Horticulture has been regarded as the number one leisure activity and provides wonderful opportunity for exercise and socialization (Larson and Meyer). Preliminary research has found that adult participation in gardening results in significant improvement in physical health (Shoemaker and Lin), as well as mental health by creating feelings of pride, competence, and satisfaction (Larson and Meyer). Similarly, it is also beneficial for younger generations to be involved in gardening to stay healthy while learning lessons about accountability, nurturing, and responsibility (Larson and Meyer). Inter-generational gardening improves physical, emotional, and spiritual well-being for all participants (Larson and Meyer). Gardening with younger generations enables the baby boomer generation to take part in an energetic and nurturing atmosphere. Also benefiting, pre-school children receive the care and attention they need while aiding aging citizens in physical tasks. Intergenerational community gardening not only helps aging people to stay healthy with moderate exercises, but also educates younger generations about plants and responsibilities. It is suggested that the positive results of gardening can apply to all members of a community. This project will explore architectural approaches influencing the social behavior in green spaces to create a mutually beneficial and educational community for inter-generation living. Main research methods are to collect information and benefits about inter-generational gardening and synthesize them into a model for inter-generational housing design.



## yuankun yu

Inter-Generational Living: Farming and Gardens Creating Community Space with Applied Feng Shui Principles





# farming and gardens

• ...beauty speaks like an oracle, and man has always heeded its message in an infinite number of ways...a garden must combine the poetic and the mysterious with serenity and joy. ??

#### Introduction

This project is located in Pioneer Square, Seattle with the goal to achieve a model for intergenerational living as well as sustainable strategies involved in this type of housing. As we know, Seattle is a leading city for sustainable buildings and healthcare facilities. Therefore, creating this type of model is reasonable for the near future of Seattle. My focus is based on the horticultural activities which involves the arrangement of gardens and services encouraging farming activities. In designing this building, I will provide gardens for different purposes such as a rooftop garden for urban farming, courtyard gardens for exercise and meditation. My main aim for this building is to promote and establish sustainable community gardens for healthy lifestyle and social interactions.

#### Target Users

My target users are Asian population in Seattle, especially baby boomers and working parents with young children.

Based on the U.S. Census Survey on 2010, 13.6% of Seattle population are Asians, the largest minority group in the city. Speaking of Asian people, they are family-oriented, which means young couples still visit their parents on a weekly basis to make sure they are doing fine or have a dinner with them. Also, Asian people are community based that they are willing to help each other out if they live in the same neighborhood. Intergenerational living is popular in Asian world with the tradition of three generations live together in the same house. It is beneficial for children to grow up with grandparents who are kind and more knowledgeable than their



Typical asian family

parents. For the elderly, they feel responsible to look after young grandchildren. It is common for grandparents to take care of grandchildren in Asian culture when the young parents are working.

#### Inter-generational Living

The idea of inter-generational living is an idea of living to create an environment for both young and older generations to live together in a community, providing services and social interactions between generations. Intergenerational community refers to a place that (1) provides adequately for the safety, health, education and basic necessities of life for people of all ages; (2) promotes programs, policies, and practices that increase cooperation, interaction, and exchange between people of different generations; and (3) enables all ages to share their talents and resources, and support each other in



Kids teaching seniors how to use a computer

relationships that benefit both individuals and their community.(Building Livable)

The benefits of inter-generational living are sharing knowledge with each other, helping each other and creating a better relationship for a more united community. For example, in child daycare, boomers have more knowledge and skills to teach children, while young children have more knowledge about the latest technology, such as using an iPad or a computer. Also, old and young generations can help each other. In terms of gardening, boomers have more experience and knowledge but they may lack in mobility. However, younger generations are more energetic but lack of experience. With guidance from boomers, younger generations can offer an extra hand for boomers in gardening. With the social interactions between different generations, the shortcoming known as generation gap could be capped to create a more harmonious neighborhood.

