Project Alfred the building Master

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ABSTRACT – The objective of this project is to design and build a system of electronic devices to provide a more efficient and practical operation of managing buildings in industry. The solution is expected to improve accuracy, cost effectiveness, and reliability of all industries with respect to daily business activities, record keeping, and organization as whole. The group believes that this project will be a base product starting point providing a good mix of electrical and computer engineering skill to aid any company in its business endeavors.

***Index Terms* – Barcode, Battery management, Glade GTK, microcomputer, Python, radio frequency identification, Raspian, wireless local area network.**

I. INTRODUCTION

Project Alfred is a team. A hardware and software team adopting old technology, new innovation, and organization to aid business in day to day industry and undertakings.

The team wants to create a better system for buildings in order to store, organize, and location of information of buildings and the rooms that lie within them. In particular, this system, Alfred, would know the ins and outs of the building as if it were the companies own personalized butler. With this in mind, The design is split into two separate entities the appliances at the door, which is the prototype designed by the team and the server computer that the information will be backed up on which will be simulated by a laptop computer. The operation would start with creating a small device at every door with a touch screen that would manage and store the entire room's data. Since, there are so many rooms with so many applications each box will be set up with a touch screen user interface to be tailored to each room's significant design. Because of this, authorized users can have easy access to the information, as well as be able to setup and control which aspects the room needs whether it be identifying electrical equipment in the electrical room, to a disease and treatments in a hospital patients room. Once all the boxes are set to the desired purpose they would all wirelessly tie into one system or the main server at the desired location that will know the location of every room in the building as well as its directions and access to what is inside the room.

As for which location to use, that is for the company to decide. Some examples may include, major storage rooms, hospital critical patient rooms, electrical rooms, and conference rooms or even all the rooms in the building. Anything from meeting times, to inventory, shipment dates, and patient records will be available to authorized personal at anytime and anywhere in the building. With this intention, Alfred will revolutionize company's ability gathering, storage and retrieval to efficiently organize a buildings data for the digital age.

The group believes this as a base system just like the IPhone is the starting point to many more application. However, the company should remember this product is a tool, not an automated system and will require maintenance to keep Alfred working the way it was intended to help the business market. In short, we have provided a user friendly base for record keeping and innovative building management with the proper care can benefit enterprises with a numerous amounts of applications.

II. THE PROTOTYPE REQUIRMENTS

The Appliance also known as the prototype, is the box that will be used to represent the all the boxes that will be placed next to all the desired doors in a company. Normally a company would own more than one box and each one would be stationed at a door where the company would like to keep records. But considering cost and design, the prototype is one box that is designed to be copied and distributed throughout the company. With this in mind we have listed a few requirements needed when creating this device:

- Small portable out of the way in a safe location where it can be access regularly without taking up to much wall space.
- Enough storage to hold the information of the entire contents and location of the room as well as, any data that the user would like to store for extra information.
- A user friendly input/output device that is clear and able to see for most people even those with disability with aids (such as glasses) can read and operate efficiently.
- Other input and outputs device (such as camera) that will allow for easy recording of data going and out of the room.
- A battery management system such that it can be removed from the wall, but if need can be tapped in on site to any 120 volt 60 Hz AC outlet used standard in the United States.

- Network adaptation to allow to be taped into by wirelesses devices to be backed up to the company mainframe to be managed by larger computer.
- RFID reader to allow for RFID tracking and input to be used when taking inventory or even a key to access information.
- Catalog and a search function to keep track of records of the room.
- Ability to be upgraded for future additions and devices
- Barcode and QR code software for easy cataloging.

With these requirements the group has come up with a design to create an appliance for project Alfred.

III. DESIGN SUMMARY

In order to accomplish our goals we start of by dividing and conquering each problem presented. By doing this the team has broken the project down into 5 major sub systems.

