PROFESSIONAL DEVELOPMENT

PRESENTED BY TEAM LP.JS

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- Project Name: Smart Dining Table
- Our project is a computer module with a display for use at restaurant tables. It will contain AI software that will interpret orders spoken by the restaurant patrons seated at that table, and dispatch waiters to bring the required items. This will reduce the inefficiencies of needing to call servers over to the table to make a request and have them relay these instructions back to the kitchen. This can reduce the number of staff needed to operate a restaurant.

STATEMENT OF OBJECTIVES

- Our team's objective for this course were to set regular meeting each weak talking about various topics regarding project development and management
- As a part of our objective, our team had produced couple of well thought project ideas which will serve the purpose of comforting people in various areas like education, dinning, and shopping.
- Techniques such as SWOT and TOPSIS, were able to determine the best project whereas techniques such as A-O-A and Project go/no-go control would make sure the development and finalization and demonstration of the chosen project is successful.

BRAINSTORMING

- Brainstorming is where the group needs to get creative and start thinking out of the box. It might no be easy for everyone to brainstorm ideas, but that is not the case for a group of engineering students who are taught to be thinking out of the box their entire life.
- These following ideas got brought up by members of our group and well discussed before moving further in the process.

1. Smart dining table

- Simple version ($) = Use AI to call waiter, simple drinks, replace forks/plates
- Complex version ($$$) = Use AI to order food + above features

2. Shopping cart deposit

- Take coins or contactless card to withdraw shopping cart; refunded to the person who returns the cart

3. Self-driving shopping carts

- The shopping carts can automatically return to the store to prevent littered carts
- It can go grab your items for you

4. Contactless shopping cart

- Measures its proximity to the customer to follow them throughout the store removing the need to manually move the cart (contactless)

5. Aisle traffic monitoring system

- Tracks how much foot-traffic in each aisle on what day/times

6. Extended keyboard with engineering symbols (μ,Ω,π, etc.)

- Would be used to assist STEM majors with typing symbols in supported text editors by providing an extra set of keys for commonly used math/science symbols.

SWOT ANALYSIS

- SWOT analysis is an organizational tool for evaluating the internal and external factors of your business or organization.

- The SWOT framework, which breaks the project into its strengths, weaknesses, opportunities, and threats, were well written and thought before moving into next area of analysis, which is the TOPSIS analysis.

- The project idea is to create a Smart Dining Table Module which will be accomplished by developing an AI-powered dining restaurant waiter that is conveniently accessible to customers at their table.

STRENGTHS

- AI is a somewhat established technology
- Value proposition for restaurants
- AI is accessible for many languages

WEAKNESSES

- Difficult to train AI
- May not be well-received by non-technology friendly patrons
- Technology might not be advanced enough to implement

OPPORTUNITIES

- May generate the restaurant more income
- May attract new patrons to a restaurant
- Captures a new market segment
- More language support can broaden the customer base to include more groups
- Can be incorporated into a contactless dining experience

THREATS

- Depends on success of restaurant industry
- May get political backlash for replacing human waiters
- Cybersecurity vulnerabilities
- Existing touch screen ordering devices are competitors
- Mobile food delivery already exist

TOPSIS ANALYSIS OF PROJECT IDEAS

- TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) is a multi-criteria decision analysis method.

- It compares a set of alternatives based on a pre-specified criterion. The method is used in the business across various industries, every time we need to make an analytical decision based on collected data.

- The main goal of TOPSIS is to choose the solution that is, on balance, furthest away from the worst case in each category.

DECISION MATRIX

- Decision matrix: Generate a product that maximizes benefit and profit while reducing costs. These values were chosen with the group's best estimates.

	Estimated Cost of Development (Includes Salary)	Estimated cost of Production Per Unit	Estimated Returns per Unit (Markup Price)	Payback Period	Similarity to Existing Products 0–10	Environmental Implications	User Accept-ance / Popularity	Risk of Project Failure
Smart Dining Table	$250K	$300/u	$2K/u	1 yr	8	8	8	8
Smart Shopping Cart	$2M	$3K/u	$4K/u	2.5 yr	9	8	7	6
Extended Keyboard	$10K	$25/u	$50/u	0.5 yr	4	9	7	10

NORMALIZED MATRIX

The values from the Decision table are normalized using Equation 1. Normalization allows the numerical data to be scaled down into the same unit for easier comparison. Normalized data ranges between 0.0 to 1.0.