The reasons for intergenerational living are as follows. First of all, inter-generational collaboration can unify and improve our communities. Secondly, resources can be more wisely used when they connect the generations, rather than separate them. Thirdly, discrimination in any form limits a person's potential to contribute to the development of his or her community. Last but not least, grandparents and other adults who step forward to raise children are providing an economic service to families and the country. The goal of inter-generational living is to improve the lives of children, youth, and older people through inter-generational collaboration, public policies, and programs for the enduring benefit of all. (Generations United)



Seniors teaching kids how to read

#### Horticulture, Healing Gardens and Intergenerational Gardening

Horticultural therapy officially started after World War II with injured veterans both physically and mentally. Later on, horticultural therapy was defined by The American Horticultural Therapy Association (AHTA) as "the engagement of a person in gardening-related activities, facilitated by a trained therapist, to achieve specific treatment goals". However, the broader uses of horticulture, known as community gardening or children's gardening, are well received by the public as daily practice of horticultural activities.(Shoemaker, Diehl)

Gardening is beneficial to people at all ages. As a moderateintensity activity, gardening has been shown to reduce the risk of certain health conditions such as primary cardiac arrest and myocardial infarction. Preliminary research has found that participation in gardening by adults resulted in significant improvements in physical health outcomes such as total



Senior taking a kid for a walk in the garden

cholesterol, lower blood pressure, and lower mortality as well as psychosocial health outcomes such as psychological well-being and stronger social integration (Shoemaker and Lin).

Healing gardens play an important role in the human history for healthcare purposes. "The idea of a healing garden is both ancient and modern. Long after humans had begun to erect dwellings, local healing places were nearly always found in nature – a healing spring, a sacred grove, a special rock or cave." (Cooper Marcus and Barnes) "Restorative or healing gardens for the sick have been part of the landscape of healing since medieval times. Such gardens have been parts of hospitals, hospices, rehabilitation centers, and more recently nursing homes for the infirm and elderly." (Gerlach-Spriggs, Kaufman, and Warner)

A garden can benefit people in a multiple ways. One of them is "the result indicate that power of concentration increases for very old people after a visit in a garden" in comparison to resting in their favorite room (Rodiek, 2005). Furthermore, "a space to look out at, and a space for passive



Senior gardening with young kid

or quasi-passive activities such as observing, listening, strolling, sitting, exploring, and so on." (Cooper Marcus and Barnes). Also simply by viewing the natural landscape resulted in lower systolic and diastolic blood pressures and lower heart rates of women who were watching the natural landscape.(Rodiek, 2005) What is more, Gardens can be emotionally healing as well as physically healing. Studies have shown that not only are people who work with gardens healthier but those people surrounded by gardens feel better. (Vappa, 2002)

The benefits for inter-generational gardening is mutually important for both older and younger generations. For the elderly, gardening can promote positive self-esteem while teaching younger generations; can encourage the elderly to continue to use their brains to remember names of plants and process; can bring comfort to a person with familiar scents or scenes; can help the elderly to pass their wisdom and experience to other generations; and can significantly improve elderly's physical health and provide a social opportunity for retired people.(Larson and Meyer) For children, gardening can provide a safe environment to play; can teach them positive social and interpersonal skills (Blair, D. 2009); can encourage children to eat more healthy vegetables; furthermore, gardening can teach them about patience and life cycle; can promote positive learning attitude and provide an opportunity to learn from elderly; and last but not least, gardening can improve physical

health of children.(Larson and Meyer) The advantages of inter-generational gardening are to bring generations together, to provide a social place for gathering, to produce vegetables for the community, to develop close relationships and fill the gap between generations.

### Precedent Related to Gardening

There are four common types of gardens I will address with related precedent.



Eagle Street Rooftop Farm

The first type is a rooftop garden. Precedent: located on the shoreline of the East River and with a sweeping view of the Manhattan skyline, the Eagle Street Rooftop Farm in Brooklyn, NYC is a 6,000 square foot green roof organic vegetable farm.(Growing Above)

The advantages of rooftop gardens are adequate sunlight, better insulation and runoff protection, more privacy and safety. The disadvantages are limited accessibility, extra layers of growing medium and heavier load for roof structure. Therefore, I think rooftop gardens are best suited for eatable plants such as vegetables or lettuces. Rooftop garden can hold rainwater as irrigation and cool the building during summer while insulating it for cold seasons. Due to the layers of medium required on the roof surface, stronger structural system should be considered during the design process.

