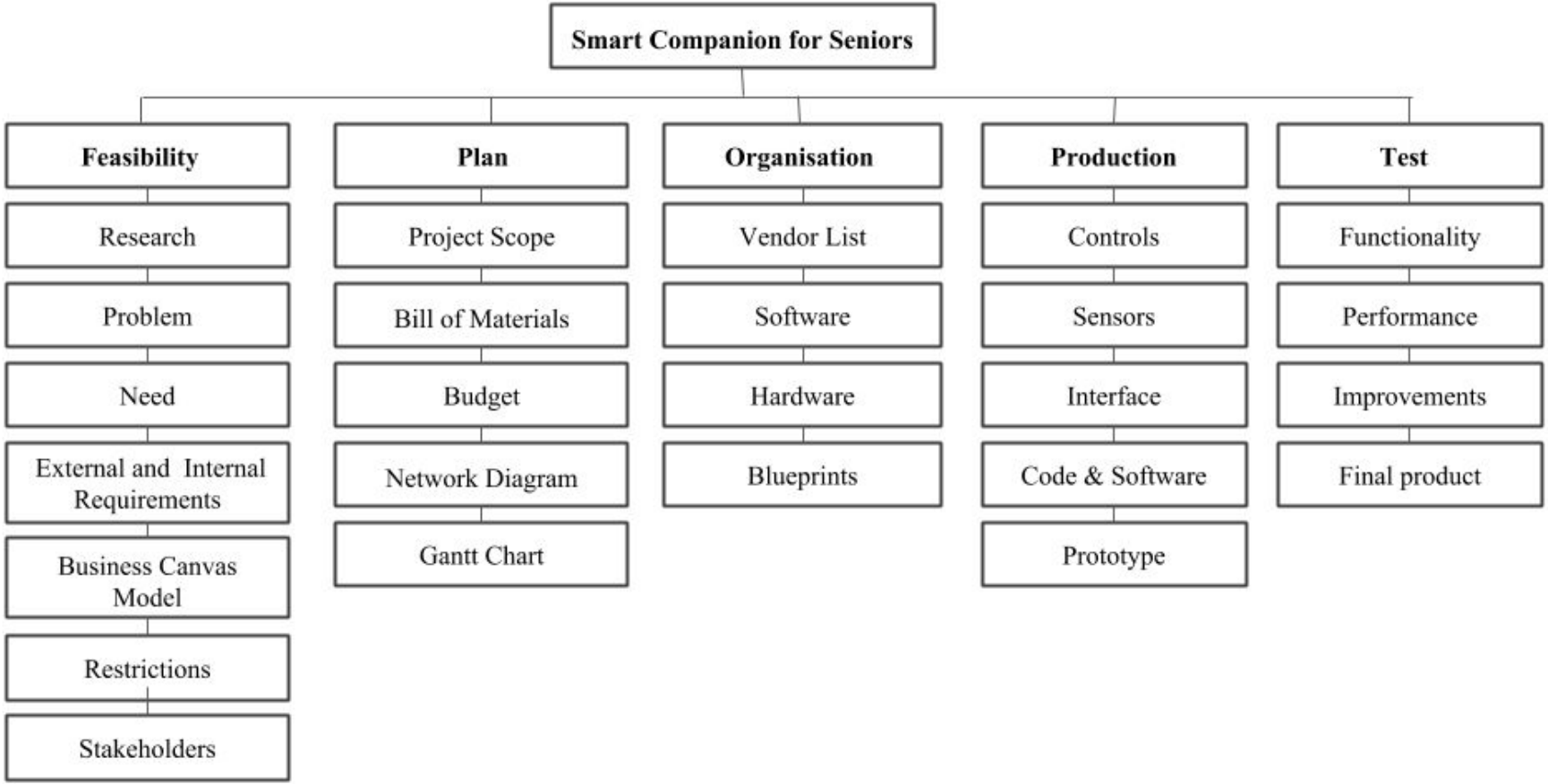
Out of scope:

- UL Certification
- Customer testing
- Obtain license or insurance for product use