	Estimated Cost of Development (Includes Salary)	Estimated cost of Production Per Unit	Estimated Returns per Unit (Markup Price)	Payback Period	Similarity to Existing Products 0–10	Environmental Implications	User Acceptance/Popularity	Risk of Project Failure
Smart Dining Table	0.1240	0.0995	0.4472	0.3651	0.6305	0.5534	0.6285	0.5657
Smart Shopping Cart	0.9923	0.9950	0.8944	0.9129	0.7093	0.5534	0.5500	0.4243
Extended Keyboard	0.0050	0.0083	0.0112	0.1826	0.3152	0.6225	0.5500	0.7071

Equation 1

$$R_{ij} = \frac{X_{ij}}{\sqrt{\sum_{i=1}^{m} \left(X_{ij}{}^{2}\right)}}$$

WEIGHTED DECISION MATRIX

Weights in order of columns, left to right
W = [0.25, 0.1, 0.15, 0.1, 0.05, 0.05, 0.1 , 0.2]

	Estimated Cost of Development (Includes Salary)	Estimated cost of Production Per Unit	Estimated Returns per Unit (Markup Price)	Payback Period	Similarity to Existing Products 0–10	Environmental Implications	User Acceptance / Popularity	Risk of Project Failure
Smart Dining Table	0.0310	0.0100	0.0671	0.0365	0.0315	0.0277	**0.0629**	0.1131
Smart Shopping Cart	0.2481	0.0995	**0.1342**	0.0913	**0.0355**	0.0277	0.0550	0.0849
Extended Keyboard	**0.0012**	**0.0008**	0.0017	**0.0183**	0.0158	**0.0311**	0.0550	**0.1414**

APPLYING CRITERIAS

- The best values by criteria (A^*)
- The worst values by criteria (A^-)
- The best values with separation (s_i^*)
- The worst values with separation (s_i^-)
- The relative distances from worst (C_j^*)

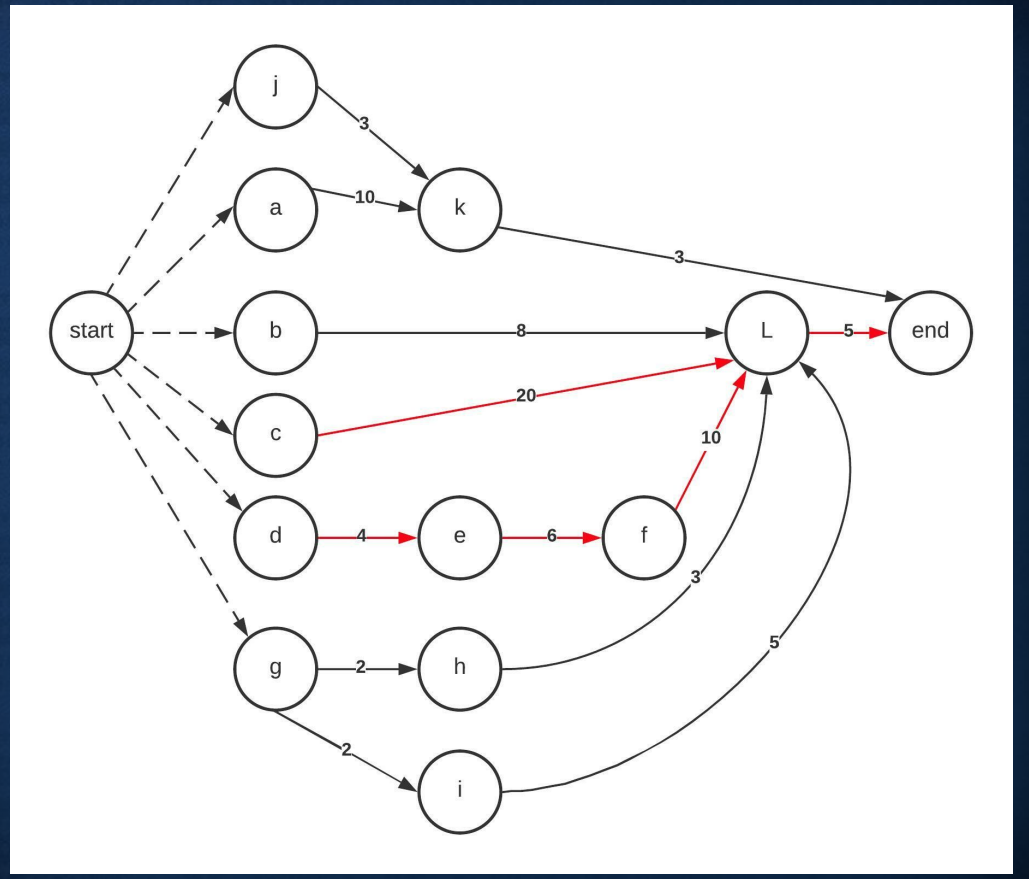
- Based on this, the smart dining table had the highest priority (with 0.7558), followed by the extended keyboard idea (0.6772), and the lastly by the smart shopping cart. Therefore, the smart dining table was chosen as the project to proceed with.

