

Robotics Research Preparation

Assignment: Research Plan

Ikigai

- Japanese for
“Reason for Living”



- Image:
@emmyzen

On Management of Research

- Research goes where it goes
 - Hard to plan
- Light touch management
 - Enough to help
 - Not too constraining



Deliverable

- Written document
 - Maximum ten pages
 - Font 11pt or larger
 - 2cm or more margins all round
 - ***Must use LaTeX, Bibtex and Git***
- Due by 5pm on Friday before Easter break
 - Worth 50% RRP credit

L^AT_EX

Scope

- Aligned to your allocated research project
- Opportunity to refine your topic and plans
- Take input from your supervisor at the outset

Mandatory Table of Contents

1. Aims and Objectives
2. Motivation
3. Literature Review
4. Risk register
5. Timeline
6. References

1. Aims and Objectives

- What's the difference?
 - Aims typically fewer and higher level
 - About your **contribution**
 - Objectives more detailed
 - About **activities**
- Examples
 - Aim: to enable quadrotors to fly through windows
 - Objectives: (1) study window sensing (2) design guidance laws (3) fly a prototype indoors

- No **agreed** distinction
- Consider linking to challenge and technology **axes** (see “Scope” lecture)

1. Aims and Objectives

- Requirements for assignment
 - **Must** be at least a bullet list of one-line points
 - **Must** somehow define the point of your project
- Could be a list of aims, or of objectives, or both
- Feel free to use surrounding text to help...
 - ... but see “2. Motivation” as well

2. Motivation

- Self-explanatory: why?
- Obviously linked to aims and objectives
 - i.e. you must make it obvious
- Provide supporting evidence from literature
 - Don't wait for the review section

3. Literature Review

- See “Publishing” lecture for style tips
 - Do more than just list papers and methods
 - Don’t be obnoxious
- Broad view of relevant state-of-the-art
 - The problem you’re tackling
 - The methods you’re using

4. Risk Register

- **Must** be a table in descending order of risk score
 - Likelihood: 1=not very likely; 4=very likely
 - Impact: 1=hardly any impact; 4=major impact
 - Risk score = (Likelihood) x (Impact)

Risk	Mitigation	Likelihood	Impact	Score
What could go wrong?	What can you do about it?	How likely?	How big a deal?	Product

4. Risk Register

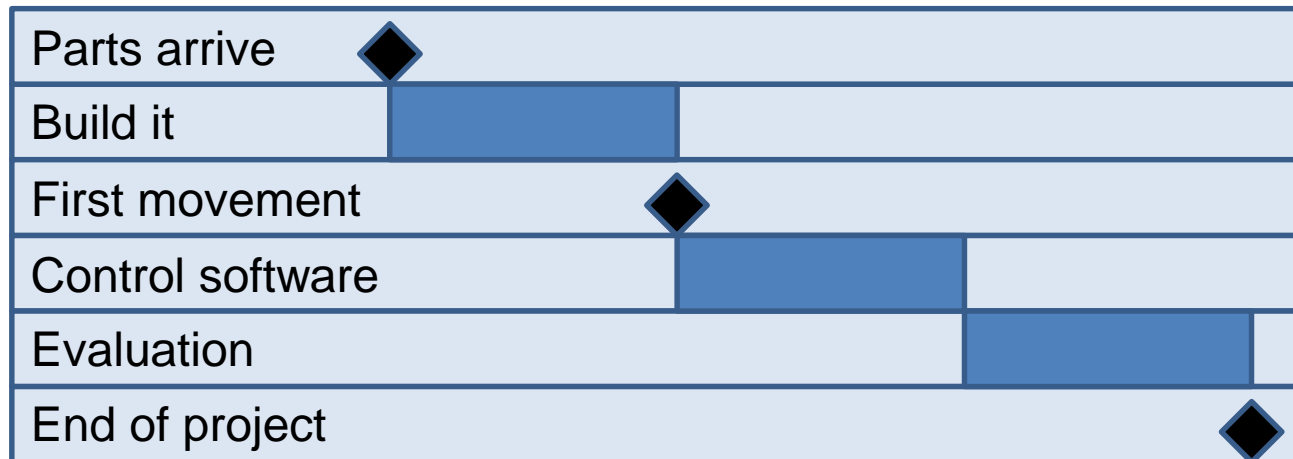
- Recommend you list your top 3 to 6 risks
 - Be sensible and focussed – no asteroids or illnesses
- Anything outside your control could be a risk
 - Late arrival of supplies
 - Dependence on someone else's outcomes
 - Failure of equipment
 - How long you might take to do X

