Project Plan: Grid Frequency Control with 5G Communication

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# 1. Subsystem Division

The project is divided into four subsystems:  
  
PHIL Lab Familiarization (A)  
- Understand lab equipment (RTCs, DGs, Grid emulator).  
- Learn Simulink control logic.  
- Conduct hands-on sessions.  
  
5G Communication Setup (B)  
- Configure BTU’s private 5G network.  
- Integrate 5G modems with PHIL hardware.  
- Test latency and reliability.  
  
System Integration (C)  
- Establish UDP communication between Grid and DGs.  
- Deploy frequency control algorithm.  
  
Testing & Analysis (D)  
- Compare 5G vs. wired communication.  
- Analyze performance metrics (latency, reliability).

# 2. Task Breakdown

| Subsystem | Task ID | Task Description | Duration | Assigned to | Dependencies |
| --- | --- | --- | --- | --- | --- |
| A | TA1 | Study PHIL lab equipment via Moodle | 1 week | SK | None |
| A | TA2 | Learn Riya’s Simulink model | 1 week | SK | None |
| A | TA3 | Hands-on lab session | 1 week | SK | TA1, TA2 |
| B | TB1 | Configure 5G network (Rolando’s code) | 1 week | LB | None |
| B | TB2 | Integrate 5G modems with PHIL | 2 weeks | LB | TB1 |
| B | TB3 | Test 5G latency (iperf3, Wireshark) | 1 week | LB | TB2 |
| C | TC1 | Set up UDP communication | 2 weeks | LB | TA3, TB3 |
| C | TC2 | Confirm control logic with Riya | 1 week | SK | TA2 |
| C | TC3 | Deploy frequency control algorithm | 2 weeks | SK | TC1, TC2 |
| D | TD1 | Baseline testing (wired) | 1 week | SK | TC3 |
| D | TD2 | 5G performance testing | 1 week | LB | TC3 |
| D | TD3 | Statistical analysis & final report | 2 weeks | SK + LB | TD1, TD2 |

# 3. Task Organization

Order of Subsystems:  
Slot 1 (Weeks 1–4): Subsystem A (SK), Subsystem B (LB)  
Slot 2 (Weeks 5–8): Subsystem C (SK + LB)  
Slot 3 (Weeks 9–14): Subsystem D (SK + LB)  
  
Parallel vs. Serial Tasks:  
Subsystem A: TA1 → TA2 → TA3 (serial)  
Subsystem B: TB1 → TB2 → TB3 (serial)  
Subsystem C: TC1 (LB) and TC2 (SK) in parallel → TC3 (SK)  
Subsystem D: TD1 (SK) and TD2 (LB) in parallel → TD3 (joint)

# 4. Gantt Chart

Task Schedule by Week:  
TA1 (SK): Week 1  
TA2 (SK): Week 2  
TA3 (SK): Week 3  
TB1 (LB): Week 1  
TB2 (LB): Weeks 2–3  
TB3 (LB): Week 4  
TC1 (LB): Weeks 5–6  
TC2 (SK): Week 6  
TC3 (SK): Weeks 7–8  
TD1 (SK): Week 9  
TD2 (LB): Week 10  
TD3 (SK+LB): Weeks 11–12  
Final Report: Weeks 13–14

# 5. Risk Mitigation

- Delays: Buffer time in Weeks 12–13 for troubleshooting.  
- Communication: Use shared tools (GitHub, Google Drive) for real-time updates.  
- Coordination: Weekly sync meetings (Wednesdays, 15:30–17:00).

# 6. Deliverables

- Functional PHIL-5G integrated system (Week 8)  
- Comparative analysis report (Week 14)  
- Presentation slides and demo video (Week 14)