1. Embedded control systems, memory and software.
2. Cataloging input and output
3. Networking and communication
4. User interfaces
5. Power and battery management

These subsystems are again broken down into major hardware and software components that when combined together create the working prototype. After each problem has been solved we will unite all the components needed to complete the prototype. The prototype while working with a laptop provided by the team will serve as a simulation of the project in its entirety.

The team has chosen, designed and tested products to simulate an inventory room scenario that a company would use on a day to day bases. The reason for this is, because whether the company is keeping records of inventory, to patient's records, or meeting times the process is the same, but the information stored is different. In addition, the inventory will utilize some the best features developed to help in record keeping such as cameras, manual inputs, and RFID technology. Even though there are many more applications that can be added, we believe this simulation shows the greatest example of the Project Alfred system's greatest capabilities.

IV. EMBEDDED CONTROL SYSTEMS, MEMORY, AND SOFTWARE.

In the original design of the prototype the team planned for all the parts to be integrated to one board. We found many problems in doing that:

1. It wasn't very cost effective
2. Not every room needs every extra device
3. Hard to interface with extra options not needed
4. No room for swapping or integration of different parts, needed changes or upgrading.

With this in mind we decide to forgo the fully integrated design with a product that can allow for attaching and detaching of products need for each room's needs. The solution: A microcomputer.

A. Raspberry pi B+

A microcomputer is a complete computer on a smaller scale. A microcomputer contains a microprocessor , memory in the form of read-only memory and random access memory , I/O ports and a bus or system of interconnecting wires, housed in a unit that is usually called a motherboard. We are using a specific brand of microcomputer known as the Raspberry Pi. The Raspberry Pi is a series of credit card-sized single-board computers developed in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in schools. The model we particularly got is the Raspberry pi B+ which is shown in the figure below.

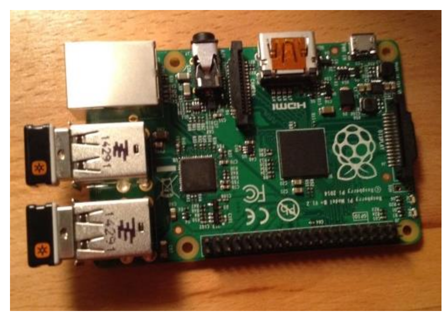

Fig. 1 Raspberry Pi B= Model

The design specs of the model are:

- Broadcom BCM2835 700MHz ARM1176JZFS processor with FPU and VideoCore IV dual-core GPU
- GPU provides Open GL ES 2.0, hardware-accelerated OpenVG, and 1080p30 H.264 high-profile decode
- GPU is capable of 1Gpixel/s, 1.5Gtexel/s or 24GFLOPs with texture filtering and DMA infrastructure
- 512MB SDRAM
- HD 1080p video output
- Composite video (PAL/NTSC) output
- Stereo audio output
- 10/100 BaseT RJ45 Ethernet socket
- HDMI 1.3 & 1.4 video/audio socket
- 3.5mm 4-pole audio/composite video out jack socket

- 4 x USB 2.0 sockets
- 15-way MPI CSI-2 connector for Raspberry Pi HD video camera (775-7731)
- 15-way Display Serial Interface connector
- MicroSD card socket
- Boots from MicroSD card, running a version of the Linux operating system (See Note below)
- 40-pin header for GPIO and serial buses (compatible with Raspberry Pi Model B 26-pin header)
- Header footprint for JTAG connector
- Power supply: +5V @ 2A via MicroUSB socket
- Dimensions: 86 x 56 x 20mm [1]

With this microcomputer we are able to have an increase functioning and processing power for a very tiny space taken up in a product. Furthermore, we are able to attach and program a plethora of device allowing for a custom form factor for any room in the building. However, the computer however able to adapt to any situation and program for multiple input and output devices it needs to be plugged into a power source and lacks wireless internet capabilities. As a result, the team designed two circuits to solve these two problems both found in the networking section and the power section of this document.

