***Final Year Project Proposal***

***<AUTOMATIC SHOPPING CART>***

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# List of Abbreviations and Acronyms

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**Final Year Project Proposal**

# Section – 1

# 1.1 Project Identification

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Project Title: | | | | | | |
| **<AUTOMATIC SHOPPING CART>** | | | | | | |
| Group Leader (GL): | | | | | | |
| 1. | Name: | **AHMED ALI RAZA** | | | | |
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| **Group Members (GM’s):** | | | | | | |
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|  | Signature: |  | | | | |
|  |  | | | | | |
|  | | | | | | |

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| --- | --- | --- |
| ***What technology is core to your product?*** *(Please mark  where applicable)*  *[ ] 3D/4D Printing [ ] Augmented Reality / Virtual Reality [ ] Big Data, Artificial Intelligence [ ] Blockchain*  *[] Cloud [ ] Neurotech*  *[ ] Robotics [ ] Shared economy*  *[***✓]** *The Internet of Things [ ] Wearables, Implantable [ ] Others (specify):* | | |
| ***What is the target market(s) for the products?***  *[ ] Automotive, aviation, marine [***✓***] Business, marketing, finance [ ] Defense, security, safety [ ] Education and training*  *[ ] Environment, water management [ ] Entertainment, tourism, sport/recreation [ ] Food, livestock, agribusiness [ ] Healthcare*  *[ ] Infrastructure, housing & transport [ ] Mining equipment technology & services [ ] Oil, gas, energy [ ] Textiles, clothing, footwear*  *[] Others (specify):*  ***Other Organizations Involved in the Project:***  ***Academic Organizations:*** | | |
| *#* | *Organization Name* | *Role / Contribution* |
| *1.* | IQRA UNIVERSITY, KARACHI | Bachelors in Compuer Science  BS(CS) |
| *2.* | IQRA UNIVERSITY, KARACHI | Bachelors in Compuer Science  BS(CS) |
| |  |  |  | | --- | --- | --- | | ***3.*** | IQRA UNIVERSITY, KARACHI | Bachelors in Compuer Science  BS(CS) |   ***Industrial Organizations:*** | | |
| *#* | *Organization Name* | *Role / Contribution* |
| *1.* |  |  |
| *2.* |  |  |

|  |  |  |
| --- | --- | --- |
| ***Funding Organizations:*** | | |
| *#* | *Organization Name* | *Role / Contribution* |
| *1.* |  |  |
| *2.* |  |  |
| ***Key Words:***  ***Arduino, ESP8266, LCD, Desktop App, RFID Tags, RFID Reader.*** | | |
| ***Research and Development Theme:***  *No research theme but using Agile Development Method(Scrum framework)* | | |
| ***Project Status:*** *(Please mark )*  *[* **✓]** *New [ ] Modification to previous Project [ ] Extension of existing project*  ***Project Duration: 8-****Months*  ***Proposed Budget:*** *PKR; Rs/13000* | | |
| ***The Problem:***  Today shopping is becoming a time consuming, hectic activity in cities. There are long lines in marts on weekend/events in big cities. Therefore, at different marts because of this, after shopping the customer reach billing counter for bill but since using bar code for adding product and calculating bill the that is very time consuming and that increases the waiting queues for Bill. The ultimate goal is to develop a system consisting of a hardware device with a software that can be used in super marts to resolve the long queues at billing counter using RFID Technology with Arduino which calculate bill and show total amount on the LCD and at the end when customer done shopping the bill will generate at the counter, where customer will pay and will leave the store.  ***Following are some of the well-known (identify the best known if possible) existing solutions to this problem. Their known strengths and weaknesses are also provided.***  In Pakistan there is no such system is been implemented yet, but research on this idea have been done. This is a new innovative idea that brings the relief to the people by save time. we are using RFID reader with Arduino and every product have RFID card number used for product identification which is connected to the Centralized data base which will calculate the bill of the customer bill with Cart ID give to the trolley when they reached the counter. The system performance is increased and speed but the weaknesses is about the hardware to get damaged and not work. | | |

|  |
| --- |
| ***Our solution will address the following weaknesses of above-mentioned solutions.***  The bar-code scanning system for billing which is most time consuming. So we are presenting the solution of billing system, replacing it with automatic billing by scanning the product in trolley since every product has its own identity of RFID card number, RFID tags have Unique products ID that will help to increase performance. |
| ***We will use the following techniques to achieve improvements mentioned above.***  The use RFID reader with Arduino board with ESP8266 that will transmit data to the database and on the trolley the hardware is implemented, That will scan/read the product code in real time and will put the price on the LCD and in data base and will continue to add/remove the prices with respect to corresponding products and adding the total amount and display in LCD installed in trolley. |
| ***Synopsis:*** |

