**Labor, Cost & Schedule Document**

**Software defined radio**

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*To use this template:*

1. *Replace any red italicized text with your own text. You may add sections as needed for your particular projects, however, you must address each section* **even if NOT APPLICABLE***.*
2. *Enter the project name in the header.*
3. *If your document is very long, break each numbered chapter into its own document section, beginning it on a new page. This will make it easier to replace/update*
4. *Don't forget to update the Table of Contents when finished! (right-click on the table)*
5. *Delete these instructions and any other italicized instructions.*

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*The Labor-Cost-Schedule Document describes*

* *The labor categories needed to complete your project, how much, and their cost*
* *The materials & equipment costs associated with your project*
* *A Gantt Chart of the schedule*

# **Introduction & Summary**

In this Project the end goal is an operational software defined radio for educational

purposes. It will be a half-duplex device operating in the North American High

Frequency Range as allocated by the North American International Telecommunications Union. The radio will be completed by May, 1st, 2018. The estimated cost for Labor is , and the estimated cost for Materials is $180.

*Name your project and give a very brief description, like the Intro from the Functional Spec.*

*State the date when the project will be complete.*

*State a summary of the costs: Labor & Materials and the total cost.*

# **Labor**

## Labor Categories

*List the labor categories and for each category, WHY or HOW it is needed. You may add categories if needed. If a category is not needed then BRIEFLY state why it is not applicable to your project.*

|  |  |
| --- | --- |
| **Project Labor Categories** | |
| **Labor Category** | **Justification** |
| Design Engineer | Optimization of radio frequency interactions with and between components. |
| Lawyer specializing in the FCC | Radio communications in the united states are regulated, and many laws apply to their use, it is important to know exactly what all of those are and how to go about designing the radio within legal bounds |
| Digital Signal Processing Engineer | As much of the fundamental filtering and operation of the radio will be done inside the digital realm of the |
| Test Engineer | Verifying the design is operating correctly and with in applicable law. |
| Technical Writer | Create a detailed and user-friendly user manual for device. |
| Technician | This will be necessary of a build kit goes in to production. A technician will need to be present to keep an eye on the production line. |
| Fabricator/Assembler | Needed to assemble the prototypes for testing. |
| Drafting / CAD | Creating clear and concise schematics for the user’s manual. |
| Marketing Analyst | Identifying the best methods to market the radio to those whom would be interested in buying it. |
| Administrative | Not needed as the device does not have administrative access. |
| Management / Supervision | Organizing contracts, setting time tables for stages of project, and facilitating funding. |
| Digital Signal Processing specialist | Need to create and optimize the digital signal processing done inside the device to limit radio latency. |
| Consulting | Not needed |
| Contractor | Not needed |

## Labor Rates

*Do a little online research to find out what these various labor categories cost. You’ll likely either get an hourly, or annual, salary. If annual, convert to hourly as there are 2,080 working hours in a year.*

*List a burden rate (double the hourly rate).*

***STATE CLEARLY the burden rate and why you chose it.*** *(e.g. median pay for job in industry, mean pay for job at Sponsor’s company, etc.)*

*Then, apply this rate to your labor categories and complete the table.*

|  |  |  |
| --- | --- | --- |
| **Labor Categories and Burdened Hourly Costs** | | |
| **Labor Category** | **Burdened Hourly Cost** | **Justification** |
| Design Engineer | $77.06 | On average Radio Frequency design engineers make $80,140 a year, as this device should not take more then a year in development and testing, and the engineer will not be needed for that time it could be a short-term contract. Unfortunately, those type of contracts tend to be more hourly then the annual salary, thus the burdened hourly cost. |
| Lawyer specializing in the Federal Communications Commission | $114.63 | As this radio is being designed for the United states market it is important all laws, rules, and regulations are followed. To do this a lawyer specializing in those things with respect to the FCC is necessary for a legal radio. |
| Digital Signal Processing Engineer | $82.55 | As the fundamental filtering and operation of this device takes place digitally through digital signal processing this job is necessary and vital. |
| Test Engineer | $63.80 | Detailed and extensive testing of radios are necessary to ensure the radio meets federal and state laws and fall within those limits and bounds. |
| Technical Writer | $70.35 | A technical writer is vital whether we are making a build kit or just posting schematics for sale because if few can understand the design, then few will buy or build it. As this is not a project that needs full time employment paying for a contract-based job at the burden rate could be cheaper over all. |
| Technician | $41.17 | This cost will only be necessary if a radio build kit for our design goes in to production, but if it does it is important the production line does not go down, thus the Technician for as long as is needed. |
| Fabricator / Assembler | $30.77 | This person can be brought on as needed for hourly pay or a contract job, This persons duty is to assemble one or a set number of radios for testing, and as that number is variable and the time required may be limited the burdened hourly cost could be manageable. |
| Drafting / CAD | $52.16 | This job is necessary for the creation of schematics for this radio, as the placement of the components will affect the radios harmonics, and internal radio frequency interference this person should work closely with the radio frequency design engineer for placement and many of these schematics will be presented to the user to facilitate assembly. Thus, paying the burdened hourly cost to keep on a qualified and competent Drafter is vital. |
| Marketing Analyst | $60.15 | This job is important as it will provide information as to where to market our radio to attract the intended audience. Having a market analyst is important for the product to even get off the ground. |
| Administrative | ----- | This job is not required as administrative access for this radio does not exist. |
| Management / Supervision | $64.44 | Organizing contracts, setting time tables for stages of the project, and facilitating funding are all things necessary to the completion and distribution of the radio, Thus having one person whom the team can turn to for leadership and consistency is important. |
| Consulting | ------ | Not needed |
| Contractor | ------ | Not needed |