WORK BREAKDOWN STRUCTURE

Activity	Description	Dependency	Time (Days)
a	Find processor and display	-	10
b	Find audio devices	-	8
c	Restaurant database interface/setup	-	20
d	Collect AI dataset	-	4
e	Train AI model	d	4
f	Test and validate AI	e	10
g	UX research study	-	2
h	Design UX flow	g	3
i	Design graphics/audio assets	g	5
j	Design table mount	-	3
k	Design protective casing	a, j	3
l	System integration	b, f, h, i	5

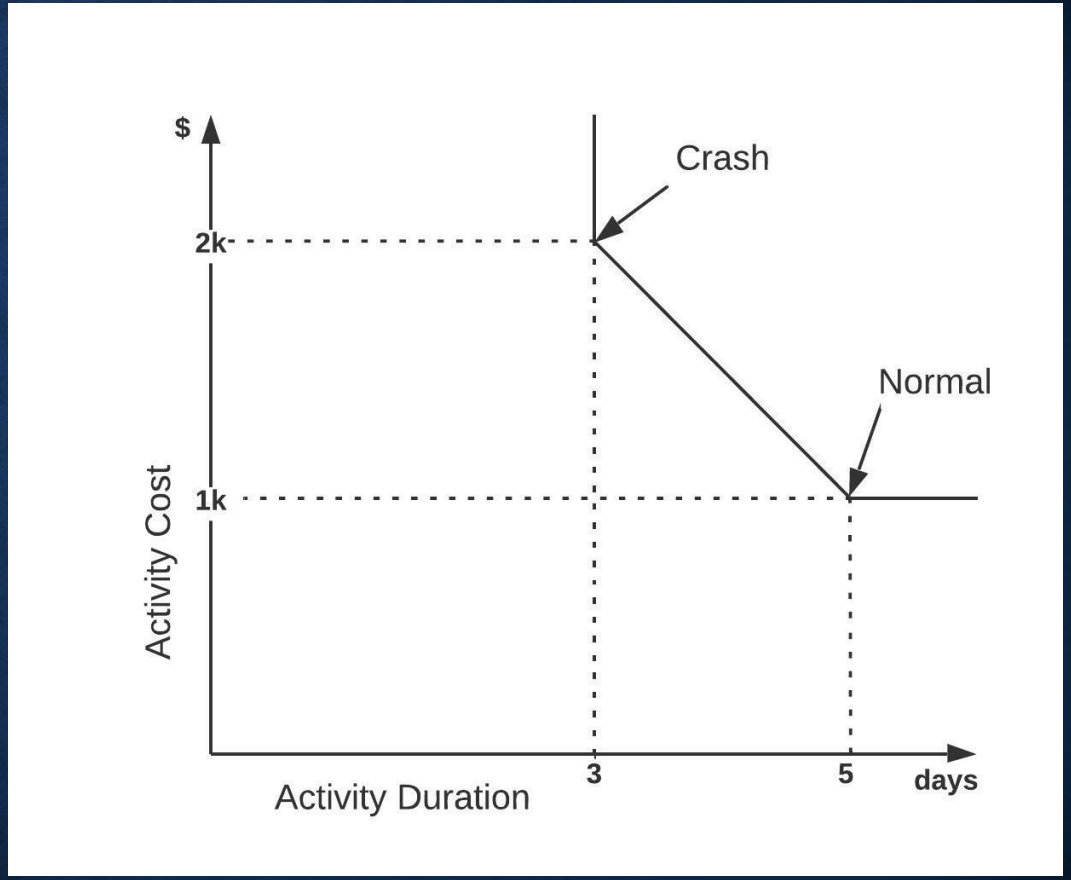
A-O-N Project Network

- The A-O-N network graph is one common way to organize the task network.