The system that we are making can be used in super marts to minimize the waiting queues at billing counter using RFID technology, system designed this with RFID technology and Arduino, the system requires cost to design. This system displays the added product amount and total amount to the user so this system is easy to use and for user. When the customer scans the product and shows its price and total amount of bill on LCD, When customer want to remove it from the cart it need to be scanned again and then remove it from the trolley. When the customer completes shopping, the data from the hardware is going to transfer to the centralized billing unit through ESP8266 (transmitter), when customer sends the data from trolley hardware to CBU, and customer can have their bill in printed form by providing the Cart ID trolley number, this will save the time of customers and customer will be satisfied.

## Section – 2

* 1. **Background**

**Scope of the Project:**

The aim and objective are to develop RFID based billing system for supermarkets in order to make billing process convenient and easy. Implementing an Automatic shopping cart using RFID technology that will be saving time of customers and improving purchasing. In this RFID card is utilized by the RFID reader in the shopping cart when the customer wants to add product the cost of the product will be shown and the total amount of bill will display on the LCD, when the customer wants to remove the product from the Cart, you need to take product out from the Cart, the amount of that product by scanning it again and gets deducted from total amount. After customer finished shopping, the customer will press send button on the hardware device and the bill will be generated in the database which could be taken by providing the Cart ID trolley number. The main purpose of this system is to make it effectively adaptable for helping the customers, time will be saved at the billing counters avoiding the long waiting queues.

**Literature Review:**

The main purpose of this Project/Idea is to ensure the satisfaction of customers with automated billing system using RFID and ESP8266 communication in hardware. For every product that has an RFID tag which is associated with a UID (unique identification No#). These RFID tags are associated with product in the database, which will be assigned to the products, and every product will not have same RFID tags it will be Unique. There will also be a centralized database and information about the product the product name, product, RFID tags/code, quantity, cost, total amount of the customer cart. LCD will display amount of product added and show the total amount of bill. The purpose is to provide an automatic billing system by using RFID technology and ESP8266 to minimize the long waiting queues and saving time marts.

**PROJECT DESCRIPTION:**

Our idea is of making an Automatic Smart Cart. Assigning RFID tags to the products and RFID reader with an LCD and arduino in the purchasing cart. The customer can see the cost of each product which are added into cart and Total amount. The quantity about the item will be printed in bill, if customers change his mind then he has to scan the product again to remove the product and the bill will be updated, the total bill amount will be displayed on LCD in the Cart. The customer send the data by clicking on the send button in hardware with associated trolley Cart ID number from which the customer will get the printed bill. This will save time and people at billing counter will be reduced, this will save money and time. The smart cart will to make shopping more easy for the customers with improvising comfort for customer.

**Hardware Specification:**

**Arduino Kit:**

This is an Arduino Pro Mini ATmega328 5V 16M Compatible Board. A microcontroller board based on the ATmega168 used as Arduino in hardware.

**RFID Reader:** A radio frequency identification **reader** (**RFID reader**) is a device used to read information from an RFIDtags associated with object, which is used to read tags no# on objects. RFID reader is like transceiver and receiver with the use of radio frequency signals.

**RFID Tags:** Tags are important part of RFID system, because they store the information of the object being tracked. Object information, which has UID is stored in the memory of tags and is accessed via the radio signal of RFID readers. There are different types of Tags.

* Active
* Semi-passive
* Passive

Passive RFID Tagshave no internal power supply since we are using passive tags. Passive tags signals by backscattering method from reader. Passive tags have practical read distances ranging from about 11 cm up to 10 meters.