The second type is a courtyard garden. Precedent: Tietgenkollegiet Dormitory in Denmark, takes its form from



Courtyard of Tietgenkollegiet Dormitory in Denmark

the traditional circle-shaped Tulou-buildings from Southeast China as a symbol, but also very functional grip of both the common and individual life lived in a small village (Bjerring, Eva). The pros of courtyard gardens are availability for larger planting such as trees, less maintenance and easy access for residents. The cons are less sunlight if the building is taller, lack of privacy and safety with public access. In my opinion, courtyard gardens are not the ideal type for farming gardens, instead, it will serve best as a viewing garden or meditating zen garden.

The third type is a vertical garden. Patrick Blanc, a French landscape and environmental designer/ artist, designed this vertical garden for the Assembly Wing for Drew School. This project transforms a solid brick wall into a dynamic and living wall with 4000 local Californian plants.

The pros for vertical gardens are making use of walls or columns as growing surface, low maintenance with built-in irrigation systems,



Vertical wall of assembly wing fof Drew School

improving air quality and creating a buffer zone between exterior and interior. The cons are limited with small size bushes, a symbol for sustainability rather than a well served garden and uneven sunlight with vertical configuration. Vertical gardens are best suited for small size plants that require little sunlight. It will require certain initial installation for irrigation system and it will be self-running. A vertical garden could be a display window for the growing plants or flowers but it will not be good to grow edible plants.

The fourth type is a balcony garden. The schematic design of Milano Santa Monica in Segrate is eco-compatible to make use of sunlight and the green space.

The advantages of balcony gardens are stage sets to express personal characteristics, low maintenance with potted plants, bringing nature close to the units and circulating fresh air. The disadvantages are balcony garden limiting the size of plants in the planters, lack of human-nature interaction due to the location of the balcony. Balcony gardens are best suited for small size plants that can be contained within a pot or a planter. The diversity of different balcony gardens will be showrooms for individual owners of the apartment and create learning opportunity for each other to further develop the social interaction.

#### **Design Applications**

The key of this research is how to convert all the information into architectural applications in building designs. Gardening as a farming activity requires a physical place for everything



Balcony gardens of Milano Santa Monica in Segrate

to happen. The locations and functions of different open space or gardens will be important in the design process. Since I am designing for inter-generational living with a focus on gardens, I provided different types of gardens for different purposes. For example, a courtyard garden can serve as a meditation place for the residents or as a private healing garden. This garden should be hidden from public and have walls along the perimeter of the space to protect its privacy. On the other hand, an exercise garden open for activities should be easily seen from the lobby or main circulation with floor to ceiling glazing. The best place for a farming garden is on the rooftop with abundant sunlight and best views of the city as a bonus for gardening. A rooftop garden not only serves as a farming facility for the neighborhood, but also as a social center for the community as a well known inter-generational garden.

In order to create a healing environment within the building, Wilbert Gesler mentions four aspects of healing environments



Rendering of healing meditating garden

in his book. Built environment is achieved by creating open space surrounded by units and care centers. The natural environment is improved by bringing nature into the building with plantings and vegetables. The social environment is strengthened by the community centers I created for the neighborhood, such as farming gardens, community dining area and daycare or adult-care centers. Lastly, the symbolic environment is received by applying feng shui principles to place the gardens into the best position within the building. All these aspects in the design will strengthen the whole scheme to be a healing environment for sustainable intergenerational living design.

Asian people take feng shui principles seriously



Bagua Template as fengshui principles

and they will not live in a place without proper consideration of feng shui. Considering the universe to mirror the Five Elements, Chinese relied on astronomy to find a correlation between the universe/ Heaven and mankind/ Earth, expressing the polarity in Yin and Yang.(Fengshui 2013)

It is complicated to understand the whole concepts of feng shui. I take the Five Elements and their relative meanings with directions to create a simplified BAGUA template as guidance to locate different spaces. For example, the fire element is in the South with dynamic and energetic meaning. So I placed an exercise garden on the South of the building adjacent to childcare center. I placed a meditating garden in the North related to water element which is gentle and calming adjacent to adult care center.