- Activity-On-Node is a graphical visualization of all required activities and dependencies.
- Each node represents the start of a particular activity and the weighted edges indicate the duration of Since the activity dependencies are fairly linear, simple inspection yields two critical paths: b–l and d–e–f–l of 25 days total time.



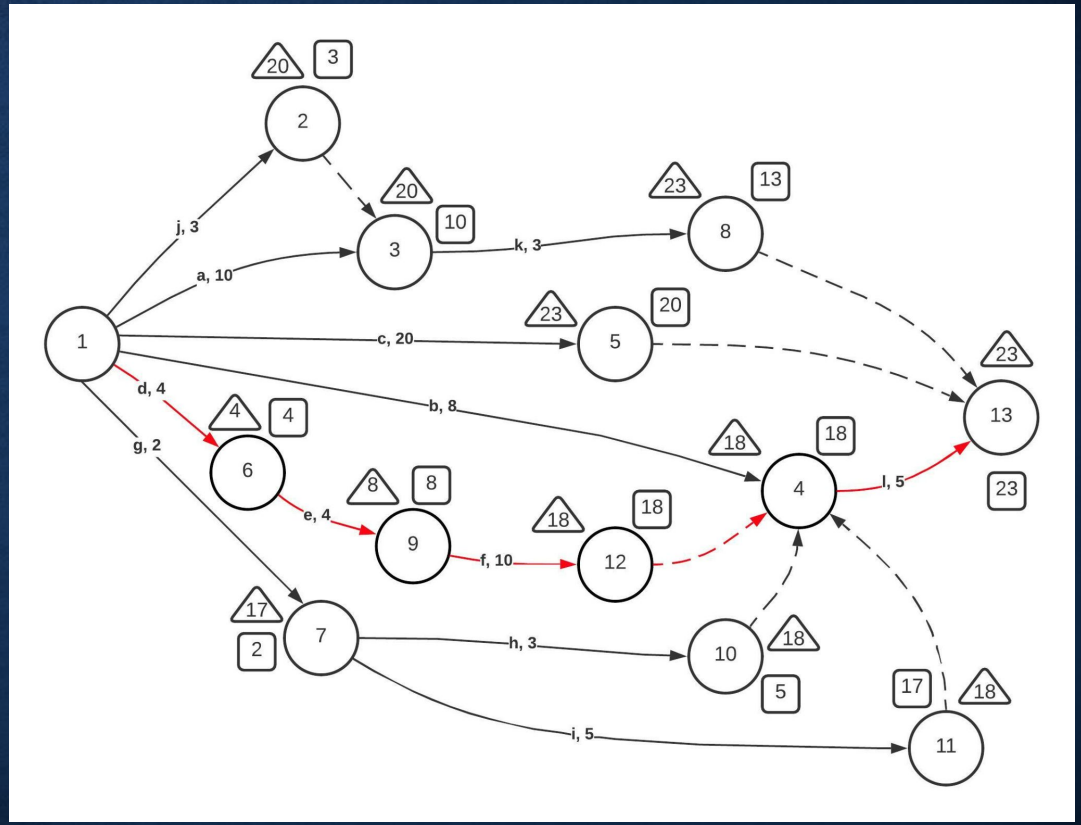
ACTIVITY CRASHING

- Crashing an activity means to expedite it in exchange for investing more resources (typically money)
- Effective strategy to reduce critical path in project networks
- The graph to the right shows crashing on activity i for this project