**Passive Tags (Ranges):**

•LF: 125 kHz – 134.2 kHz: low frequencies,

•HF: 13.56 MHz: high frequencies,

•UHF: 860 MHz – 960 MHz: ultra-high frequencies,

•SHF: 2.45 GHz: super high frequencies

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Frequency Ranges** | **LF**  **125 KHz** | **HF**  **13.56 MHz** | **UHF**  **868-915 MHz** | **Microwave**  **2.45 GHz &**  **5.8 GHz** |
| **Read Range (Passive Tags)** | Shortest 1”-12” | Short 2”-24” | Medium 1’-10’ | Longest 1’-15’ |
| **Data Rate** | Slower | Moderate | Fast | Faster |
| **Ability to read near metal or wet surfaces** | Better | Moderate | Poor | Worse |

# Advantages of Passive Tags:

* Size is Optimized
* Lesser Cost
* More Flexibility
* Ability of Reading from Longer Range
* Lifelong capability.

**Software requirements;**

Programming Languages:

1. Embedded C
2. C#

**Platforms:**

* Visual studio 2015(software)
* MySQL Server(database)

**Functional Requirements;**

**System features;**

* Every product in the mart will have an RFID tag on it.
* There will be a Centralized Server System and Database which holds the information of the products.
* The product RFID tags should be scanned and added to the bill.
* Cart will have an RFID reader with Arduino and ESP-8266 communication.
* When a customer wants to remove any product from the trolley, then that product needs to be scanned again, displays of items bill on the LCD and centralized database will be updated.
* Display Product price and total Bill amount.
* After the payment of money, the Cart will be reset with the button given in hardware. .
* The customer Cart ID will be verified and the product will be count before paying the bill.
* The customer will get the printed form of bill to pay and then items will be packed and customer can leave.

**Non-Functional requirements:**

**System: Easy/Difficult for the Customers:**

This implementation is used to assist a person while shopping and also to avoid standing in long queues and saving time

* Ease of use for customer: since we are using RFID reader and other components it will be new to the customer so it would be difficult for the customer to understand and use for the first time but once they have used it, they will know how to use and will make it easier when they constantly used it.
* The other factor that can affect project is the average time that what time from a customer entering a mart till the customer get bill on the cash counter without any difficulty or error in between.
* The customer can enter many products and remove any at time, since its centralized billing going on the Billing unit the workload of cash counter has been altered and can save 1 person pay and use it for increasing efficiency of product.
* First time customer used the project, some person has ease to understand and some have difficulty but for first time they will be showed how to use it and complete the task of what project is made for.
* As the multiple user will access the system at same time therefore the software need to be efficient and reliable.
* The accuracy of the project is calculated by the accuracy of calculating the bill of the customer.
* Security requirements should be fulfilled by only the data administrator has the rights

To access the database with and ID and password.

* The automatic cart we are making which can add/remove product and update at the same time in database and calculating the total bill of all the customers separately that uses our project in the mart. Performance is that quality that shows you how responsiveness is the system and database updated at equal time and bill is generated in CBU, user interactions with product decides the performance of product. Poor performance leads to negative user experience. The system security can fail when it gets overloaded.

**System Availability:**

* Availability of the product is defined that all the hardware components are available that being used in system the RFID reader, RFID tags, Arduino kit, ESP8266 etc.
* Availability of the services that the RFID reader read the tags and added in the cart which also being edit in database and bill will generate at the CBU and given to the customer, ensures that will work properly.
* Availability of the database and hardware app and CBU work together at the same time.

**System Scalability:**

* It’s being defined that the technology can grow with positive performance and since its increasing in last few years, we can make hardware compatible and software that can take load and database does not fail. The automatic cart we are making which can add/remove product and update at the same time in database and calculating the total bill of all the customers separately that uses our project in the mart.
* The memory size of the system memory can be expanded. Algorithm can be used for the system for giving recommendation for the customers of the products, but we are not using algorithms.