Bill of Materials



Work Breakdown Structure



List of Activities: An example

Business Model Canvas

1) Attend the Business Model Canvas Lecture

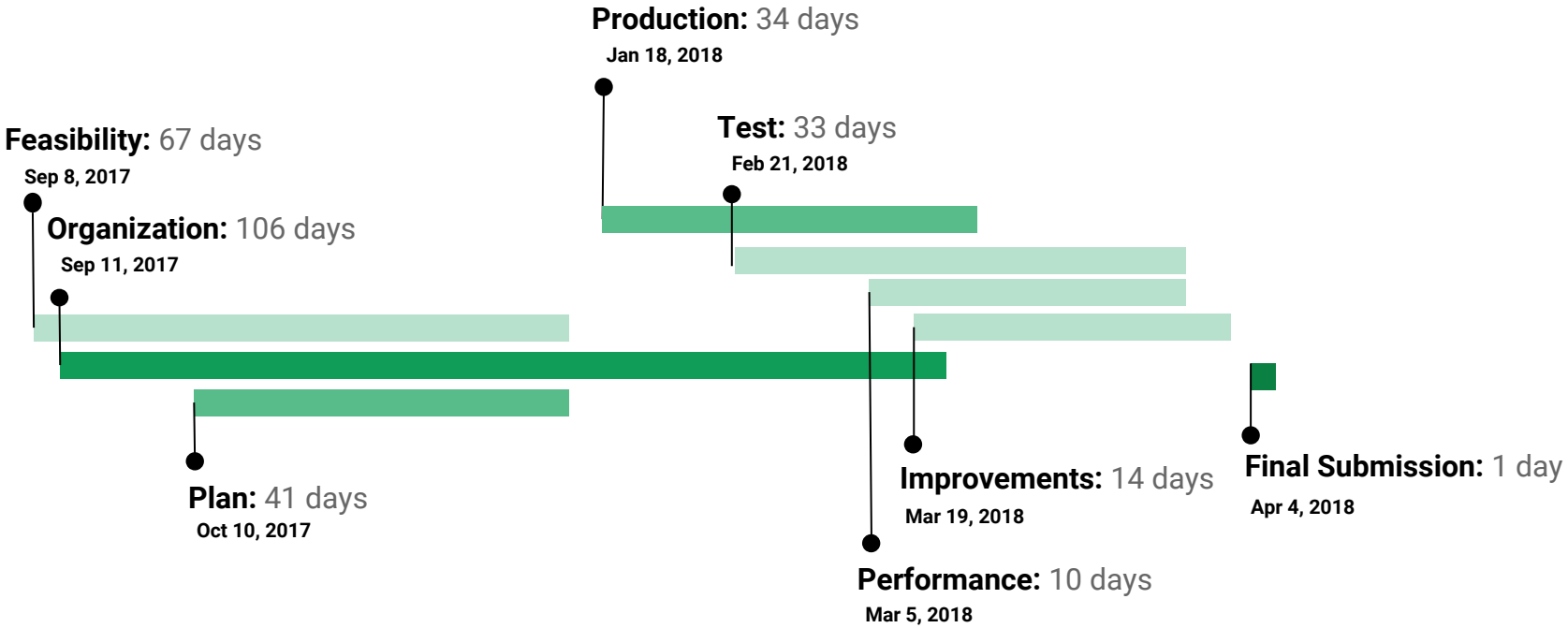
2) Research the Business Model Canvas and find template