B. Raspian software

The software provided by the PI is called Raspbian. Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run. The initial build of over 35,000 Raspbian packages, optimized for best performance on the Raspberry Pi, was completed in June of 2012. However, Raspbian is still under active development with an emphasis on improving the stability and performance of as many Debian packages as possible.[2] Although, Python is the primary software we used to code the device. This Linux based system is perfect for open source coding allow the team design and implement all the codes used by the Pi microcomputer.

C. Python 2.7 coding

The group has decided to use Python 2.7 to code the Pi user friendly interface to interlink all the products attached to it. Python is a widely used general-purpose, high-level programming language. Its design philosophy emphasizes code readability, and its syntax allows programmers to express concepts in fewer lines of code than would be possible in languages such as C++ or Java. The language provides constructs intended to enable clear programs on both a small and large scale.[3] The language was chosen for its wide range of application, easy to learn and it's an open source. Python 2.7 was chosen due to the stability and bug free set up that plagues the later versions in 3.0 and above. Python provides complex functions with simplicity creates a simpler interface friendly for touch screen devices and for users with little computer experience. Thus, being the most useful programing language for the prototype for designing the cataloging and input/output software.

D. 16 GB SD card Storage

Originally Alfred was designed to have larger external storage device. Though since the Pi module offers a micro SD input. With proper research and a donation from one of the group members we were able to incorporate a 16 GB SD card. Used in most portable devices a Secure Digital (SD) card is a nonvolatile memory card allows for large amount of memory for small amount of space. The team thinks this card is sufficient for the amount of storage needed for a room. If need though, one can add a USB external storage device for more space.

E. MySQL Lite (Database in Ben's laptop)

Most of the paper has illustrated the prototype and its functions. In addition, to storing and manipulating data in the prototype itself we need to remote access it for back up and management of the building as a whole. Ben's laptop will be representing the server that all of the Alfred appliances will be connecting to. To do this and to keep an accurate data base the team is using a program called MYSQL. MySQL is (as of July 2013) the world's second most widely used relational database management system (RDBMS) and most widely used open-source RDBMS. The SQL acronym stands for Structured Query Language.[4] The lite version that is Programmed on both the prototype and server are the heart of the cataloging program used by both devices. Since, it is an open source it can allow for many applications can be added or manipulated to design better management of the database.

V. CATALOGING INPUT AND OUTPUT

Being that, the prototype design is to simulate that of a storage room or stock room design, it needs devices that are able to keep track of inventory. Accordingly, the team has provided the user with many ways in which to keep an accurate database for those rooms. Chosen and coded by the group these items include a camera module, code scanners, and RFID technology upgrades.

A. Microsoft Lifecam vx-5000 webcam

Project Alfred's appliance devices comes with a mini camera used in conjunction with applications to help keep inventory and picture records of items going in and out of the room. The camera can be utilized from the main screen of the appliance door product to take pictures of the products that go into the room. The devices storage can hold pictures in the information to be able to retrieve any images at the location device or the main frame running project Alfred. However, the camera is fixed to the device, so the user will have to maneuver what objects, or people the camera needs to scan or take pictures of. As a result you can upload your own pictures to the appliance device at will, see how to on the controls and storage for information on pictures not taken with this camera

The camera utilized by the prototype is the Microsoft Lifecam vx-5000 webcam, which was picked over the PI camera due to its ability to autofocus, which the Pi camera severely lacked. The details are shown below:

- Width: 1.8 in
- Depth: 1.8 in
- Height: 4 in
- Weight: 3.4 oz
- Optical sensor type: CMOS
- Manufacture: Microsoft
- Max digital video resolution: 640 x 480
- Digital Zoom: X4
- Min focus Range: 19.7
- Min operating temperature: 32 F
- Max operating temperature 104 F
- Humidity Range operating 5-80%
- Relative Humidity 5-80% [5]

This camera allows for good pictures around that of early smart phones, but more importantly due to the auto focuses, the camera allows for the integration of barcoding software which will be discussed in the next section.