There are a few programs that promote community gathering after sunset or during the non-farming hours. One of them being the grandparents babysitting. It is beneficial for the children to receive prekindergarten education from knowledgeable elderly. Another program, called TimeBanks, promotes an exchanging system of rewarding"decency, caring, and a passion for justice." Instead of dollars, an hour's help earns a member one credit which in return, the member can use it to get help from other members for other services. No service is valued over another. In other words, if the elderly volunteer a couple of hours for children's daycare, they can get help from parents of the children or other members of this program (out of many, one) This could foster close relationship between residents and create a better community for the whole inter-generational living. The interesting thing is that you never know what your neighbors



Community Meal Program

are capable of until you get to know them. The truth is you could always get help from your neighbors as long as you offer your expertise to helping others.

Another program is the community meal program. In Seattle, the government has a "farm to table" program to connect senior meal and childcare programs with local farms. This program offers cooking skills training for childcare or adult-care providers. (Langlais, Maria)

In my design, there will be one childcare and one adult-care running with professionals on a daily basis. However, as I said before, the boomers are welcome to volunteer their effort as grandparents babysitting and have TimeBanks service in return. It is same for the rooftop garden, professional farmers will work on the garden everyday while amateur farmers could come in and learn about how to grow with professions or with volunteers from boomers. These three programs of grandparents babysitting, community farming and congregate meal plans will

ensure plenty of opportunities for boomers to get involved in the neighborhood and provide services as they wish.

#### Sustainable Strategies

Sustainability is an important aspect of architecture in Seattle.

First of all, solar energy collection is important to make a living building. This idea of living building challenge is to produce enough energy from solar or thermal resources to accommodate its own needs without getting energy from the city grid. However, during the summer time, more energy is made from PV panels which can be sold to the city grid. During winter seasons, the building can use energy from the city grid stored at peak seasons. Even though Seattle gets a lot of rainy days, there is still much solar energy available.

I will have solar panels on the south part of my building to reduce the energy cost. Because of the drizzle and mists in Seattle, people love sunny



days to embrace the sunlight whenever it is possible. Therefore, I provide outdoor seating and exercising space with plenty sunlight for the residents. The building height is also descending from North to South to maximize sunlight into the courtyard, corridors and community space.

Secondly, rainwater collection is another crucial strategy to apply in Seattle. The average annual precipitation for Seattle is 36.15 inches compared to average rainfall of 41.11 inches throughout U.S. (WEATHERDB) It seems that Seattle does not have that much rain at all. However, the fact is Seattle has constant rainfalls which is good for irrigation purposes and gray water collection. The plants and soil on the rooftop could absorb a lot of rainwater and prevent runoffs. Also, extra rainwater will be stored in a cistern as gray water to be used for toilet flushing or irrigation.

Thirdly, wood frame construction above the concrete base is a typical building method in Seattle. With abundant trees within short distance, heavy timber treated as local material to reduce the cost of transportation. Reducing the amount of concrete used in the building is helpful to control global warming because the

GARDEN LOCATION



curing of concrete will release huge amount of CO2 into the atmosphere. Steel bracing is used in certain areas to provide seismic reinforcing due to the site location in an earthquake zone.(Bullitt Center)

Fourth, with two open courtyards inside the building, natural wind could come in for ventilation. Also, water is a great asset to moderate the temperature. During the summer, water can absorb more heat for the same temperature change than the environment which provide cooling effect. During the winter, water functions to slow the rapid drop of temperature and provide heating effect.

Fifth, the media on top of the building and the solar panels will absorb solar energy to reduce the heat impact on the building itself during summer. On the other hand, this extra layer works as an additional insulation for the building to prevent heat loss during the winter.

Last but not least, heating is more important than cooling in Seattle based on the fact that 40% of energy is used for heating while 7% is used for cooling in Seattle,(Cardno, Catherine). Thermal water wells are drilled 400 feet down into the earth which stays at 53 degrees. The idea of heat exchange by water is to warm the building during winter while cooling the building during summer. Heat pumps are necessary to convert the 53-degree water into 95 degrees to warm the building by tubes embedded in concrete floor plates.(Bullitt Center) during the summer, 53 degree water will be effective to cool the building by itself.