4. Risk Register

- Use this opportunity to ***manage*** your risks
 - Revisit mitigations and plans if scores are high
 - Time can be a mitigation
 - Do X early so there's time to fix or try something else
- Note that this is project risk not safety hazard
 - Project risks affect your ability to meet your aims
 - Safety hazards might injure people

5. Timeline

- **Must** be graphical, typically a Gantt chart
 - Activities
 - Milestones

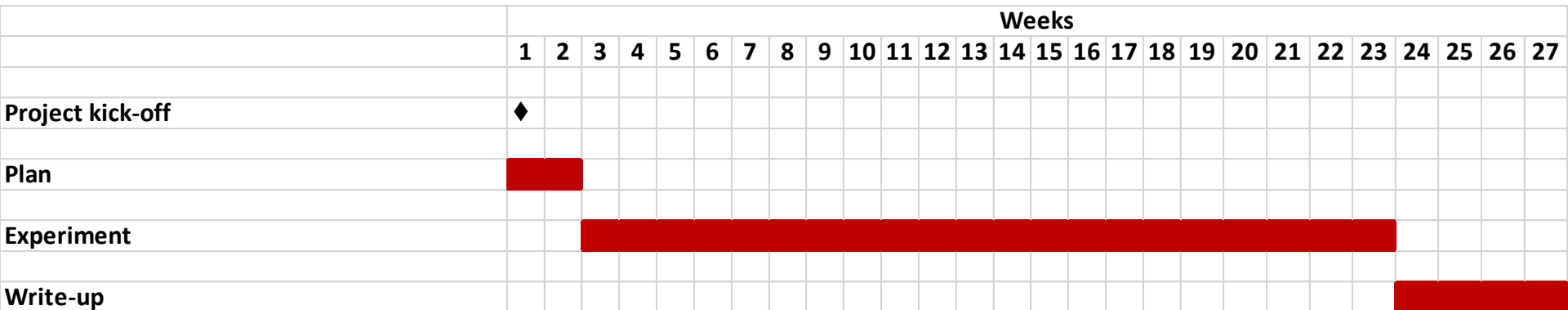


5. Timeline

- A good plan will help you do the project
 - Greatest value is to help monitor
 - You almost certainly won't follow it exactly
 - Plan to help you answer questions
 - Am I on track? Am I ahead or behind?
 - Should I be worried? Can I explore this new idea?
 - Do I need to change my plans? How will I know?
-