B. Barcode and QR code scanning

In order to keep track of goods in the market companies use Barcodes or QR codes to identify items. A barcode is a code consisting of a group of printed and variously patterned bars and spaces and sometimes numerals that is designed to be scanned and read into computer memory and that contains information (as identification) about the object it labels. Most barcodes used today are under the UPC or Universal Product Code. These codes are designed to have both the thin thick bars as well as a 12 digit UPC code. QR codes their recent development are the same technique, different design in which the code is in 2D instead of one.

To utilize this system we are incorporating ZBar open source software suite for reading bar codes from various sources, such as video streams, image files and raw intensity sensors. It supports many popular symbologies (types of bar codes) including EAN-13/UPC-A, UPC-E, EAN-8, Code 128, Code 39, Interleaved 2 of 5 and QR Code.[6] With the python coding Alfred can read any barcode through the camera.

C. RFID Reader

RFID stands for Radio-Frequency Identification. The acronym refers to small electronic devices that consist of a small chip and an antenna. The chip typically is capable of carrying 2,000 bytes of data or less. The RFID device serves the same purpose as a bar code or a magnetic strip on the back of a credit card or ATM card; it provides a unique identifier for that object. And, just as a bar code or magnetic strip must be scanned to get the information, the RFID device must be scanned to retrieve the identifying information.

A Radio-Frequency Identification system has three parts:

1. A scanning antenna
2. A transceiver with a decoder to interpret the data
3. A transponder - the RFID tag - that has been programmed with information.

The scanning antenna puts out radio-frequency signals in a relatively short range. The RF radiation does two things:

1. It provides a means of communicating with the transponder (the RFID tag)
2. It provides the RFID tag with the energy to communicate (in the case of passive RFID tags).

This is an absolutely key part of the technology; RFID tags do not need to contain batteries, and can therefore remain usable for very long periods of time. The scanning antennas can be permanently affixed to a surface; handheld antennas are also available. They can take whatever shape you need.

The server computer equipped with a USB RFID transceiver: the Chafon Contactless Smart Card Reader, USB 125khz RFID Reader, EM Card Reader/Writer/Copier/Duplicator. With this Project Alfred can read, write, and copy ID cards that can be attached to items or personal for proper identification and tracking. Allowing the product to use a first step in the of future of the tracking industry.

Since the computer has a writer, Alfred needs a reader, which is accomplished with the RFID Reader ID-12LA (125 kHz). Combined with a SparkFun RFID USB Reader we can create the wireless non-contact use of radio-frequency electromagnetic fields, for the purposes of identifying and tracking tags attached to objects.

VI. NETWORKING AND COMMUNICATION

We have concluded that the best method to transfer data for Alfred is to use a WIFI WLAN to transmit the data to others so you can access it easily wirelessly. We chose this method over the others since radio is lacking when it comes to data transfer as well as suffers range issues. We chose WIFI instead of Bluetooth because while Bluetooth is generally easier to use and has lower power requirements, it also has limited connection options. Furthermore, WIFI has better range from the base, a faster connection, as well as decent security options. A WIFI WLAN will allow Alfred the best mix of range, security, data transfer, speed, and simplicity. It is also already widely used and understood by consumers.

A. CC3200 Chip

Originally the CC3200 chip was chosen when it was first to be fully integrated and since the team has had extensive work with it we decided to keep it as our main Wi-Fi chip for these reasons:

- Dedicated ARM MCU
- WIFI and internet Protocols in ROMi
- 802.11 b/g/n radio, baseband, medium access control, WIFI driver, and supplicant
- TCP/IP Stack with industry standard BSD socket application programming interface, eight simultaneous TCP or UDP sockets, and two simultaneous TLS and SSL sockets.
- Crypto Engine
- Station, AP, and WIFI Direct Modes
- WPA2 personal and enterprise security
- SimpleLink connection manager
- SmartConfig Technology
- TX Power

o 18.0 dBm at 1 DSSS
o 14.5 dBm at 54 OFDM
- RX Sensitivity

o -95.7 dBm at 1 DSSS
o -74 dBm at 54 OFDM [7]

This chip has been designed on a new board that will be attached to the PI as shown in the figure below