**Current State of the Art:**

**Research & Articles and Projects:**

1. SMART SHOPPING SYSTEM: submitted by MAHANTESH S HIREMATH, MAHANTESH V HOSUR, MALLIKARJUN S MATH, MANJUNATH CHINCHAKHANDI Under the Supervision of PROF.VIJAYALAXMI S. NAGANUR Under the Supervision of PROF.VIJAYALAXMI S. NAGANUR, Department of Computer Science and Engineering 2016-2017.
2. Smart Shopping Trolley Using RFID : submitted by Supriya Sharma, Komal Ambekar, Vinayak Dhole, Tushar Wadekar SKNSITS, Lonavala, Savitribai phule pune University.
3. RFID Based Smart Trolley for Automatic Billing System : submitted by RachanaDoshi, AmritaSutar, SonaliAher, Sanvida Dalvi, Prof. B R Chandani Computer Department SavitribaiPhule Pune University, K.J. College of EngineeringManagement & Research, Pune
4. Design and Implementation of a Smart Shopping Cart by RFID Technology: by Nemalidinne Sai Megana , degree of Master of Engineering in Microelectronics and Embedded Systems

1. Smart Shopping Trolley using RFID Yashashri Pohokar1, Shubhangi Bangadkar2, Sumit Kumeriya3, Manish Dhoble4, Aniket Wanjari5, Akash Chavhan6, Dr.R.A.Burange7, Department of Electronics K.D.K.C.E, Nagpur, India

***Challenges:***

There are and will be challenges after implementation of RFID regarding Radio frequencies to take permission from the local regulations

## Outcomes and Benefits

***Expected Outcomes:***

The system is becoming smarter, the requirement of manpower will decrease, and therefore it’s benefiting the customers, which further adds to the cost efficiency. The time efficiency will increase since this system will eliminate the long waiting queues. More customers can be served in same time thus benefiting the retailers and customers as well, the customer can pay the bill and leave with a smile.

***Key Benefits and Beneficiaries:***

The proposed model is easy to use, for the first time because to add scan the product and to remove again scan the product and when done shopping press the send button on hardware to end bill to the database. As the whole system is becoming smart, the printed bill will generate at the cash counter, the time efficiency will increase, more customers can be served in same time thus benefiting the retailers and customers as well.

***Technology Transfer/Diffusion Approach:***

RFID technology used in the smart cart is use full because it saves time and increase performance as compare to the barcode system.

|  |  |  |
| --- | --- | --- |
|  | RFID (proposed) | Barcode(existing) |
| Read Rate | It can read Multiple tags. it has fast data throughput | Tags can only read one at a time. It has low data throughput. |
| Line of Sight | Line of sight not required | Line of sight not required |
| Read/Write Capability | Ability to read, write, modify,  And update. | Ability to read items and  Nothing else. |
| Durable | Highly durable and better protected. | Less durable. Easily damaged, cannot be read if dirty or greasy. |
| Security | Difficult to change the data which can be encrypted | Easier to change the data and which is changeable.  . |
| Event Triggering | Can be used to trigger certain events (e.g.: alarms etc.) | Not capable can’t be used for events triggering. |

**Objectives:**

This proposed system works on improving customer satisfaction as on customer enter in the super-mart ﬁrst customers take a cart which has a Cart ID number, Cart have hardware application with a RFID reader with Arduino and LCD. Customer wants to add products in the Cart by scanning tags of the product that will be read by the reader. If the Tags matches with the product ID then the cost of that product will be displayed on the LCD in the Cart. If the customer want to remove product from the cart, the customer can take away that product from Cart and scanned again and cost of that product will be reduced from the total amount, and after shopping the products data with total amount gets transferred to the CBU through ESP-8266. The database at the central billing system will be updated when add/remove from the cart. And at the end the customer send the data by pressing send button on hardware, which generate the bill associated with trolley Cart ID. The cashier will verify Cart ID and customer will pay the bill without hectic of queues.

|  |
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| * **Research Objectives:**   **-No**   * **Academic Objectives:**   **-Final Year Project (Automatic shopping cart)**   * **Commercial Objectives:**   -No   * **Other Objectives:**   -No |