West Elevation

#### Conclusion

With the unique combination of baby boomers and families with children, gardens offer overlapping spaces for these three generations to interact with each other. Gardening is a moderate exercise for the elderly and is beneficial for people at all ages. By providing rooftop gardens, residents get a chance to meet each other, grow vegetables and eat fresh food regularly. Other programs to improve this social relationship are childcare & adult care program and congregate meal plan. Children of working parents get dropped off to the childcare during the daytime, boomers living in the community could volunteer to take care some children by doing gardening together, or teaching them how to read. Those hours get transferred into credit under the program of TimeBanks so that the elderly could receive help from other members for technology issues or consulting services. The congregate meal plans also provide community meals for the elderly and children. A program named "Farm to Table" will get



Community Dining Room

involved in this mean services to get fresh produce from local farms or the rooftop farm itself and trained caretakers to cook delicious and nutritious meals for the community. Because Seattle is the leading city for sustainable strategies and it does save a lot of money for the maintenance cost, I make use of some strategies suitable for this building. By applying all the ideas and techniques above, this building design will be healing, sustainable, inter-generational and community based.





Rendering of Northwest Corner



Basement Floor Plan







Second Floor Plan

Third Floor Plan



Childcare Entrance



Peek of Bamboo Garden



South Elevation



Transverse Section

East Elevation





Fourth Floor Plan











Structure Diagram





Sun Room Rendering



Sixth Floor Plan





Flexible Unit Type 2

Work Cited:

- Bjerring, Eva. "Tietgen Dormitory Lundgaard & Tranberg." The social and private village. arcspace, 22 Apr 2013. Web. 11 Mar 2014. <a href="http://www.arcspace.com/features/lundgaard--tranberg-/tietgen-dormitory/">http://www.arcspace.com/features/lundgaard--tranberg-/tietgen-dormitory/</a>>
- Blair, D. (2009). The child in the garden: An evaluative review of the benefits of school gardening. Journal of Environmental Education, 40(2): 15-38.
- "Building Livable Communities for Children, Youth, Families and Older Adults." America's Best Intergenerational Communities. (2012): 1-15. Web. 11 Mar.2014
- "Bullitt Center." building features. Bullitt Foundation Legal. Web. 12 Mar 2014. <a href="http://www.bullittcenter.org/building/building-features/">http://www.bullittcenter.org/building-features/</a>>.
- Cardno, Catherine. "Building Comes Alive." The largest, tallest "living building" to date is currently under construction on Seattle's Capitol Hill. American Society of Civil Engineers. Web. 12 Mar
- Carnevale, Anthony, Aaron Smith, Shirley Sagawa, Heather McGhee, James Corless, Anita Hairston, Erika Poethig, and Megan Bolton. "out of many, one: uniting the changing faces of america." Generations United and The Generations Initiative 2013. (2013): n. page. Print. <a href="http://www.gu.org/RESOURCES/Publications/OutofManyOne.aspx">http://www.gu.org/RESOURCES/Publications/OutofManyOne.aspx</a>).
- CNN Library, "Baby Boomer Generation Fast Facts." Boomers work past retirement. CNN, Wed November 6, 2013. Web. 11 Mar 2014. <a href="http://www.cnn.com/2013/11/06/us/baby-boomer-generation-fast-facts/">http://www.cnn.com/2013/11/06/us/baby-boomer-generation-fast-facts/</a>.
- "\_\_\_\_ Feng Shui." Feng Shui. Nations Online, 10 Feb. 2013. Web. 17 Apr. 2014. http://www.nationsonline.org/oneworld/Chinese\_Customs/feng\_shui.htm

Frey, William H. "Baby Boomers and the New Demographics of America's Seniors." Journal of the American Society on Aging. 34.4 (2010): 28-37. Print.

Friedland, R. and Summer, L. 1999. Demography is not destiny. National Academy on an Aging Society.