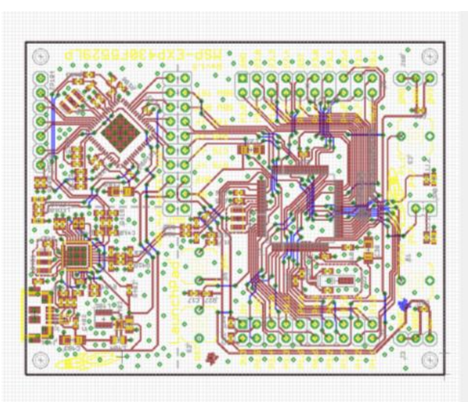

Figure 2: Wi Fi Circuit Board schematics.

This board featuring the CC3200 is designed by the team to be plugged into the PI and coded with MY SQL will run all of Alfred's WI – FI needs.

B. MySQL DBAPI

My SQL is a python user interface that allows the PI to communicate and network with other computers. As mention earlier in this document it helps both the server computer and prototype catalog products, but it also allows for communication between the two. Using python coded functions this program will manage not only the database inside of each of the hardware devices, but the network which they share. As a result, allowing for sharing among all the prototypes and servers in one building.

VII. USER INTERFACES

Project Alfred prototypes needed a way for the user to manually input and see outputs on site. With the device mounted to the wall that left the group with limited options: a screen to see and the inability to use a keyboard or mouse. For these reason, the team incorporated both the output and input together with a touch screen.

A. 4DPi_35Display Module

The group needed to fulfill the desire to be user friendly screen and our reference the standard phone screen is about 3.5". Thus, the product that was chosen to fill the requirements is 4DPi_35. The 4DPi-35 is a 3.5" 480x320 Primary Display for the Raspberry Pi, which plugs directly on top of a Raspberry Pi and displays the primary output which is normally sent to the HDMI or Composite output. It features an integrated Resistive Touch panel, enabling the 4DPi-35 to function with the Raspberry Pi without the need for a mouse.[8]

Communication between the 4DPi-35 and the Raspberry Pi is interfaced with a high speed 48Mhz SPI connection, which utilizes an on-board processor for direct command interpretation and SPI communication compression, and features a customized DMA enabled kernel.[8]

The 4DPi-35 is designed to work with the Raspbian Operating System running on the Raspberry Pi, as that is the official Raspberry Pi operating system.[8]

The 4DPi-35 features a breakout header (P2), which enables all of the Raspberry Pi GPIO pins to be accessed while the 4DPi-35 is connected. These can be access with jumper wires or with an IDC ribbon cable.[8]

- Universal 3.5" Primary Display for the Raspberry Pi.
- Compatible with Raspberry Pi A, B and B+ versions.

- 480x320 QVGA Resolution, RGB 65K true to life colours, TFT Screen with integrated 4-wire Resistive Touch Panel.
- Display full GUI output / primary output, just like a monitor connected to the Raspberry Pi
- High Speed 48Mhz SPI connection to the Raspberry Pi, featuring SPI compression technology.
- Powered directly off the Raspberry Pi, no external power supply is required.
- Typical frame rate of 17FPS. Higher if image is able to be compressed by Kernel.
- On/Off or PWM controlled backlight, selectable by on board jumper.
- Module dimensions: 56.6 x 97.6 x 20.8mm (including corner plates). Weighing ~ 50g.
- Display Viewing Area: 49 x 73.4mm
- 4x corner plates with 2.6mm holes for mechanical mounting.
- RoHS and CE Compliant. [8]

The group decided not using intelligent display because it is not need and has been replaced by Glade and GTK in order to design the software GUI display.

B. Glade (application to build)

Glade is a RAD (Rapid application development) tool to enable quick & easy development of user interfaces for the GTK+ toolkit and the GNOME desktop environment. The user interfaces designed in Glade are saved as XML, and by using the GtkBuilder GTK+ object these can be loaded by applications dynamically as needed. By using GtkBuilder, Glade XML files can be used in numerous programming languages including C, C++, C#, Vala, Java, Perl, Python, and others. Glade is Free Software released under the GNU GPL License.[9] Glade was picked over the intelligent display, because can be used with python our main programing language and has an easier GUI for designing the display.