|  |  |  |  |
| --- | --- | --- | --- |
| * 1. ***Research Approach:*** No Research Approach   ***Key Milestones and Deliverables:*** | | | |
| ***S.***  ***No.*** | ***Elapsed time since start of***  ***the project*** | ***Milestone*** | ***Deliverable*** |
| *1.* | *Week 01 – 04* | Research of Suitable ideas | Potential Ideas |
| *2.* | *Week 05 – 08* | Brainstorming of Ideas | One specific idea for Project |
| *3.* | *Week 09 – 12* | Preparation of Proposal defense | Approval of Project |
| *4.* | *Week 13 – 16* | Prototype Implementation of Hardware and Desktop application | Final Prototype |
| *5.* | *Week 17 – 20* | Market survey for main Equipment | Budget and Specifications of Hardware |
| *6.* | *Week 25 – 24* | General Discussion of Desktop Application | Design of Desktop Application |
| *7.* | *Week 25 – 28* | Construction of Desktop Application | Finalized Desktop Application |
| *8.* | *Week 29 – 32* | Assembly and Coding of Hardware | Automatic Smart Cart Model |
| *9.* | *Week 37 – 36* | Integration Testing of all modules (software& hardware) | Robust communication between modules |
| *10.* | *Week 37 – 40* | System Testing and Maintenance | Optimized Product |
| *(Please add more rows if required.)* | | | |

* 1. ***Risk Analysis***

|  |  |  |  |
| --- | --- | --- | --- |
| ***Risk*** | ***Likelihood***  ***(Low, Med, High)*** | ***Impact*** | ***Mitigation*** |
| Breaking of Hardware | Medium | The impact will be system will not work | Installing hardware in Cart where any external factor can affect it. |
|  |  |  |  |
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|  |  |  |  |
|  |  |  |  |

***Section – 3***

* 1. ***Resources & Other Requirements***

|  |  |
| --- | --- |
| ***Project Team:*** | |
| ***Title / Position*** | ***Number*** |
| *Team Leads* |  |
| *Researchers / Developers* |  |
| *Researcher / Development Assistants* |  |
| *Support Staff* |  |
| *Contract Staff (please specify)* |  |
| *Others (please specify)* |  |
| *Add more rows if required* |  |
| ***Team Structure:***   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Title/Position**  **(of each member)** | **Role/Key Responsibilities** | **Minimum Qualification Required** | **Expertise / Background Required** | **Minimum Experience Required (years)** | | Ahmed Ali Raza | |  | | --- | | Database/Hardware | | BS(CS) |  |  | | Bilal Ahmed | Desktop App/Hardware | BS(CS) |  |  | | Hamza Arif | Desktop App/Hardware | BS(CS) |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | |  |  |  |  |  | |  |  |  |  |  | | |