- "Generations United." Core Beliefs. generations united, n.d. Web. 11 Mar 2014. <a href="http://s4k.infotectdesign.com/ABOUTUS/AboutGenerationsUnited.aspx">http://s4k.infotectdesign.com/ABOUTUS/AboutGenerationsUnited.aspx</a>>.
- Gerlach-Spriggs, Nancy, Richard Enoch Kaufman, and Sam Bass Warner. Restorative Gardens: The Healing Landscape. New Haven, CT: Yale UP, 1998. Print.
- Gesler, Wilbert M. Healing Places. Lanham, MD: Rowman & Littlefield, 2003. Print.
- "Growing above Brooklyn thanks to: Broadway Stages." three stories up in the air, the power of an idea & fresh food are growing. Broadway Stages, n.d. Web. 11 Mar 2014. <a href="http://rooftopfarms.org/">http://rooftopfarms.org/</a>>.
- Langlais, Maria. "getting fresh local produce to kids and seniors." exceeding expectations with the farm-to-table partnership in king county, WA. American Public Health Association Conference. Seattle. 30 Oct 2012. Lecture.
- Larson, Jean, and Mary Meyer (2006). Generations Gardening Together: Sourcebook for Intergenerational Therapeutic Horticulture. 1st edition. 112. Binghamton, NY: The Haworth Press Inc., 2006. Print.
- Marcus, Clare Cooper., and Marni Barnes. Gardens in Healthcare Facilities: Uses, Therapeutic Benefits, and Design Recommendations. Martinez, CA: Center for Health Design, 1995. Print.

Rodiek, Susan. The role of the outdoors in residential environments for aging. New York: Haworth Press, 2005. Print.

Shoemaker, C.A., and E.R.M. Diehl. "The Practice and Profession of Horticultural Therapy in the United States." Acta Hort. 954, ISHS 2012. n. page. Print.

Shoemaker, C.A. and Lin, M. (2008). A model for healthy aging with horticulture. Acta Hort. (ISHS) 775:93-98http://www.actahort.org/books/775/775\_10.htm

- Vapaa, Annalisa Gartman. "Healing Gardens: Creating Places for Restoration, Meditation, and Sanctuary." Healing Gardens: Creating Places for Restoration, Meditation, and Sanctuary (2002): 1-85. Virginia Polytechnic Institute. Web. 16 Apr. 2014.
- "WEATHERDB." Seattle, Washington Average Rainfall. WEATHERDB. Web. 12 Mar 2014. < http://average-rainfall.weatherdb.com/l/267/Seattle-Washington>.

Images Cited:

- Barton, Paul. Elderly Couple Gardening. N.d. Photograph. corbisimagesWeb. 8 May 2014. <a href="http://www.corbisimages.com/stock-photo/rights-managed/F-204-0142/elderly-couple-gardening-">http://www.corbisimages.com/stock-photo/rights-managed/F-204-0142/elderly-couple-gardening-</a>.
- Blanc, Patrick. DREW SCHOOL. 2009. Photograph. verticalgardenpatrickblanc, CA. Web. 8 May 2014. <a href="http://www.verticalgardenpatrickblanc.com/node/1481">http://www.verticalgardenpatrickblanc.com/node/1481</a>.
- "Denmark's Beautiful College Dormitory." Neatorama. Lundgaard & Tranberg Arkitekter, n.d. Web. 8 May 2014. <a href="http://www.neatorama.com/2012/07/26/denmarks-beautiful-college-dormitory/#!KIDHL">http://www.neatorama.com/2012/07/26/denmarks-beautiful-college-dormitory/#!KIDHL</a>.
- Gardening Helps Child Development. 2010. Array. seedoramaWeb. 8 May 2014. <a href="http://seedorama.com/2010/07/07/gardening-helps-child-development/">http://seedorama.com/2010/07/07/gardening-helps-child-development/</a>.
- "Grandfather and Girl Outside." 42-17082594. N.p., n.d. Web. 8 May 2014. <a href="http://www.corbisimages.com/stock-photo/royalty-free/42-17082594/grandfather-and-girl-outside?popup=1">http://www.corbisimages.com/stock-photo/royalty-free/42-17082594/grandfather-and-girl-outside?popup=1</a>>.
- Kaputkin, Ari . "New Yorkers forge ahead with rooftop farming." New York. N.p., n.d. Web. 8 May 2014. <a href="http://newyork.thecityatlas.org/lifestyle/yorkers-forge-roof-top-farming/">http://newyork.thecityatlas.org/lifestyle/yorkers-forge-roof-top-farming/</a>.

Milano Santa Monica. 2008. Photograph. HomedesignfindWeb. 8 May 2014. <a href="http://www.homedesignfind.com/green/milano-santa-monica/#more-2930">http://www.homedesignfind.com/green/milano-santa-monica/#more-2930</a>>.