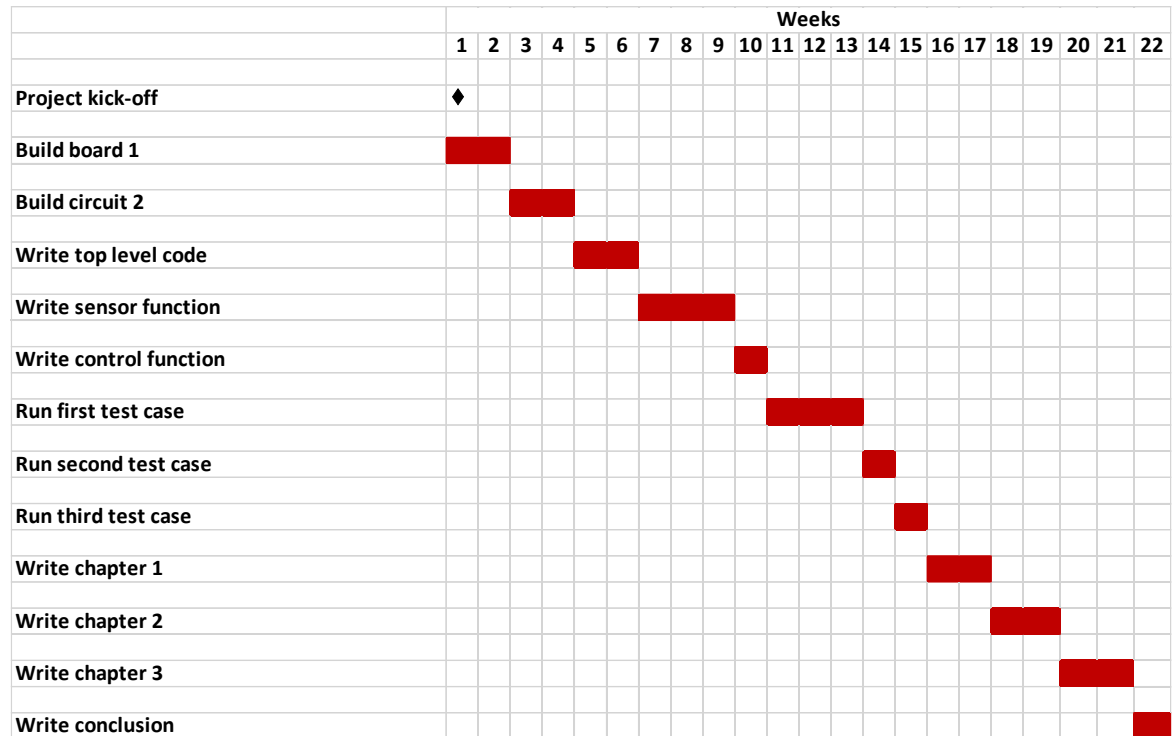
Timeline Examples

- Poor: not much work breakdown
 - How will you know if experiment is going OK?



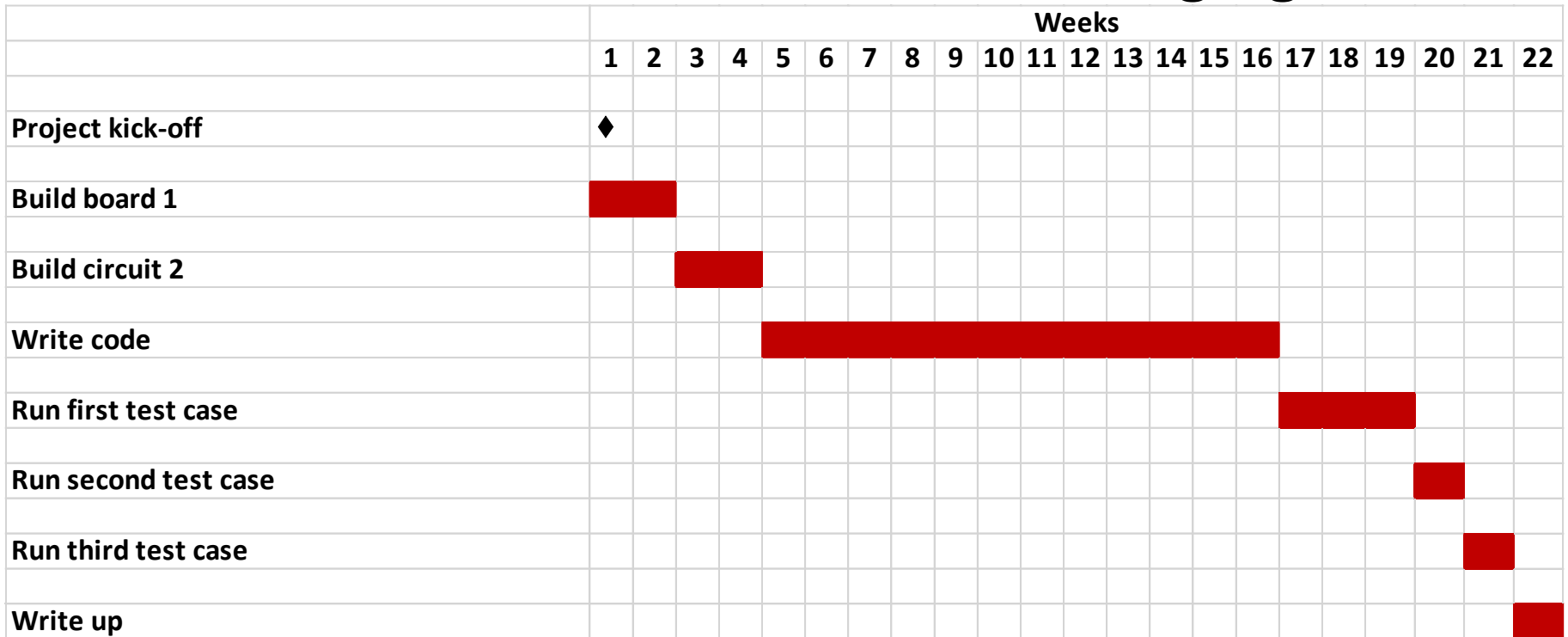
Timeline Examples

- Now too much breakdown
 - Can you really deliver at this pace?
 - Flexibility?