C. GTK

GTK+, or the GIMP Toolkit, is a multi-platform toolkit for creating graphical user interfaces. Offering a complete set of widgets, GTK+ is suitable for projects ranging from small one-off tools to complete application suites. GTK+ is written in C but has been designed from the ground up to support a wide range of languages, not only C/C++. Using GTK+ from languages such as Perl and Python (especially in combination with the Glade GUI builder) provides an effective method of rapid application development.[10] Using this and Glade Gui builder we have designed all the screens that one would see when operating the device in project Alfred.

VIII. POWER AND BATTERY MANAGEMENT

As stated in previous sections, Project Alfred has two major components to the design: the main frame and the appliance box on each door. The power supplied to the main frame or computer acting as the master of the whole building will be provided by the user. Subsequently power for each box used in project Alfred will be incorporated into the lower power device. Considering that the apparatus is a low powered device project Alfred will be using a low DC power. Alfred's power system is broken into three major categories:

1. The battery management system
2. The Battery or load of the system that will power the devices
3. The source to recharge the battery (in Alfred's case a wall outlet connected to an AC to DC adapter.)

Even though the team has decided to use products that allow for removal from the wall, the products will still be mounted to the door. Since the PI lacks mobility wanted by the team, we designed a battery management circuit to allow it to be removed from the wall.

A. Battery Management Circuit

The circuit is designed to allow for a cellphone lithium ion battery of the average of about 3.7 volts powering Alfred for a period of time. The figure below shows the circuit diagram of the battery:

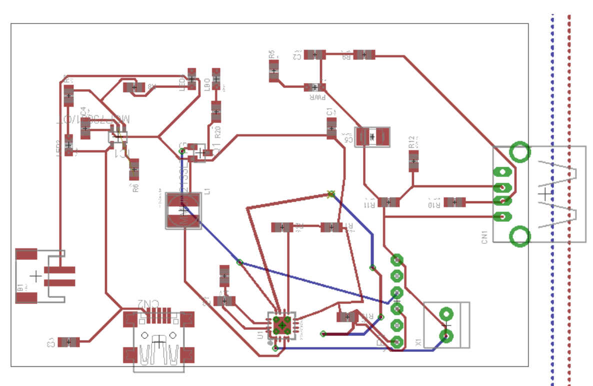

Figure 3: Wireless Power Board Design for Alfred.

The board is designed to with a DC to DC boost converter known as the TPS61090 from TI to with its 2A internal switch increase the voltage from 3.7 volts to around 5.2 maximum voltages. We are able to pull about 500mA to as much as 1000 mA Powerful enough to power the PI and all the devices attached to it. We can place a USB output wire into the power boards and Micro USB output into the Raspberry PI. If the battery needs to be recharged then it can be docked to an AC to DC power converter to the wall to be powered till the battery is full

B. Rechargeable Lithium-polymer Battery

A lithium polymer battery, or more correctly lithium-ion polymer battery is a rechargeable battery of lithium-ion technology in a pouch format. Unlike cylindrical and prismatic cells, LiPos come in a soft package or pouch, which makes them lighter but also lack rigidity

The Battery provided to Alfred is a Lipo Battery the Dromida 3.7v battery. As many small batteries for portable devices are 3.7 volts, many differ from the amount of amperage they can store. Most cellphone batteries have about 2100 milliamp hours or mAH for short. So if the battery continuously takes 300 milliamps, which most cellphones do it can last for up to 2100/300 which is 7 hours. But if the battery draws more amperage then of course the time changes based on draw current. Our battery is a 700 mAH battery, and although it may seem not enough if the Pi only pulls similar to a cellphone it can run for up to more than two hours. If it pulls more than 1000 mA it would seem we can't reach that, however ever most batteries are rated in number of C. Most only are 1C meaning it pulls its exact amount. The Dromida is rated at 25C which means we can pull 25 times more current or 25 times 700 at 17,500 mAH. That is 8 times the normal battery, but of course shortening the battery life span. We put in this safety net just in case the Pi needs more current than we calculated, although docked more for a prototype it's a good start.