*General Note: You should include elements related to the and your sponsor in this estimate. It gives a more realistic view of what a project actually costs. Just because you are given free access something does not mean that it can be left off the list.*

*This means including the value of your Sponsor’s time, Faculty Advisor’s Time, equipment, and facilities that you will use, etc.*

*Do NOT ask them their salary; use their job title to estimate it.*

## Total Cost of Labor

*You will fill in the table below. What is shown is an EXAMPLE.*

*Do this by:*

* *Including a column for each labor type needed for your project*
* *Include the burdened hourly rate for each labor type*
* *List the tasks necessary to complete the project in the left-most column*
* *State how many hours are necessary to complete the task, for each labor type,* ***for YOUR project*** *(NOT the numbers below!!)*

<http://www.writingassist.com/pdfs/WAI_EstimatingWritingProjects_V4_1_2011.pdf> *is useful for estimating writing time.*

* *Estimate at least 1 hr of management time per 4 hours of other time.*
* *Multiply out and add them up!*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **LABOR ESTIMATE - DO NOT COPY THIS IS AN EXAMPLE ONLY!!!!!!!!!!!!** | | | | |
|  | **Engineer** | **Test Engr** | **Fabricator** | **TOTAL** |
| Burdened Hourly Rate | $100 | $80 | $40 |  |
| **Task** | **Hours Required** | | |  |
| Project definition | 20 |  |  | $2,000 |
| Functional Specification | 20 | 5 |  | $2,400 |
| Simulation | 40 |  |  | $4,000 |
| Test Plan | 10 | 20 |  | $2,600 |
| Prototype Assembly | 5 | 5 | 40 | $3,650 |
| Characterization | 10 | 30 |  | $3,400 |
| Total Burdened Cost |  |  |  | $35,400 |

*Note: Your table may be larger than this. You may need to put in a ‘section break’ and define the table page to be landscape (layout > breaks > page). Image is everything!*

*How many hours? Each student on the team is expected to put in at least 9 hours a week. Your project duration is about 25 weeks. So each student is about 225 hours, or 675 hours for a three-person team.*

# **Materials**

*Besides labor, your project will require physical items, each of which have an associated cost. You will list them below - not here.*

## Capital Expenses

*A****capital expenditure or expense****is incurred when a business increases its value by spend money on an asset that will be useful longer than one year. It is typically defined to be a purchase of $5,000 or more. An oscilloscope costing $10,000 is a capital expense. $10,000 of soda, paper plates and plastic war for company events would not be capital, but rather, non-capital.*

*Consider the facilities and resources you have previously listed and complete the table.*

|  |  |  |
| --- | --- | --- |
| **CAPITAL EXPENDITURE ESTIMATE** | | |
| **Task** | **Materials** | **Cost** |
| Product Simulation | Hardware accelerator | $7,5001 |
|  | Disk farm | $75,0001 |
| Fabricate prototype | 3D printer | $6,0002 |
| Test bed | LTX Tester | $8,000,0001 |
| **TOTAL** |  |  |

1 Available from Sponsor

2 Available at Texas State University

## Non-Capital Expenses

*A non-capital purchase is usually termed an operating expense such as small spare parts, fuel and lubes, protective clothing etc. So, basically anything that is other than a capital purchase, above, is termed as non-capital. If it will be consumed over the course of your project, or under $5000, consider listing it here.*

*Complete the table as best you can. An EXAMPLE – which MAY NOT apply to your project – is shown.*

|  |  |  |
| --- | --- | --- |
| **NON-CAPITAL EXPENDITURE ESTIMATE** | | |
| **Task** | **Materials** | **Cost** |
| Simulation | PSPICE for PC | $500 |
| Fabricate prototype | Solder kit | $20 |
|  | Cables | $100 |
|  | IC's | $200 |
| Test bed | PC board | $75 |
| **TOTAL** |  | **$900** |

# **Total Project Cost**

*Here we will summarize the costs of the project in tabular form. Copy the totals from the previous three sections.*

|  |  |
| --- | --- |
| **PROJECT LABOR & MATERIALS COST SUMMARY** | |
| **Cost Category** | **Estimated Cost** |
| Labor | $35,400 |
| Capital Expenses | $2,195 |
| Non-Capital Expenses | $20,000 |
| **TOTAL ESTIMATED PROJECT COST** | **$39,895** |

# **Project Schedule**

*The project schedule is your Gantt Chart created in Microsoft Project. It should start with the formation of your team and end with the completion of your project.*

*It must be READABLE! A detailed Gantt Chart will probably need to be presented in landscape view at least; use 11” x 17” paper.*

*See the Primer and “Links to Gantt Chart Tutorials” documents for instruction.*

# **Approvals**

|  |  |  |  |
| --- | --- | --- | --- |
| **Approver Name** | **Title** | **Signature** | **Date** |
|  | Project Manager |  |  |
|  | D2 Project Manager |  |  |