3) Use the previous written section to fill out template

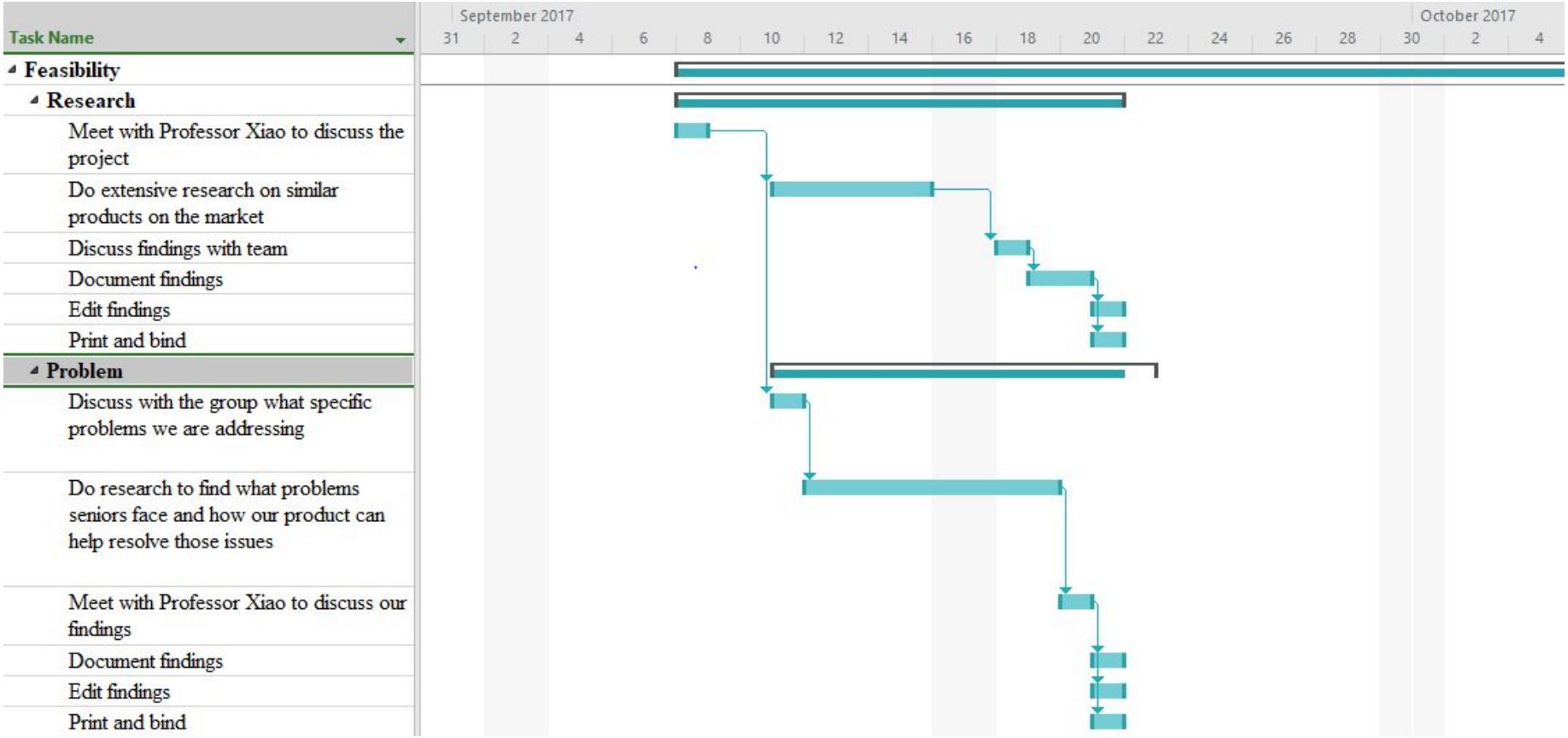
4) Review

5) Print and bind

Network Diagram: Summary

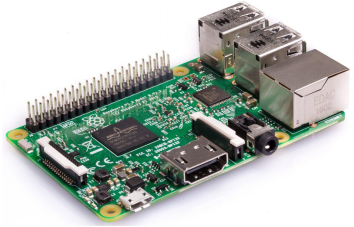


Gantt Chart: A Snapshot



Budget

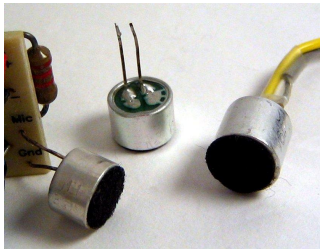
Senior Design Funding: $250.00
Project Mentor Funding: as requested



$35.00

$22.00

$20.00



$0.82

Chapter 3: Vendor List

- Arduino Uno
- Raspberry Pi 3
- Pan and Tilt Kit with Servos
- Continuous Rotation Servos
- Electret Microphone

- Arduino Uno
- Raspberry Pi 3
- Speaker
- Lithium Polymer Battery Packs

- Pan and Tilt Kit with Servos
- Continuous Rotation Servos
- Electret Microphone

Vendor List cont.

amazon

- Arduino Uno
- Raspberry Pi 3
- Pan and Tilt Kit with Servos
- Continuous Rotation Servos
- Bluetooth Pulse Sensor
- Interface Modules Rechargeable 5V Lipo USB Boost

CUI INC®

- Electret Microphone

CELL-CON

- Lithium Polymer Battery Packs

sparkfun™ ELECTRONICS

- Interface Modules Rechargeable 5V Lipo USB Boost

TOPEX

- Lithium Polymer Battery Packs