In addition to the booster we have placed a MicroLipo charger to regulate battery voltage and reduce the charge from the AC to DC adapter to the 3.7 volts that the battery can handle. Powered by a USB micro jack the rechargeable battery can receive 5 volts DC stepped down. Once charged the LED will turn on indicating that the battery is fully charged and can be removed from the wall.

C. AC/DC Adapter

Project Alfred is designed to allow for any AC to DC wall adapter to be plugged into it as long as it meets the 5 volt 2A requirement. As long as the wire between the two has a micro USB output the power board can operate near any wall plug or in house wiring.

IX. BUDGET AND COSTS

Through our sponsor, Boeing, we have received six hundred and eighteen dollars to be used as a budget for project Alfred. Most of the money will be spent acquiring the necessary parts to complete the project though some will go toward the design and building of a PCB board. The table provided shows the different costs of all the products that will be used in the construction.

Devices	Part	Price
network board (3) and parts	cc3200 and custom	$60
Microcomputer	Raspberry Pi B+	$35
touch screen	4DPi_35	$69.99
SD Card	16 GB SD	free
Server computer	Ben's Laptop	free
RFID	Chafon Contactless Smart Card Reader And	$30
Main Box	Box And Foam Cordboard	free
AC to DC converter	Provided by team	$free
Camera	Microsoft LifeCam VX-5000	$free
battery	lithium ion	$10.99
Power board(3) and parts	TPS61090 and other parts	$60.00
product software	Python Glade GTK MY SQL	$Free
miscellaneous equipment and contingency and shipping		$100.00
Total		$546.9

Table 1: Budget table

Our original projected budget came out a lot higher when integrating the board, but with our new and improved design. Through integration and design many, revisions, we found that house electronics we had lying around worked much better than the ones designed in the original project. Because of this, we were able to integrate a majority of the parts from items in our own house. The items that are free were originally to be bough products. As a result, of the house hold electronics being more reliable and functional, the team cut costs considerably by removing parts that were pushed by manufactures as worse designs then simple items such as web cameras.

X. CONCLUSION

To the future: we believe this as a base system and the sky is the limit, and just like the IPhone is the starting point to many more application. We believe that this system can be improved, added to, or customized for any personalized use. For example, we can add a lock system to each door controlled by the box to have a pass key to open the door, or a temperature gage to monitor the room climate or check for fires, and automated ordering system which notifies the main server when you're running low on products in storage. With this intention, this prototype will be the start in developing a new base design for the first smart building.

ACKNOWLEDGEMENT

We would like to thank Texas Instruments for all of their help providing helpful documentation and research when developing the sub systems for this project. We would like to thank Boeing for sponsoring our project with which would not have the funding to make it work. Last, we would like to acknowledge the Walt Disney Company that was the inspiration behind the design and the desire created to make large companies more organized.

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[10] http://www.gtk.org/

Benjamin Bush is a senior at the University of Central Florida studying Electrical Engineering. Currently, he works for the Facility and Operations Management group at IKEA LLC. Recently, he passed the Fundamentals of Engineering exam and hopes to pursue a career in electrical facility design.

Brandon Becker is a 23 year-old electrical engineering student. Brandon plans to start at the USPTO post-graduation as a patent Clerk and eventual move on to being a patent attorney

Alec Seketa is a senior at the University of Central Florida studying Electrical Engineering. Living in Florida his whole life, he worked for the Walt Disney World company for 6 years in which, 2 terms (6 months) were as an electrical engineering intern in both the Ride and Show and Facility Asset management departments. Furthering, his career in the electric design field Alec has accepted a job at EXP a local MEP firm in the Disney Department as an Electrical Designer.