***Remarks:***

* + 1. *Name & Signature of Supervisor:*

**MISS RIDAH FATIMA**

* + 1. *Name & Signature of Co-Supervisor:*

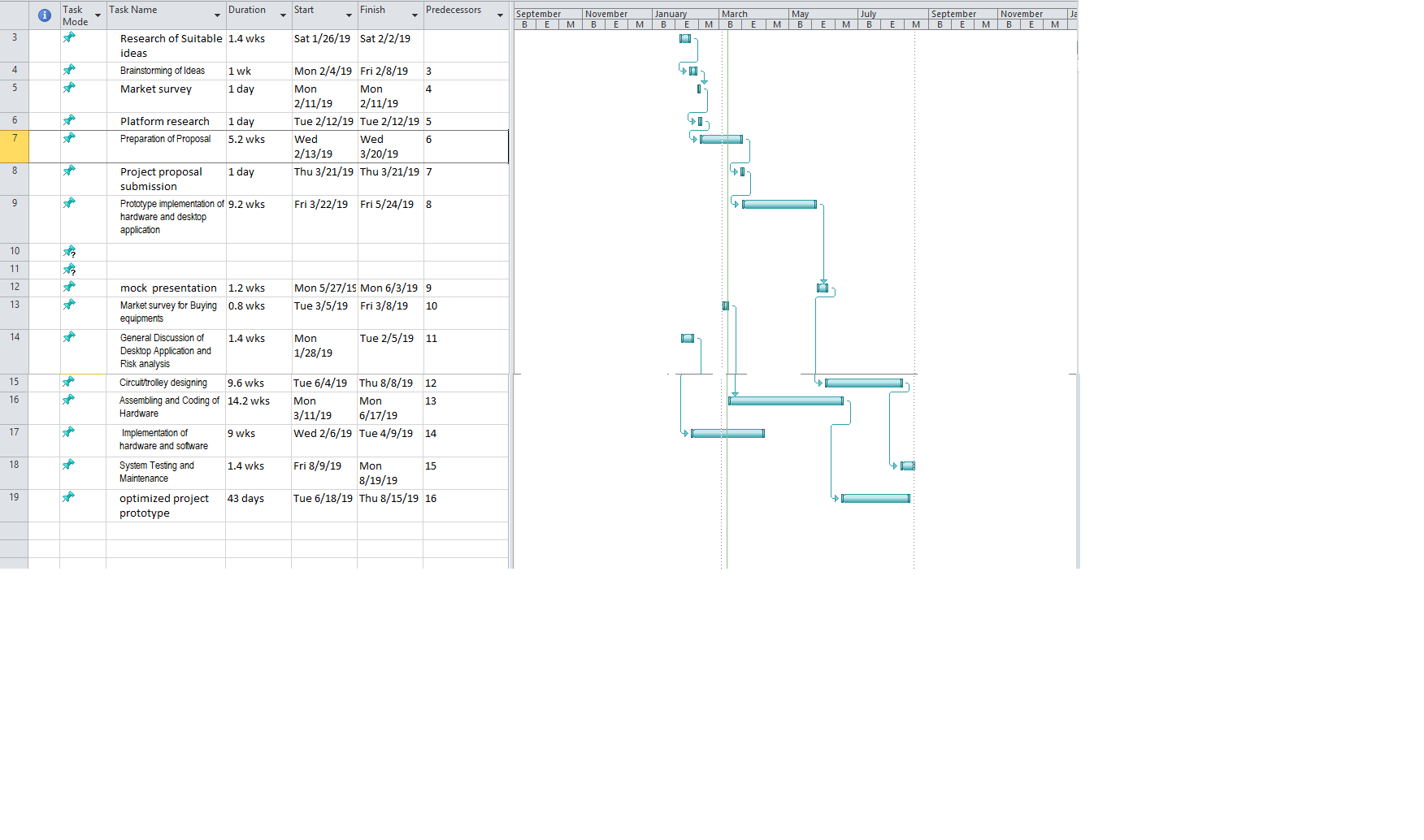
* + 1. *Name & Signatures of FYP Coordinator:*

**DR AARIJ MAHMOOD HASSAAN**

## Annexure–A: Project Schedule / Milestone Chart

***(Project schedule using MS-Project (or similar tools) with all tasks, deliverables, milestones, cost estimates, payment schedules clearly indicated are preferred.)***

***Example:***



## Annexure–B: Proposed Budget

*Please use the embedded Excel Worksheet for providing budget details.*

*Double click the icon to open the worksheet*

|  |  |  |
| --- | --- | --- |
| SR. | Description |  |
|  | Heads Of Expenditure | |  |  | | --- | --- | | Amount (Rs) | Qty | |
| 1 | Arduino KIT | 800---(1) |
| 2 | RFID Reader | 4000----(2) |
| 3 | ESP8266 | 500-----(1) |
| 4 | 12V Battery : | 800-----(1) |
| 5 | Wires : | 300-----(1) |
| 6 | Trolley | 3000------(1) |
| 7 | RFID Tags | 3000-----(50-100) |
| 8 | Display(LCD) | 600------(1) |
|  |  |  |
|  | Total Budget | 13,000 |

[Automatic smart cart (Budget)2019.xlsx](file:///C:\Users\HP\Desktop\FYP\FYP(smart%20trolly)\New%20folder\New%20folder\Automatic%20smart%20cart(Budget)2019.xlsx)

## Annexure–C: Business Canvas Model

***Bibliography:***

***(Resources)***

* *International Engineering Research Journal (IERJ) Volume 2 Issue 3 Page 1418-1421, 2016, ISSN 2395-1621 © 2015, IERJ All Rights Reserved (ISSN 2395-1621) Smart Shopping Trolley Using RFID*
* *International Journal of Engineering Science and Computing, June 2017, Research Article Volume 7 Issue No.6, ISSN XXXX XXXX © 2017 IJESC, RFID Based Smart Trolley for Automatic Billing System*
* *International Journal of Advanced Research in Computer and Communication Engineering ,Volume 4, Issue 3, 2013. “ RFID Based Smart Shopping and Billing ,”*
* *International Journal of Engineering Science and Computing, March 2018, “Smart Shopping Trolley using RFID”, Research Article Volume 8 Issue No.3, ISSN XXXX XXXX © 2018 IJESC.*