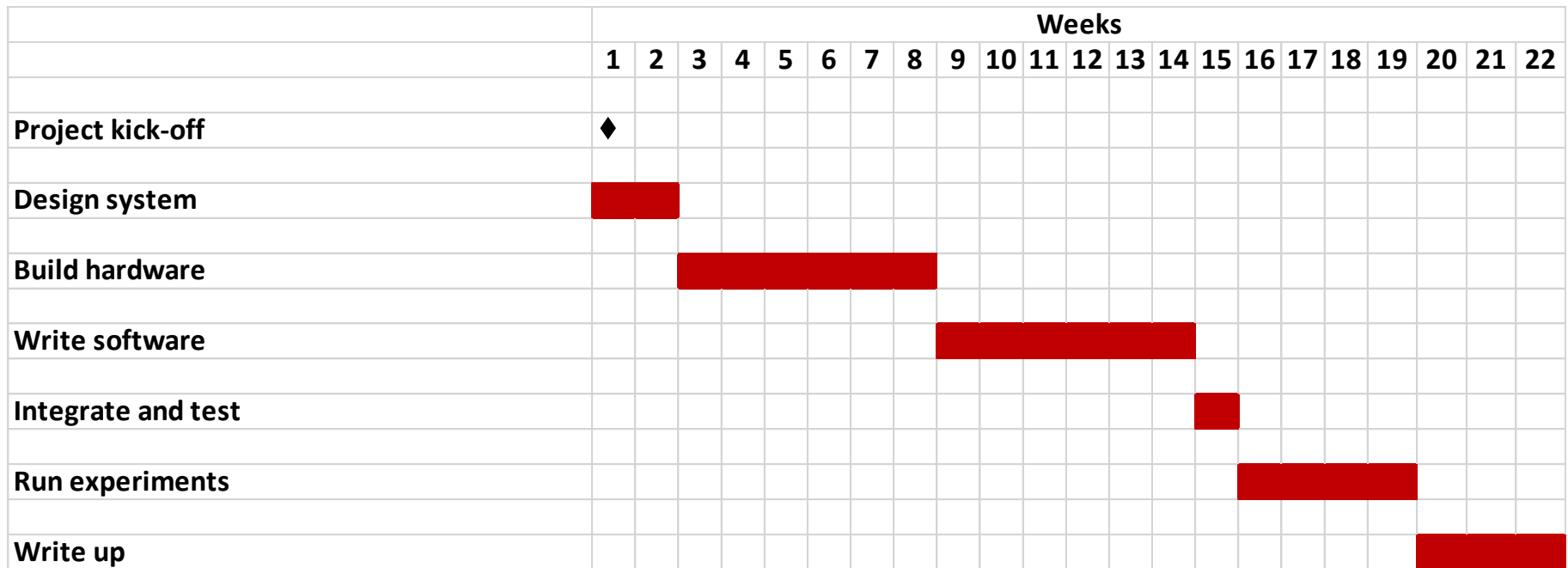
Timeline Examples

- Bizarre mix of over- and under-managing



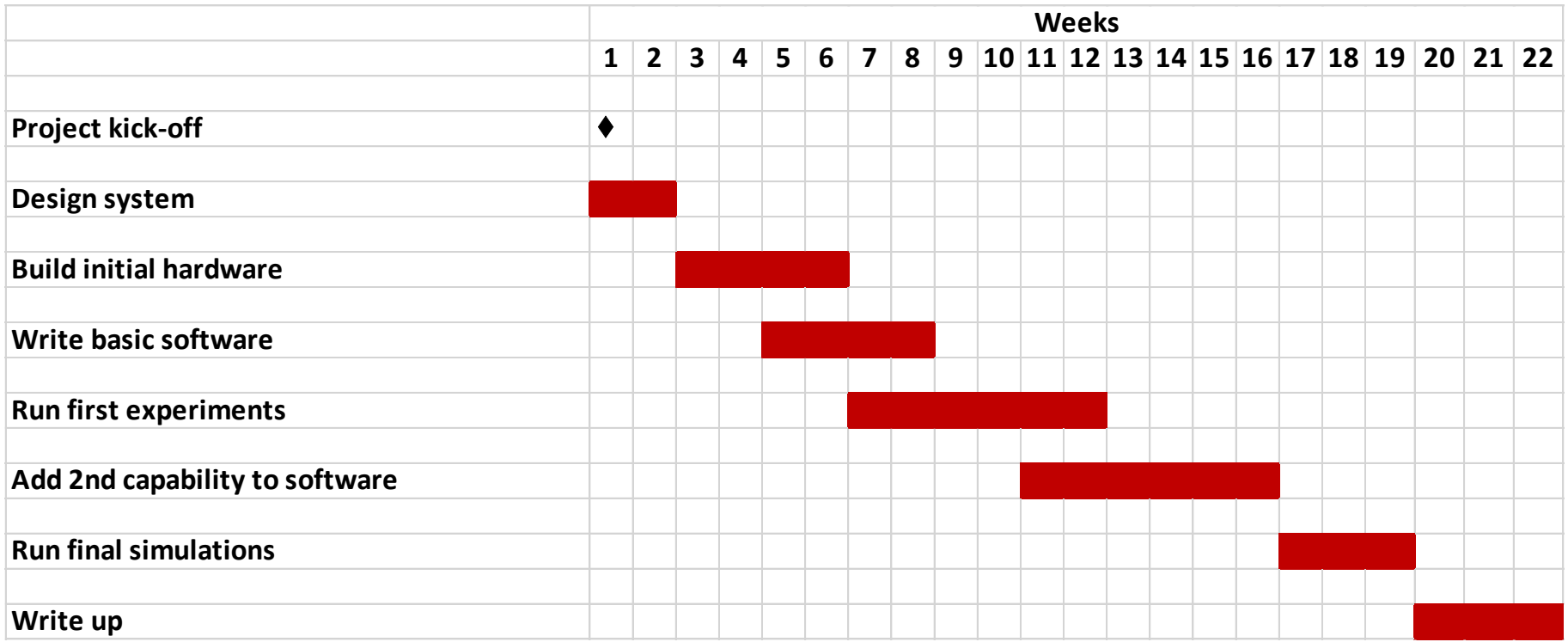
Timeline Examples

- Optimist! Testing is there to find problems



Timeline Examples

- Overlaps add flexibility, but don't double time!



Timelines for Bigger Projects

- Work packages
 - Used to group activities
 - Assigned team members and effort levels
- Deliverables
 - Key milestones tied to contract
 - No deliverable → no money

Role of the Timeline

- Don't slavishly stick to the plan
- *Use* the plan to help you monitor progress
- Revisit the plan as you need to

Timeline: Writing Up

- Tell your reader what you have learnt
 - Not the story of how you learnt it
- Allow time for plugging holes
 - Often find problems during writing
- Motivating to Write is Hard
 - Closing vs opening

Mandatory Table of Contents

1. Aims and Objectives
2. Motivation
3. Literature Review
4. Risk register
5. Timeline
6. References

	To <i>pass</i> , you must	For <i>merit</i> , you must also	For <i>distinction</i> , you must also:
Aims and Objectives	Write some sensible aims and/or objectives	Write a good number of clear aims and/or objectives	Neatly define project with concise aims and/or objectives
Motivation	Sensibly justify your project	Provide an evidence base for your project	Make a clear, concise case for your project
Literature Review	Show that you have read appropriate papers	Provide a good summary of relevant literature	Clearly relate your project to the state of the art
Risk Register	Identify sensible project risks	Identify and rank all significant risks	Effectively manage all significant risks
Timeline	Divide project into feasible sequence of activities and milestones	Define clear, efficient sequence of activities and milestones	Propose a usable, robust plan in appropriate level of detail

Self-Consistency is Key

- Surprisingly easy to get wrong
 - Solve world hunger by automating caviar production
 - Test two months of software development in a week
 - Big hardware risk at the very end of the project
 - Lengthy details of pointless background literature
 - Reader misses the point of a new method
 - Top tip: develop the plan *as a whole*
-

Self-consistency is key