GPS tracking based lighting using Raspberry Pi

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Objective: To automatically turn on/off appliances based on the GPS location of the user by controlling the pins on the raspberry pi

Motivation:
• Convenience in today’s fast paced world
• Saves time, energy ; users forget to turn off appliances when they leave

Related work:
• Controlling lights using webIOPi
• GPRS module on RPi
• Getting GPS using location listener
HW components:

- 8-channel relay: to supply 12V to the buttons of the remote

SW components:

- Mobile app:
  - User can set preferences
  - Gets GPS location using location listener service and transmits to IP address
  - TCP socket connection
Integration and Implementation:

• Mobile app tracks GPS location and accepts user preferences
• The information is transmitted through TCP socket connection to an IP address, port using the internet
• A TCP server is setup on the raspberry pi, listens on the same port
• The GPS coordinates and the user preferences are received and distance is calculated using Haversine formula
• If distance within a certain range (say 10m) → Turn on pins of raspberrypi based on preferences
• Rpi controls buttons of remote through relay
• The remote turns on the corresponding appliances
Problems faced:

• HW: The remote control needs a 12V supply whereas the raspberry pi gives out a maximum of 5V
• SW: Couldn’t integrate both the GPS tracking and the UI for user preferences in the same application. Hence we created a background process which continuously tracks the GPS and the android application saves the user preferences
• GPS reliability

Results:

• Customized preferences can be set at any point by user
• Accuracy: offsets of 10m
• Battery: Low battery consumption

Able to turn on/off appliances successfully based on GPS location and user preferences