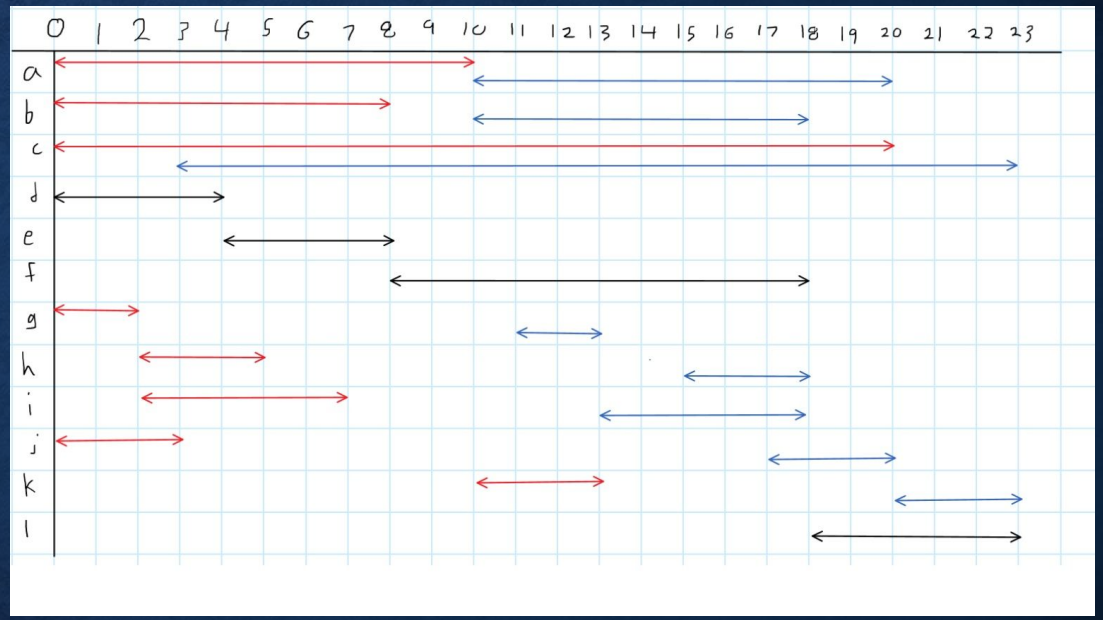
A-O-A Project Network

- Activity-On-Arrow (A-O-A) is a network planning technique that provides an event-oriented representation
- Uses activity dependencies and project's critical path to determine each activity's total float
- Nodes that represent the start and finish of the activities are connected with directed edges that represent the activities and are weighted by their duration



GANTT CHART

- A GANTT Chart shows the project timeline by displaying each activity's start and finish dates
- Red and blue lines display the earliest and latest start to finish dates, respectively
- Black lines display the forced start to finish dates for activities on the critical path



Project Controls

- Our project will use Go/No-Go Control during development
- We will also use Post Control after launch to learn from any mistakes
- Cybernetic Control is not applicable

Critical Ratio Analysis

Task	Actual Progress (days)	Scheduled Progress (days)	Budgeted Cost ($k)	Actual Cost ($k)	Critical Ratio
Finding the processor and display	9	10	20	18	**1.00**
Finding audio interface devices	8	8	14	13	**1.08**
Restaurant database interface setup	23	20	30	22	**1.57**
Collect AI dataset	3	4	20	17	**0.88**
Train AI Model	6	4	40	38	**1.58**
Test and Validate AI Model	11	10	50	44	**1.25**
UX Study / Research	3	2	5	4	**1.88**
Design UX Flow	3	3	7	10	**0.70**
Design Graphical / Audio Assets	5	5	10	7	**1.43**
Design Table Mount	3	3	10	15	**0.67**
Design Protective Casing	3	3	10	12	**0.83**
System Integration	4	5	10	10	**0.80**

CONCLUSION

- Overall, based on the various factors described in this presentation, the smart dining table project is classified as a success.
- This project helped prepare the team for their future careers through experience in project planning. Being able to effectively plan projects is an essential aspect of any business or company. Developing experience in project planning is a crucial component in one's professional development.
- Professional development is an ongoing process that requires continuous practice in various settings, whether it is in an educational environment or even collaboration with fellow professionals.